California Energy Alliance

2023 Fall Member Meetings – Day 2

November 16, 2023, 8:00 a.m. - 4:00 p.m.

Welcome & Meeting Overview

Josh Dean, CEA Executive Director

CEA Antitrust Statement

The purpose of the CEA is to explore avenues of mutual interest and cooperation in building energy policy. It is important to recognize that these activities are subject to certain legal limits imposed by state and federal antitrust laws. One central concern of these laws is with combinations or agreements in restraint of trade whereby competition is reduced by design. In the course of all CEA activities, discussions among members involving pricing, sale terms, territories, production or other aspects of competition, must be avoided. In the event any member ever feels that the course of Alliance activities or statements or actions in Alliance meetings is headed into such an area, members should raise the issue immediately so that further discussion of such matters can be suspended pending receipt of advice satisfactory to the members that the topics addressed do not give rise to antitrust problems.

Agenda

Morning Session

8:00 a.m.	Breakfast
8:30 a.m.	Welcome, Meeting Overview, and Day 1 Recap • *Josh Dean, CEA* • *Kelly Seeger, Signify, CEA Interim President & Board Chair*
9:00 a.m.	Roundtable: PLETICS and REAL EPIC Projects • *PLETICS Project Team – Katie Gladych, CalPlug; Keith Graber & Manuel Lopez, CLTC; Bingbing Li, CSUN* • *REAL Project Team – Nicole Hathaway, CLTC*
10:30 a.m.	Break (5 minutes)
10:35 a.m.	2025 Energy Code Development • *Bernadette Boudreaux, CEA*
11:55 a.m.	Morning Session Wrap-up • *Josh Dean*
12:00 p.m.	LUNCH / BREAK

Agenda cont.

Afternoon Session

1:00 p.m.	Overview of Afternoon Session • *Josh Dean*
1:05 p.m.	Working Group Breakouts • *All* • *Discuss involvement with updated CEA Strategic Plan* • *Develop Work Plans for 2024*
2:40 p.m.	Developing a Coordinated Effort for 2024 • *All* • *Brainstorm New Strategic Priorities, Identify Research Needs & Opportunities, and Develop Action Items*
3:50 p.m.	Afternoon Session Wrap-up • *CEA Leadership*
4:00 p.m.	Adjourn

Day 1 Recap

All

Day 1 Highlights

- 2024 Way of Working
  - OBP Strategic Objective
  - Govt Affairs, C&S, and Compliance & Enforcement WGs
  - Member Engagement
- Convening Discussion
  - How big is the compliance & enforcement issue
  - Stopgap solutions vs long term solutions
  - Noncompliance evaluation
- 2024 Advocacy
  - Meet w/ legislators between now and end of year
  - Discuss/propose OBP bill

Roundtable: PLETICS & REAL EPIC Projects

Project Team Members

California Energy Alliance

Roundtable: PLETICS & REAL EPIC Projects

CEA Member Meetings

California Lighting Technology Center

November 16, 2023

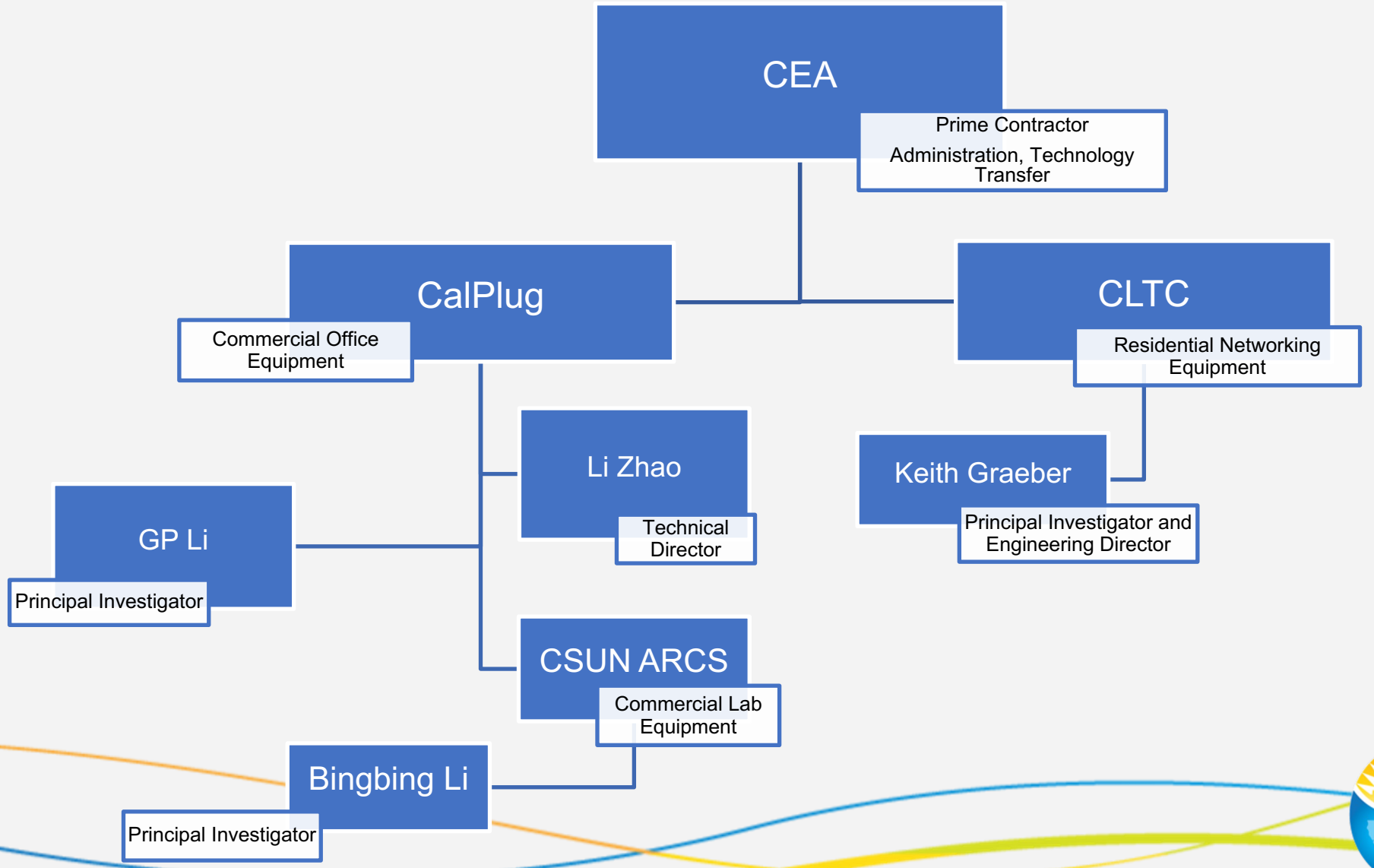
Roundtable Purpose

- Provide industry stakeholders with an update on two California Energy Commission (CEC) Electric Program Investment Charge (EPIC) research projects focused on potential energy savings from unregulated plug loads (PLETICS) and renewable energy & advanced exterior lighting systems (REAL).

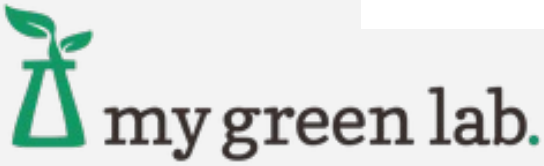
- The Project Teams look to gather information on stakeholder needs and concerns with the proposed plug load testing procedures and exterior advanced lighting prototypes. Additionally, the Teams will seek industry stakeholder feedback to ensure the codes & standards recommendations address identified gaps in the market.

Plug Load Energy Testing to Inform Codes and Standards (PLETICS)

Project Team



Technical Advisory Committee



xergyconsulting

PLETICS - Goals & Objectives

Project Goals:

- Identify non-covered plug load devices with the most potential to inform future C&S for energy efficiency or load management
- Develop C&S recommendations and standardized test procedures to quantify their energy use for compliance purposes.

Project Objectives:

- Identify plug load devices with the most potential for cost-effective energy savings
- Develop test procedures to reliably quantify energy use & related performance attributes for compliance purposes
- Test devices to determine energy consumption in active, standby, sleep, idle and/or other operating modes
- Analyze test data and extrapolate results to determine specific C&S opportunities
- Model the impact of the C&S recommendations to determine statewide savings and related impacts.

Technical Tasks & Products

TASK 2 Preliminary Market Assessments and Product Selection

Assess the three selected device types of laboratory equipment, commercial office equipment, and residential networking equipment and create a plan to evaluate energy savings opportunities and device sourcing.

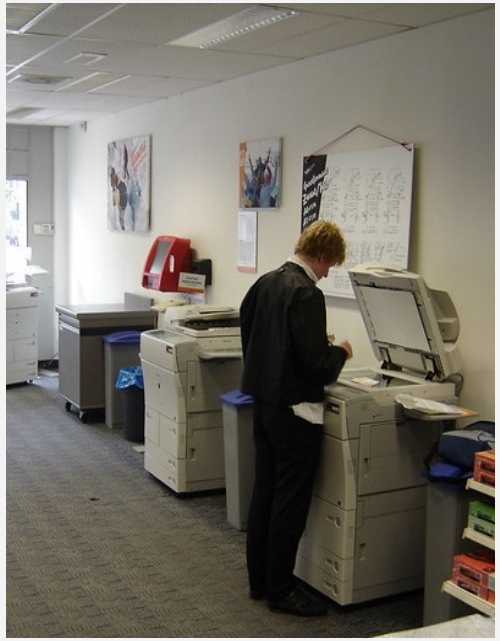
Task 2.1 Device Review and Assessment

Product: **Market Assessment Report** *(List device types, current and projected future market, international and domestic codes and standards, manufacturer voluntary agreements, government mediated voluntary agreement/labeling programs, and energy usage information for the devices)*

Product: **Device Type List** *(Details for considered devices)*

Task 2.2 Device Segmentation and Analysis

Products: **Plug Load Devices: Market Assessment and Energy Savings Opportunities Report** *(Incl. market assessment, research on features that impact energy use, preliminary energy savings estimates, and recommendations for product selection)*



Technical Tasks & Products

TASK 3 Develop Product Test Procedures

Develop procedures for testing the three plug load device types and models/products identified and selected under Task 2. Considerations will include common subsystems contributing to energy use within each device type and opportunities for savings at the device level, which can be achieved by adopting commonly available architectures, components or operating modes.

Task 3.1: Plug Load Device Testing - Planning

Product: Plug Loads: Component Opportunities and Potential Savings Report *(Incl. assessing features, components, usage patterns, and user interfaces for energy savings)*

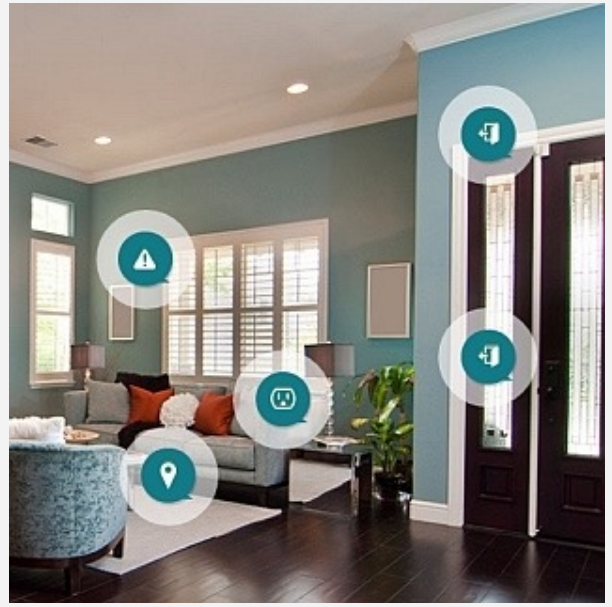
Task 3.2: Test Procedure Development

Product: Plug Load Devices: Proposed Test Procedures *(Incl. selecting 15+ devices, developing test procedures building on existing protocols, considering forthcoming trends)*

Task 3.3: Device Sourcing

Product: Product Test List and Inventory *(Details of specific sourced devices)*

Product: CPR Report #1



Technical Tasks & Products

Task 4 Product Testing And Analysis

Test selected devices, analyze results, identify opportunities for codes and standards based on results, model energy impacts of code change recommendations to understand statewide impacts.

Task 4.1: Device Testing

Product: Test Results Report *(Dataset with power consumption during low power and idle modes, total energy consumption, connected devices interactions, differences across devices, root causes)*

Task 4.2: Results Analyses

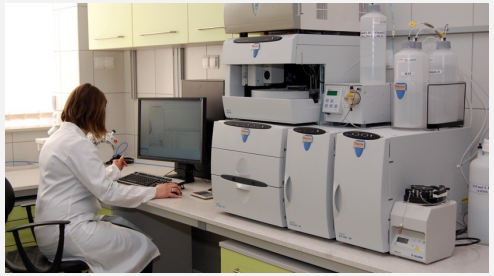
Product: Test Results and Recommendations *(Draft of complete results, analyses and interpretations, recommendations for codes and standards)*

Product: Technical Report on Testing Procedures *(Test procedures and instructions for each device)*

Task 4.3: Model Measures and Estimate Savings

Product: Plug Loads: Codes and Standards Impacts Report *(Incl. energy-use model, statewide energy savings and cost-effectiveness analyses using model, summary of findings and recommendations)*

Product: CPR Report #2



Project Benefits & Knowledge Transfer

Task 5 Evaluation of Project Benefits

Capture, evaluate, and report the benefits of the project.

Products: Mid-term and Final Project Benefits Questionnaire

Task 6 Technology/Knowledge Transfer Activities

Ensure the scientific and techno-economic analysis and tools developed are utilized in the energy policy, and/or planning decisions

Products: Knowledge Transfer Plan and Transfer Summary Report

Activities:

- Industry Feedback & Development
- Stakeholder Education
- Codes & Standards Development

Project Schedule

4	Product Testing & Analysis			
4.1	Device testing	CPR Meeting #2	Test Results Report	~~2/28/2023~~ ~~4/30/2023~~ ~~6/30/23~~ **11/15/23**
4.2	Results analyses		Test Results and Recommendations	~~5/1/2023~~ ~~7/11/2023~~ **1/31/2024**
			Draft Technical Report on Testing Procedures	~~5/1/2023~~ ~~7/1/2023~~ ~~8/11/23~~ **2/29/2024**
			Final Technical Report on Testing Procedures	~~6/1/2023~~ ~~9/1/2023~~ **3/31/2024**
4.3	Model Measures and Estimate Savings		Plug Loads: Codes & Standards Impacts - Report	~~6/30/2023~~ ~~8/31/2023~~ **4/30/24**
			CPR Report #2	~~7/15/2023~~ ~~9/15/2023~~ **5/15/2024**
5	Evaluation of Project Benefits		Kick-off Meeting Benefits Questionnaire	~~3/25/2021~~ **4/1/2021**
			Mid-term Benefits Questionnaire	~~6/30/2023~~ ~~8/31/2023~~ **12/31/2023**
			Final Meeting Benefits Questionnaire	~~5/1/2023~~ ~~3/15/2024~~ **9/11/2024**
6	Technology/Knowledge		Draft Knowledge Transfer Plan	~~6/1/2022~~ ~~8/1/2022~~ ~~4/14/23~~ **11/15/23**
	Transfer Activities		Summary of TAC Comments	~~8/31/2022~~ ~~10/31/2022~~ ~~5/1/23~~ **12/15/23**
			Final Knowledge Transfer Plan	~~9/30/2022~~ ~~11/30/2022~~ ~~5/10/23~~ **12/31/23**
			Draft ~~Technology~~ **Knowledge** Transfer Summary Report	~~9/1/2023~~ ~~11/1/2023~~ ~~1/1/24~~ **8/1/24**
			Final ~~Technology~~ **Knowledge** Transfer Summary Report	~~12/15/2023~~ ~~2/15/2024~~ **8/31/2024**
			High Quality Digital Photographs	~~8/30/23~~ ~~10/31/2023~~ **3/31/24**

Device Categories – Testing Updates

- Commercial Office Equipment
  - California Plug Load Research Center
- Residential Networking Equipment
  - California Lighting Technology Center
- Commercial Laboratory Equipment
  - California State University, Northridge

CalPlug: Commercial Imaging Devices

- Device selection (commercial imaging devices): Desktop laser printers; desktop laser MFDs; freestanding color MFDs; freestanding monochrome MFDs; desktop color inkjets
- Market and technology review assessment
  - Device features; unit energy consumption data; installed base; market growth rate
  - Current voluntary agreements and labeling programs
- Device sourcing (mostly in UCI buildings)
- Test Approaches and Methodologies
  - Existing solutions – Start with ENERGY STAR test method
  - Power management / Low power mode usage/Power factor
  - Uncover solutions
- Testing phase
  - Use HOBOware meters to record W, Wh, Power Factor (PF), Voltage (V), Current (A) and Apparent Power (VA)

CalPlug: Commercial Imaging Devices

Market Data: Laser Printers and MFDs

Device Type - TEC Method (EP)	Speed/ Images per Minute (ipm)	UEC: TEC (kWh/yr)	Market Size ($ Millions)	Compound Annual Growth Rate (CAGR) 2021-2026
Monochrome Non-MFD	s ≤ 20	< 20	39,208 (All lasers)	3.6% (All lasers)
	20 < s ≤ 40	8.84 - 27.04		
	40 < s ≤ 60	18.2 - 46.28		
	60 < s ≤ 135	37.44 - 47.84		
	s > 135	>900		
Monochrome MFD	s ≤ 20	<15		
	20 < s ≤ 40	9.88- 30.68		
	40 < s ≤ 60	20.8 - 49.92		
	60 < s ≤ 80	35.88 - 76.96		
	s > 80	75.4 - >100		
Color Non-MFD	s ≤ 20	17.68		
	20 < s ≤ 40	10.92 - 38.48		
	40 < s ≤ 60	22.88 - 45.76		
	s > 60	> 452		
Color MFD	s ≤ 20	9.88 - 10.4		
	20 < s ≤ 40	12.48 - 32.76		
	40 < s ≤ 60	23.92 - 50.44		
	60 < s ≤ 80	53.04- 447.2		
	s > 80	>500		

Market Data: Inkjet MFDs

Device Type	Speed (ipm)	UEC: Power in Sleep Mode (W)	Market Size Estimate 2026 ($ millions)	CAGR 2021-2026
Monochrome Non-MFD	20-24 ipm	0.6- 0.9	13,854 (All inkjets)	3.3% (All inkjets)
Monochrome MFD	20-24 ipm	0.6 - 1.1		
Color Non-MFD	01-25 ipm	0.5 - 1.6		
Color MFD	04-10 ipm	0.2 - 4.3		

Selected Devices: Published Energy Consumption

UUT	Speed (ppm)	Advertised Power Consumption	Advertised TEC (kWh/wk)
Large Color MFD 1	60	Active: <1,584 W; LPM: 0.59W Auto Off: N/A	0.762
Large Color MFD 2	55	Active: 787 W avg. LPM:95 W avg. Auto Off: 1.2 W avg.	N/A
Large Color MFD 3	31	Active: < 1,300 W; Sleep Mode: 0.65W	0.37
Large Color MFD 4	26	Active: <750 W LPM: <82 W Auto Off: <4 W	N/A

Selected Devices: Measured Energy Consumption

UUT	Active Average (W)	Sleep Average (W)	Off Energy (W)	TEC (kWh/wk)
Large Color MFD 1	22.63	8.926	0.849	2.35
Large Color MFD 2	22.0	5.85	0.43	1.87
Large Color MFD 3	8.44	6.67	0.31	1.43
Large Color MFD 4	20.96	3.66	0.31	5.4

Device Categories – Testing Updates

- Commercial Office Equipment
  - California Plug Load Research Center
- Residential Networking Equipment
  - California Lighting Technology Center
- Commercial Laboratory Equipment
  - California State University, Northridge

Residential Networking Equipment (RNE) Device Tests

Initial Testing:

- Idle Power Consumption (VA)
  - Average power over 1 hour period
  - Ports connected per CTA 2049 A
- Power Consumption vs. Network Traffic Throughput
  - 5 minute duration for each traffic level
  - Download Traffic Speeds: 1, 2, 5, 10, 20, 50, 100, 200, 500 (Mbps)
  - Upload Traffic Speeds: 0.1, 0.2, 0.5, 1, 2, 5, 10, 20, 50 (Mbps)

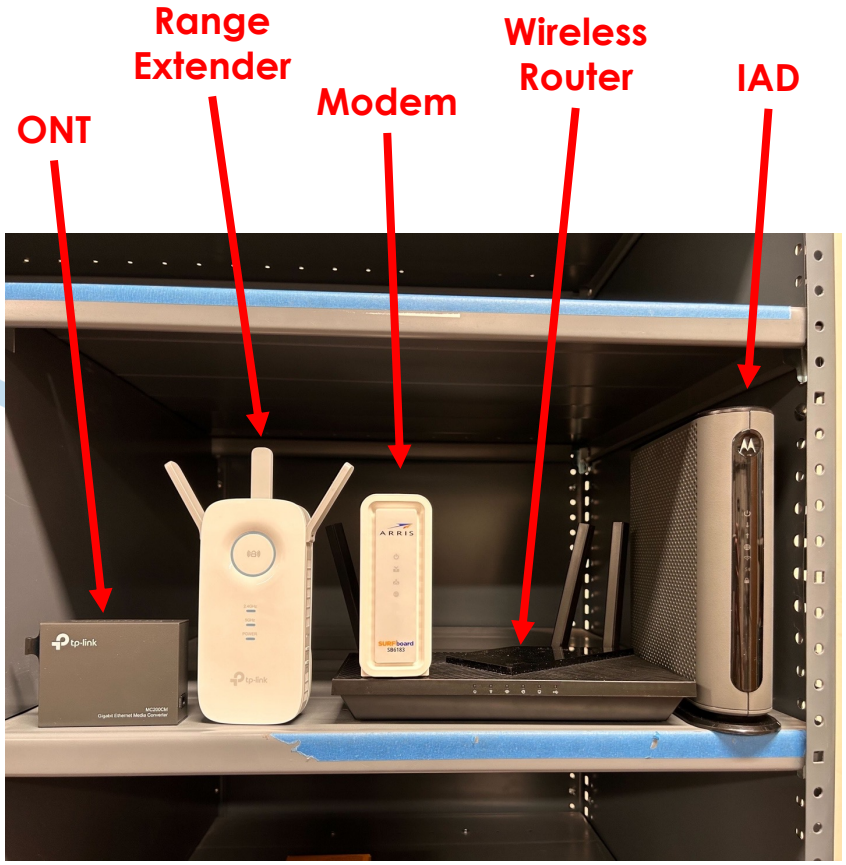


Figure 1: Examples of the 5 families of devices tested

Residential Networking Equipment (RNE) Testbed Configuration

- Network Traffic Generator
GL Communications Packet Expert 1-10G

- Power Analyzer
Xitron 2802

- Cable Modem Termination System
Blonder Tongue CMTS EDGE

- Power Supply
Elgar CW2501

- Device under test (DUT)

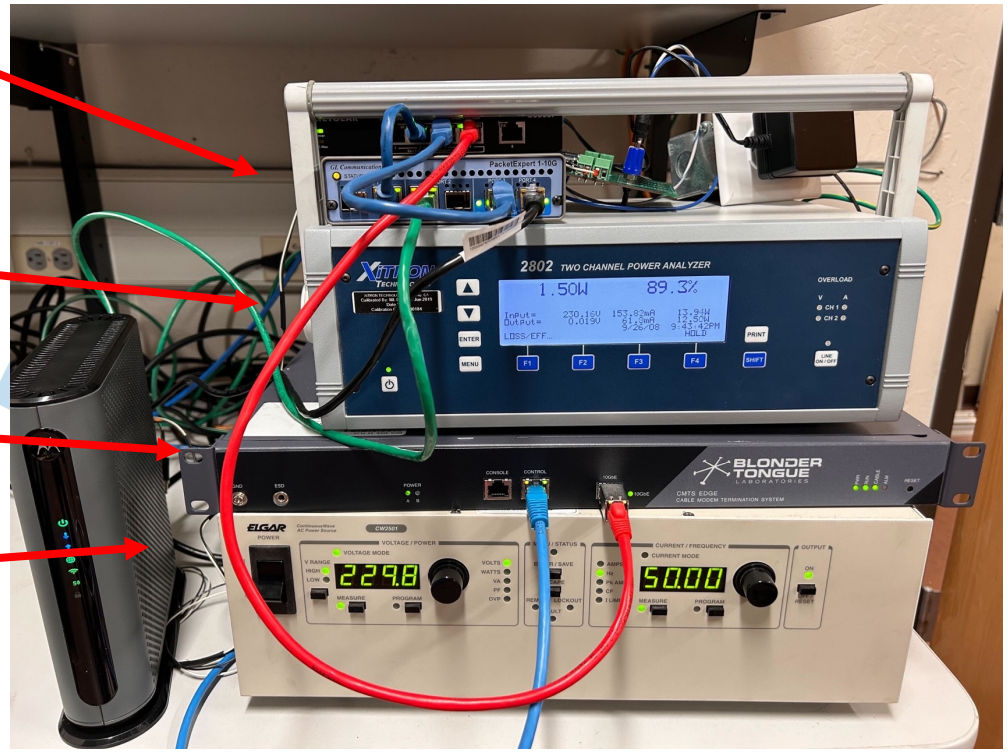


Figure 2: Test equipment set up to test an IAD

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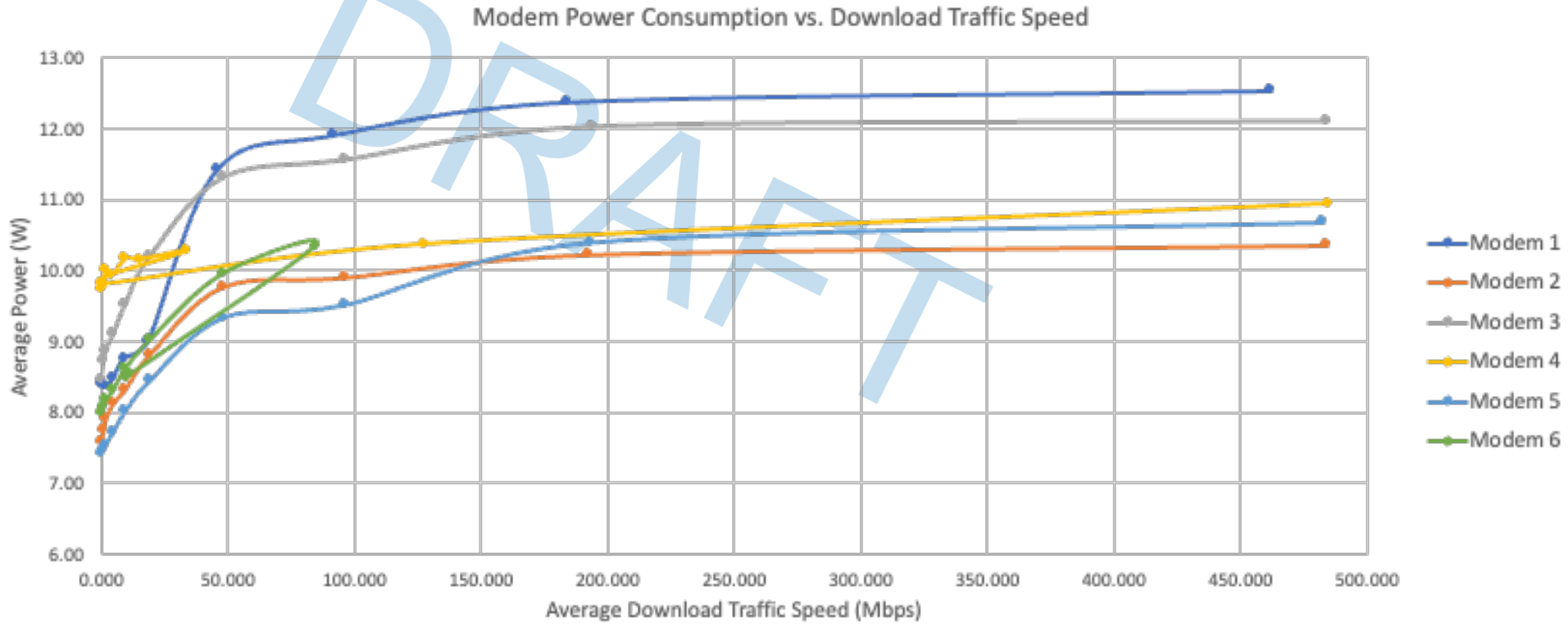
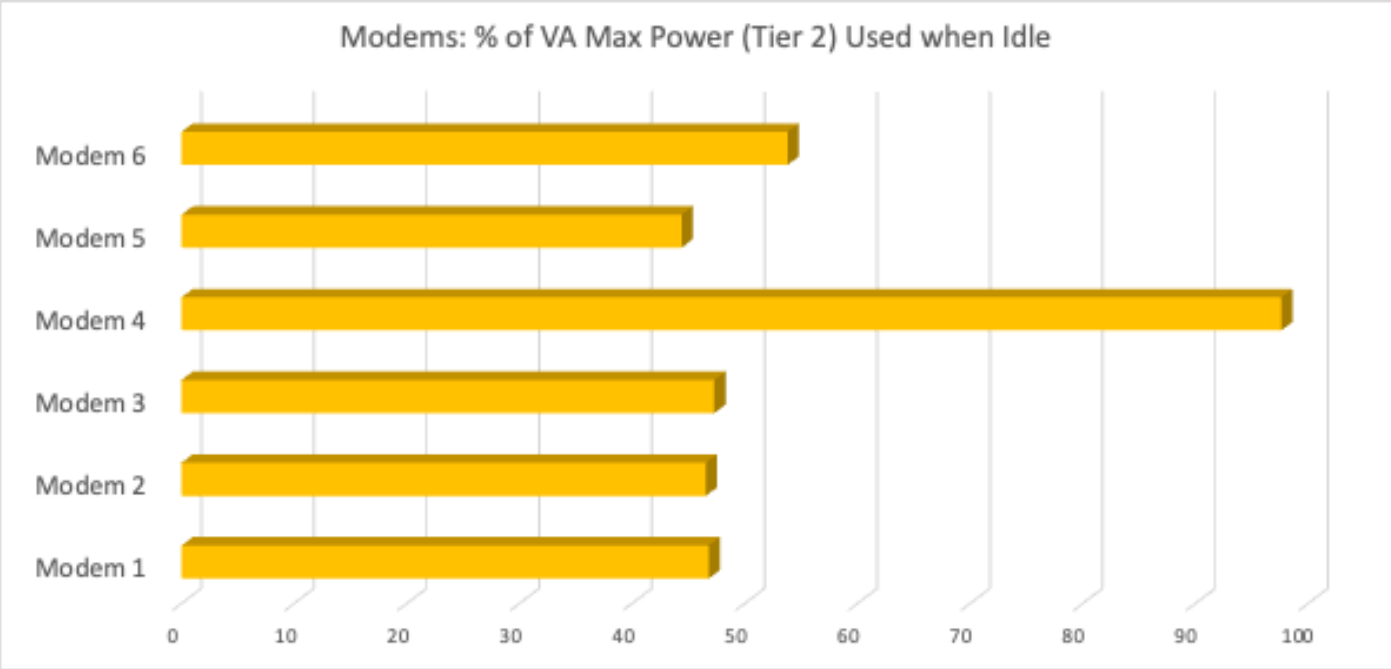
Residential Networking Equipment - Modems Throughput Testing

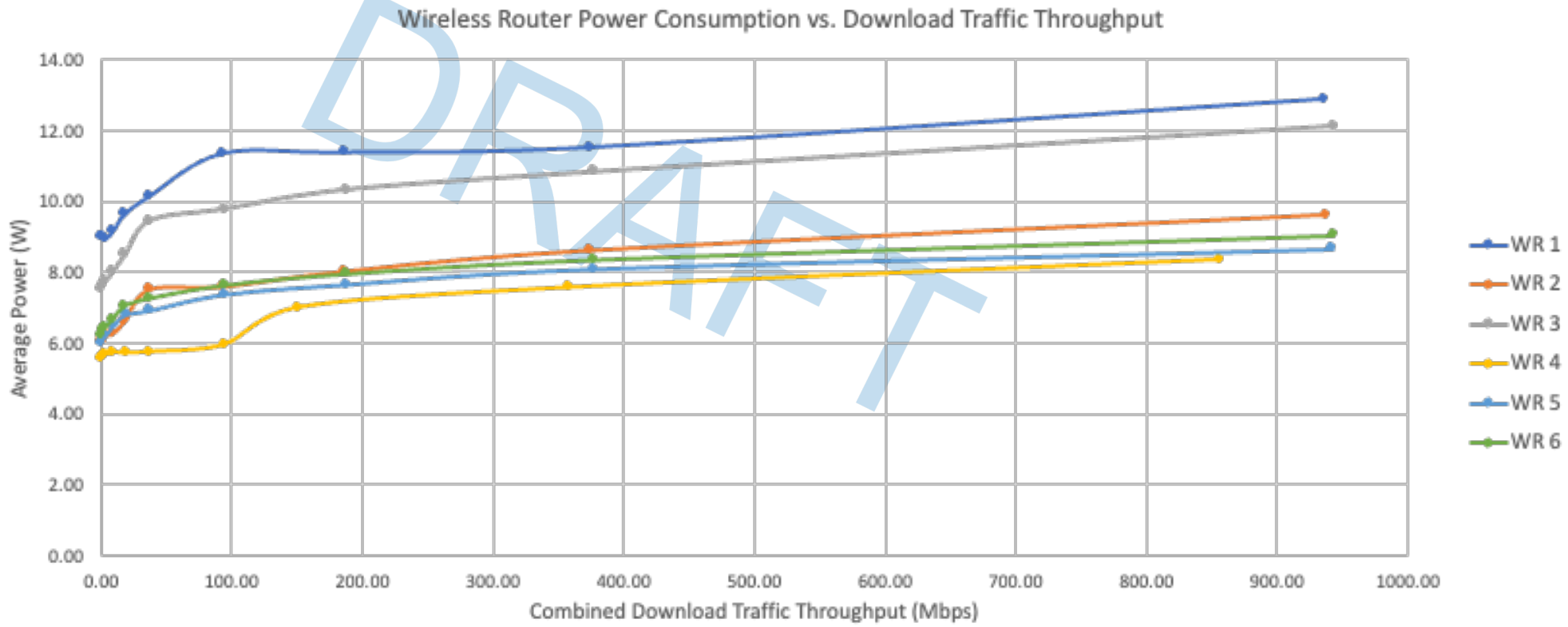


Residential Networking Equipment - Modems VA Allowance Testing



DUT	Allowances	Tier 1 Allowance	Tier 2 Allowance	Tier 3 Allowance
Modem 1	DOCSIS 3.1 no FDX, 1x Gigabit Ethernet LAN port	16.95	15.30	14.20
Modem 2	DOCSIS 3.1 no FDX, 4x Gigabit Ethernet LAN port	17.70	15.90	14.80
Modem 3	DOCSIS 3.1 no FDX, 2x Gigabit Ethernet LAN port	17.20	15.50	14.40
Modem 4	DOCSIS 3.0 4x4, 3x Simultaneous WAN: DOCSIS 3.0 4 channel, 1x Gigabit Ethernet LAN port	10.95	10.10	7.70
Modem 5	DOCSIS 3.1 no FDX, 2x Gigabit Ethernet LAN port	17.20	15.50	14.40
Modem 6	DOCSIS 3.1 no FDX, 2x Gigabit Ethernet LAN port, 2x FXS	17.80	16.10	15.00

Residential Networking Equipment – Wireless Routers Throughput Testing



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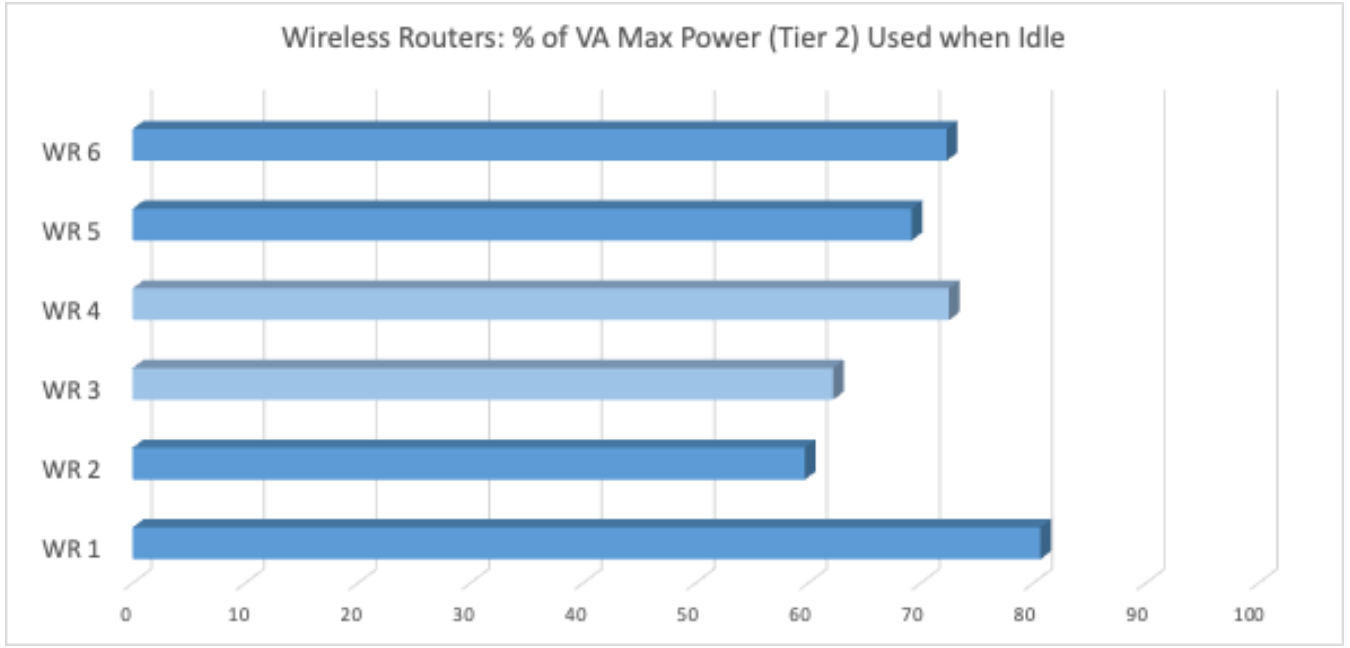
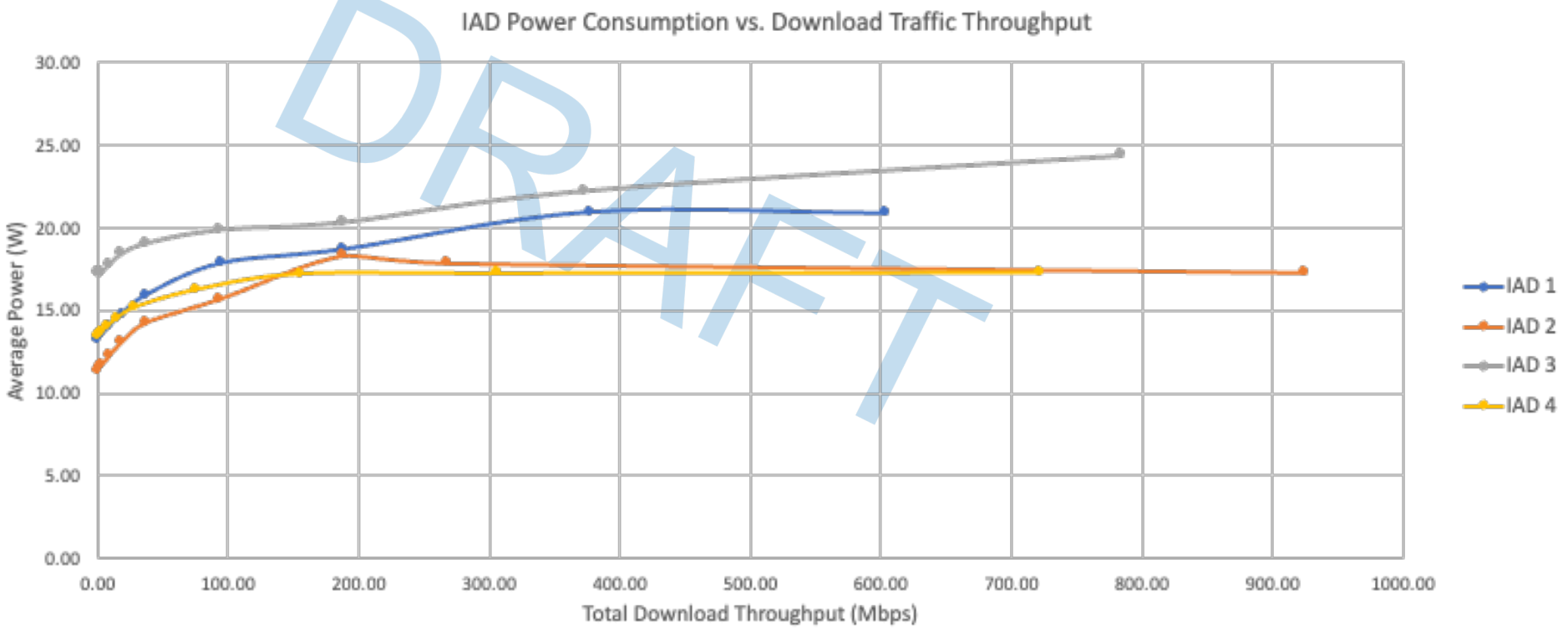
Residential Networking Equipment – Wireless Routers VA Allowance Testing



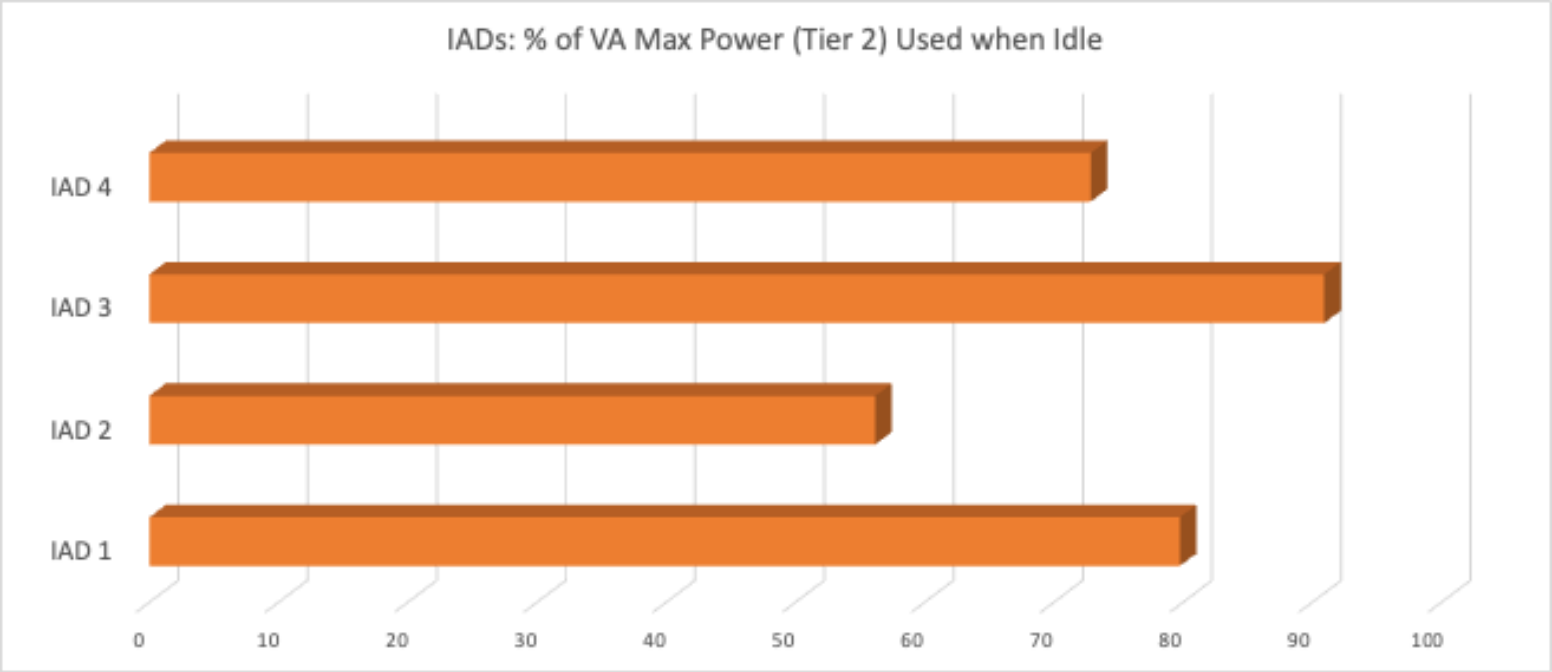
DUT	Allowances	Tier 1 Allowance	Tier 2 Allowance	Tier 3 Allowance
WR 1	Advanced LNE, 5x Gigabit Ethernet LAN port, 1x 802.11n LP, 1x 802.11ac LP, 3x Per-chain allowance above 2x2 MIMO, 1x 2.4 GHz support 256-QAM. 1x USB 2.0, 1x USB 3.0, 2x PCIe Interface, 1x Processor 5-10K DMIPS	12.1	10.9	10.0
WR 2	Advanced LNE, 5x Gigabit Ethernet LAN port, 1x 802.11n HP, 1x 802.11ac HP, 2x Per-chain allowance above 2x2 MIMO, 1x 2.4 GHz support 256-QAM, 1x USB 3.0, 1x PCIe Interface, 1x Processor 5-10K DMIPS	11.4	10.3	9.5
WR 3	Advanced LNE, 5x Gigabit Ethernet LAN port, 1x 802.11n HP, 2x 802.11ac HP, 2x Per-chain allowance above 2x2 MIMO, 1x 2.4 GHz support 256-QAM, 1x USB 3.0	12.7	11.3	10.4
WR 4	Advanced LNE, 4x Gigabit Ethernet LAN port, 1x 802.11n LP, 1x 802.11ac LP, 3x Per-chain allowance above 2x2 MIMO	8.75	8.0	6.9
WR 5	Advanced LNE, 5x Gigabit Ethernet LAN port, 1x 802.11n HP, 1x 802.11ac HP, 1x 2.4 GHz support 256-QAM, 1x USB 2.0, 1x PCIe Interface	9.5	8.6	8.0
WR 6	Advanced LNE, 5x Gigabit Ethernet LAN port, 1x 802.11n HP, 1x 802.11ac HP, 1x 2.4 GHz support 256-QAM, 1x USB 3.0, 1x PCIe Interface	9.6	8.7	8.1

Residential Networking Equipment - IADs

Throughput Testing



Residential Networking Equipment - IADs VA Allowance Testing



DUT	Allowances	Tier 1 Allowance	Tier 2 Allowance	Tier 3 Allowance
IAD 1	DOCSIS 3.0 4x4, 5x Simultaneous WAN: DOCSIS 3.0 4 channel, 4x Gigabit Ethernet LAN port, 1x 802.11n HP, 1x 802.11ac HP. 1x per-chain allowance above 2x2 MIMO	18.80	16.90	13.70
IAD 2	DOCSIS 3.1 no FDX, 4x Gigabit Ethernet LAN port, 1x 802.11n LP, 1x 802.11ac LP, 1x USB 3.0	21.00	18.90	17.60
IAD 3	DOCSIS 3.0 4x4, 5x Simultaneous WAN: DOCSIS 3.0 4 channel, 4x Gigabit Ethernet LAN port, 1x 802.11n HP, 1x 802.11ac HP. 2x per-chain allowance above 2x2 MIMO, 1x 2.4 GHz supports 256-QAM, 1x USB 2.0, 2x PCIE interface	20.20	18.20	14.70
IAD 4	DOCSIS 3.1 no FDX, 4x Gigabit Ethernet LAN port, 1x 802.11n HP, 1x 802.11ac HP, 2x PCIE interface	21.80	19.60	18.40

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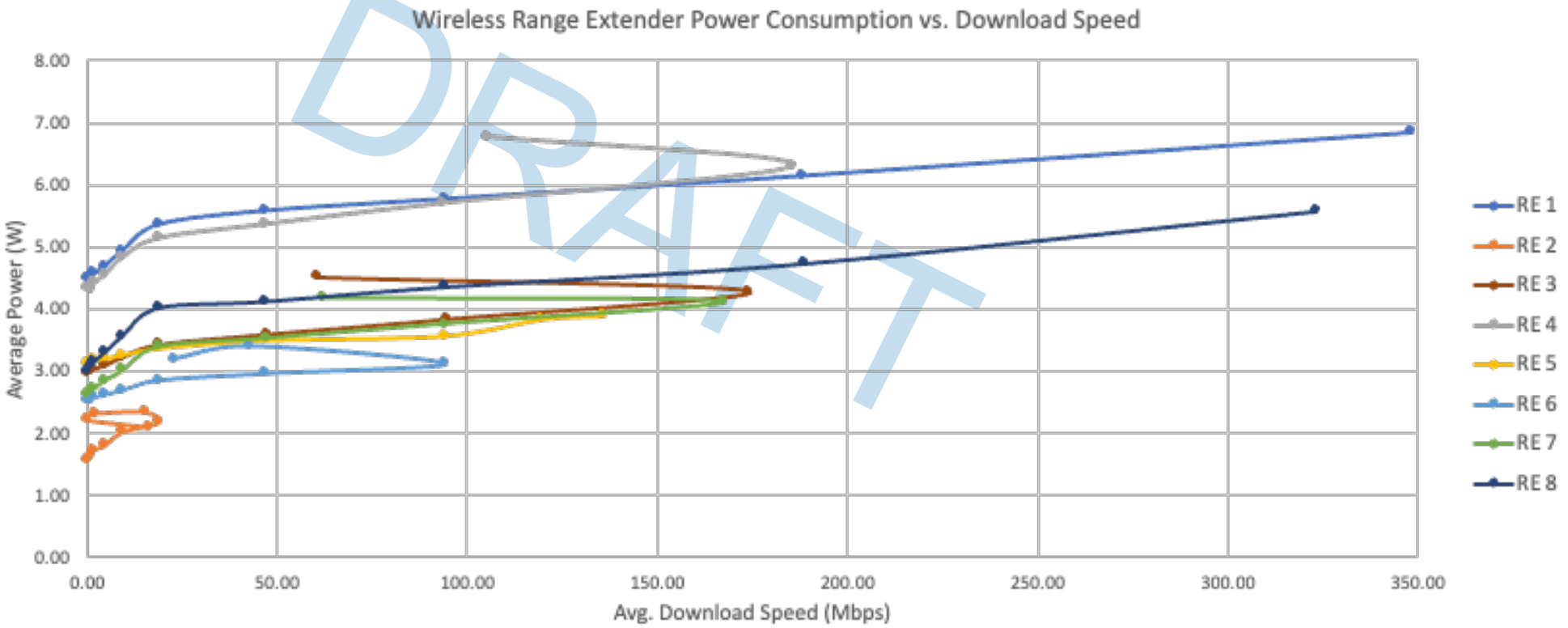
Residential Networking Equipment – Range Extenders Throughput Testing



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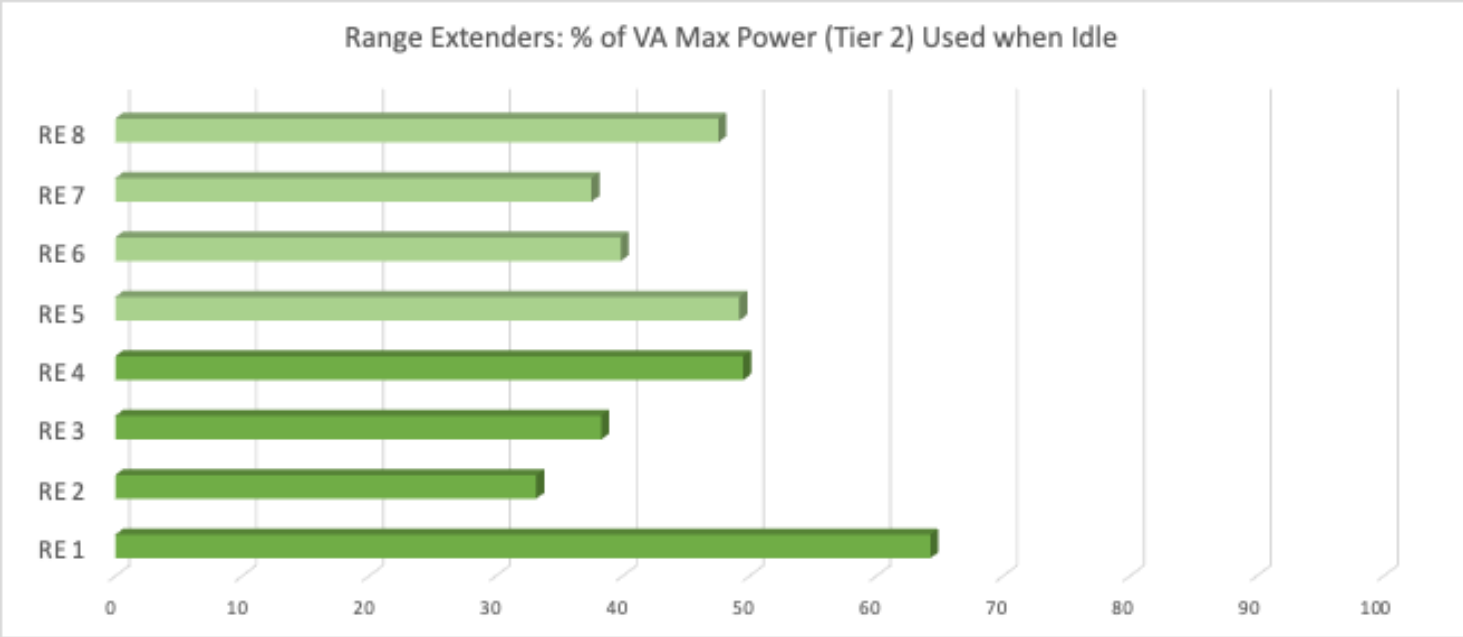
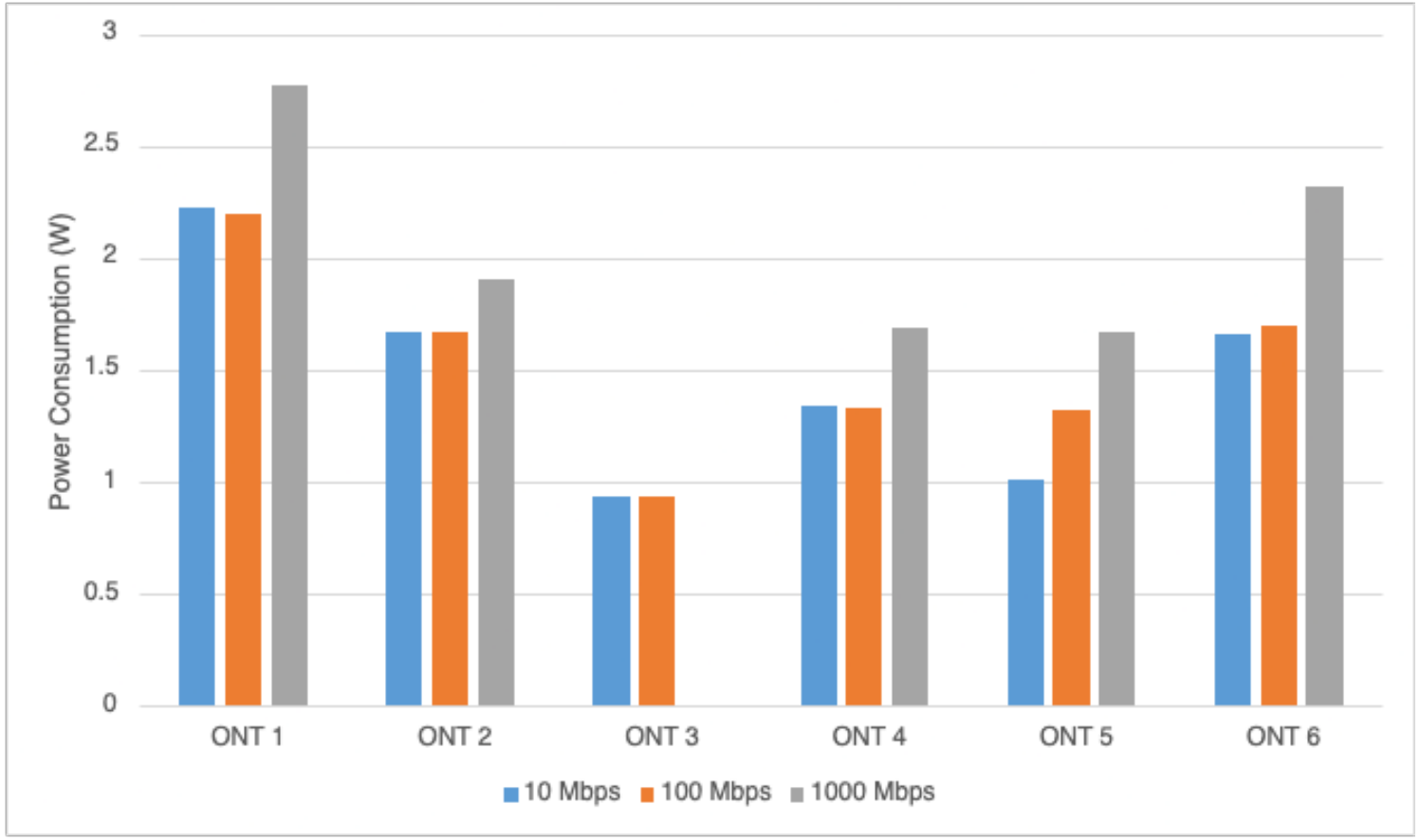
Residential Networking Equipment – Range Extenders VA Allowance Testing



DUT	Allowances	Tier 1 Allowance	Tier 2 Allowance	Tier 3 Allowance
RE 1	Advanced LNE, 1x Gigabit Ethernet LAN port, 1x 802.11n LP, 1x802.11ac LP, 1x per chain allowance above 2x2 MIMO	7.4	6.8	6.1
RE 2	Advanced LNE, 1x Gigabit Ethernet LAN port, 1x 802.11ac LP, 1x802.11ac HP	5.0	4.7	4.4
RE 3	Advanced LNE, 1x Gigabit Ethernet LAN port, 1x 802.11ac LP, 1x802.11ac HP	8.6	7.7	7.1
RE 4	Advanced LNE, 1x Gigabit Ethernet LAN port, 1x 802.11ac LP, 1x802.11ac HP, 4x Per chain allowance above 2x2 MIMO	9.1	8.1	7.3
RE 5	Advanced LNE, 1x 802.11n LP, 1x802.11ac LP	6.85	6.3	5.8
RE 6	Advanced LNE, 1x 802.11n LP, 1x802.11ac LP	6.85	6.3	5.8
RE 7	Advanced LNE, 1x Gigabit Ethernet LAN port, 1x 802.11n LP, 1x802.11ac HP	7.5	6.9	6.5
RE 8	Advanced LNE, 1x Gigabit Ethernet LAN port, 1x 802.11n LP, 1x802.11ac LP	7.1	6.5	6.0

Residential Networking Equipment - ONTs

Throughput Testing

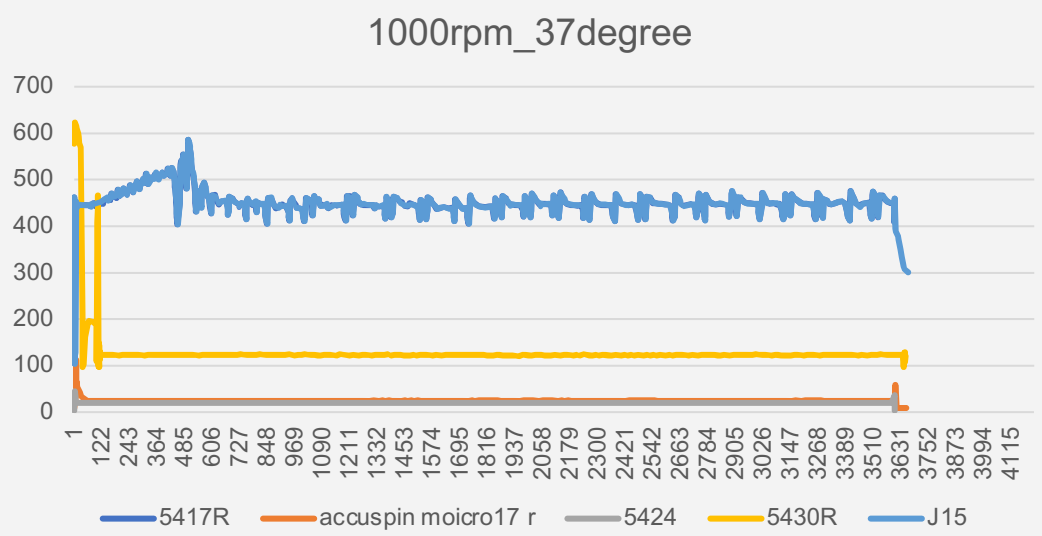


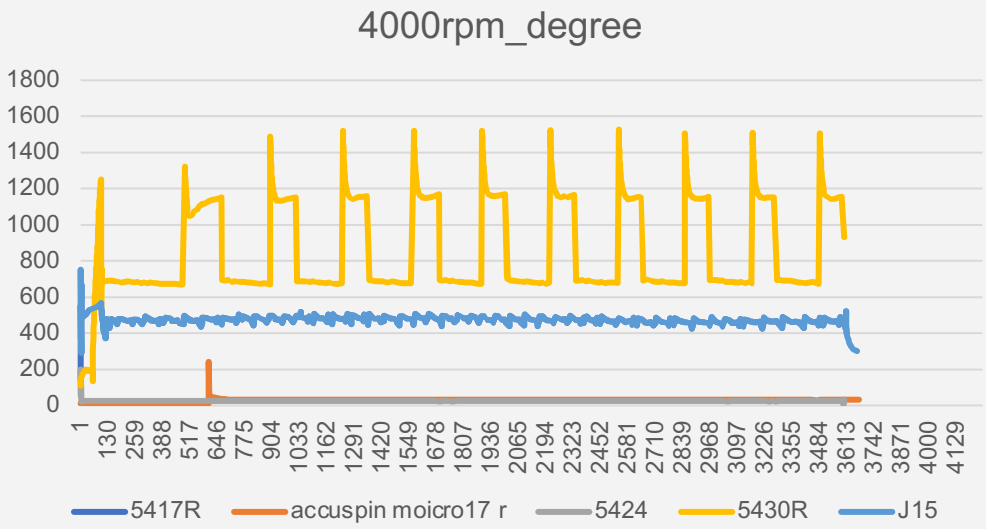
Device Categories – Testing Updates

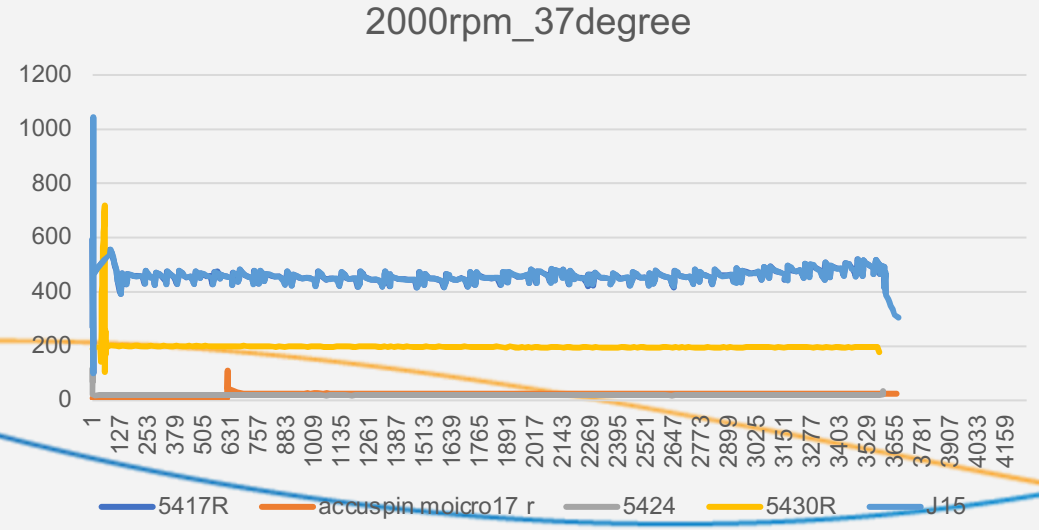
- Commercial Office Equipment
  - California Plug Load Research Center
- Residential Networking Equipment
  - California Lighting Technology Center
- Commercial Laboratory Equipment
  - California State University, Northridge

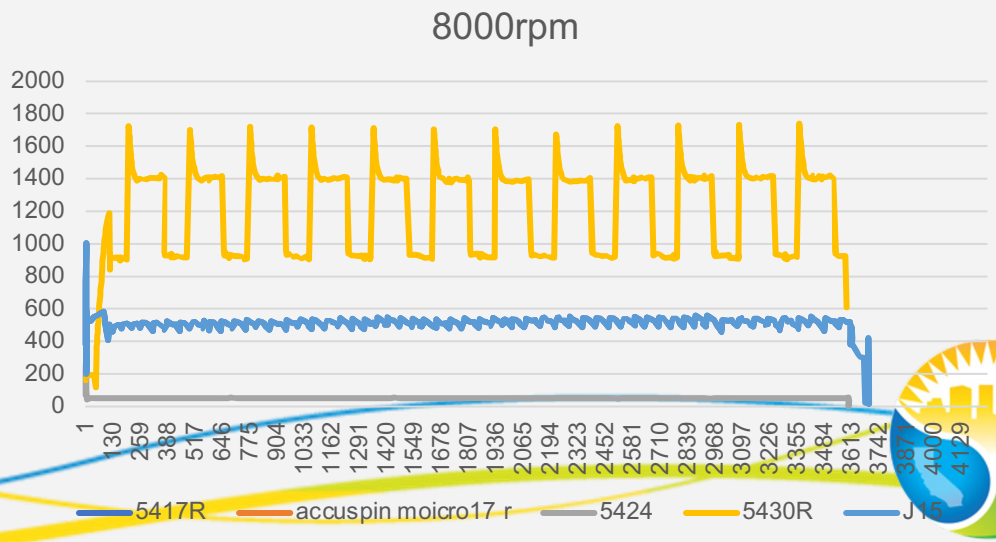
CSUN: Centrifuges

This test was conducted at 1000rpm, 2000rpm, 4000rpm and 8000rpm at 37 degrees Celsius, and when the rotational speed was 2000, the energy consumption generated at -9 degrees Celsius, 0 degrees Celsius, 10 degrees Celsius and 20 degrees Celsius was tested.



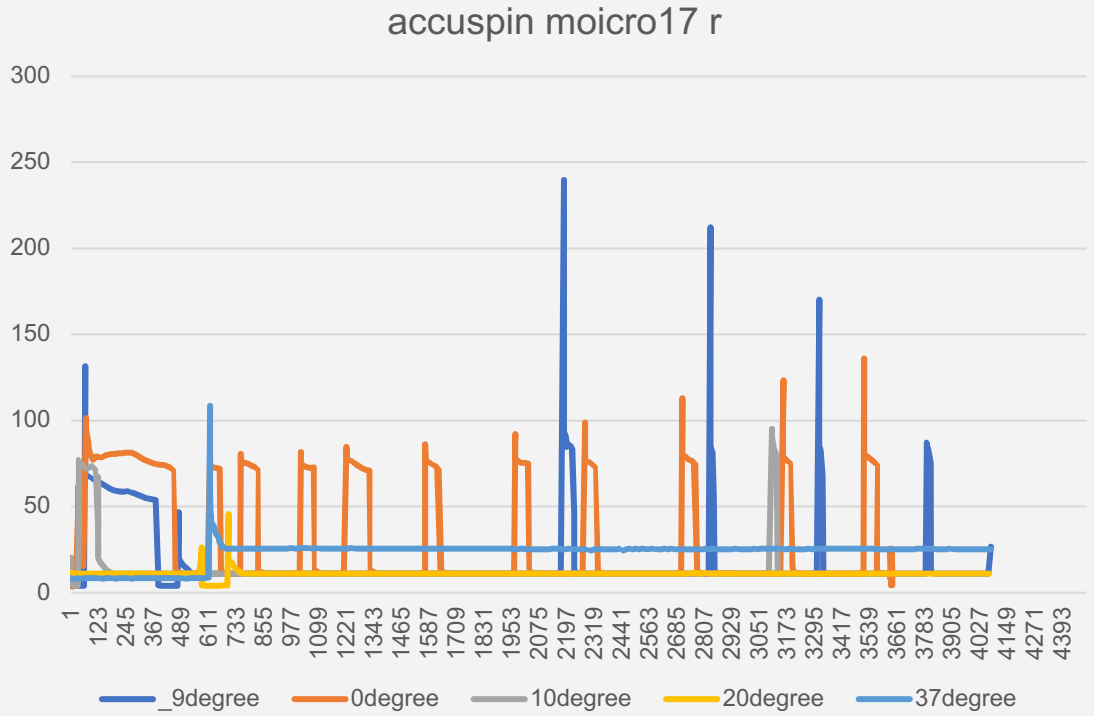


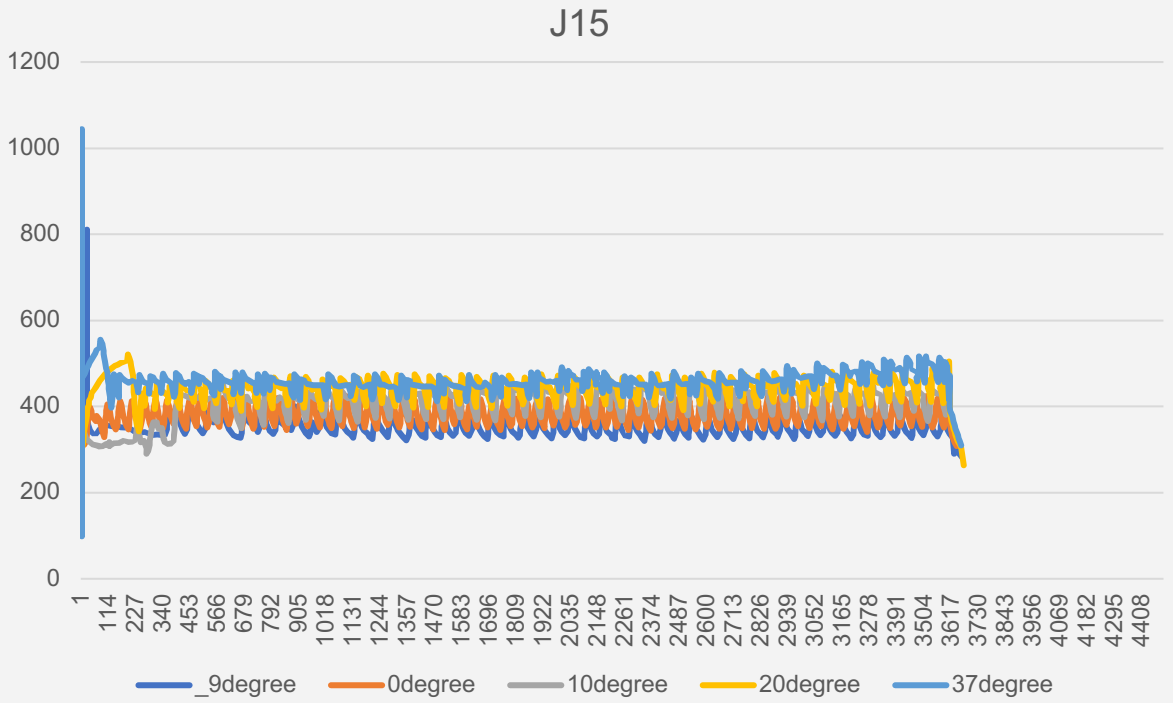




CSUN: Centrifuges

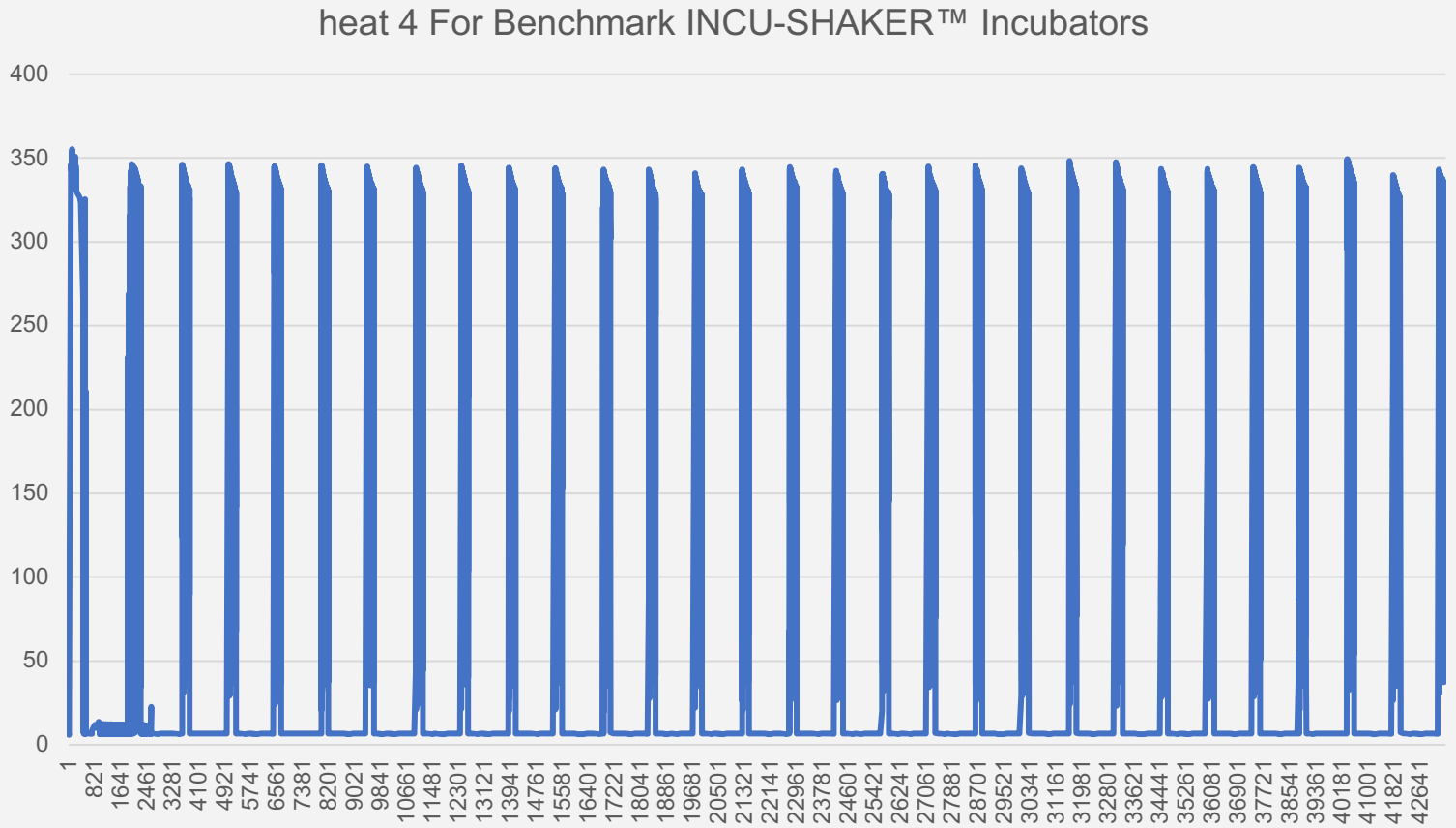
This test was conducted at 1000rpm, 2000rpm, 4000rpm and 8000rpm at 37 degrees Celsius, and when the rotational speed was 2000, the energy consumption generated at -9 degrees Celsius, 0 degrees Celsius, 10 degrees Celsius and 20 degrees Celsius was tested.



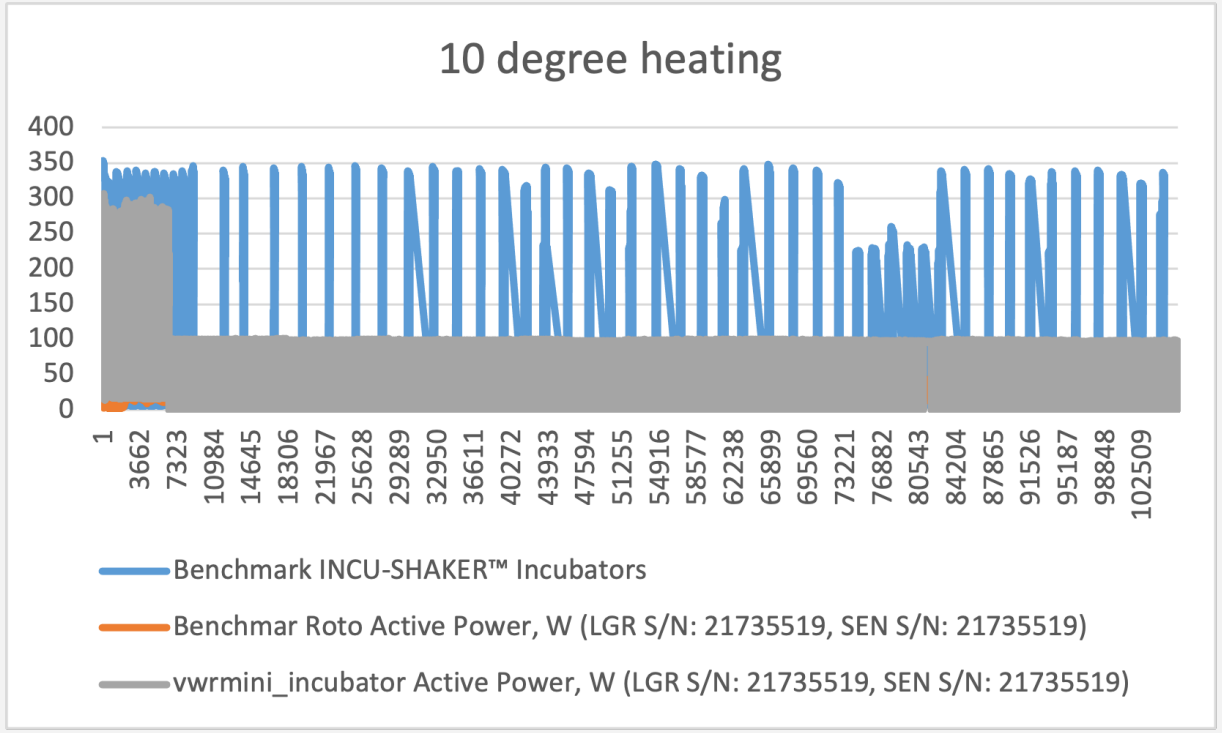


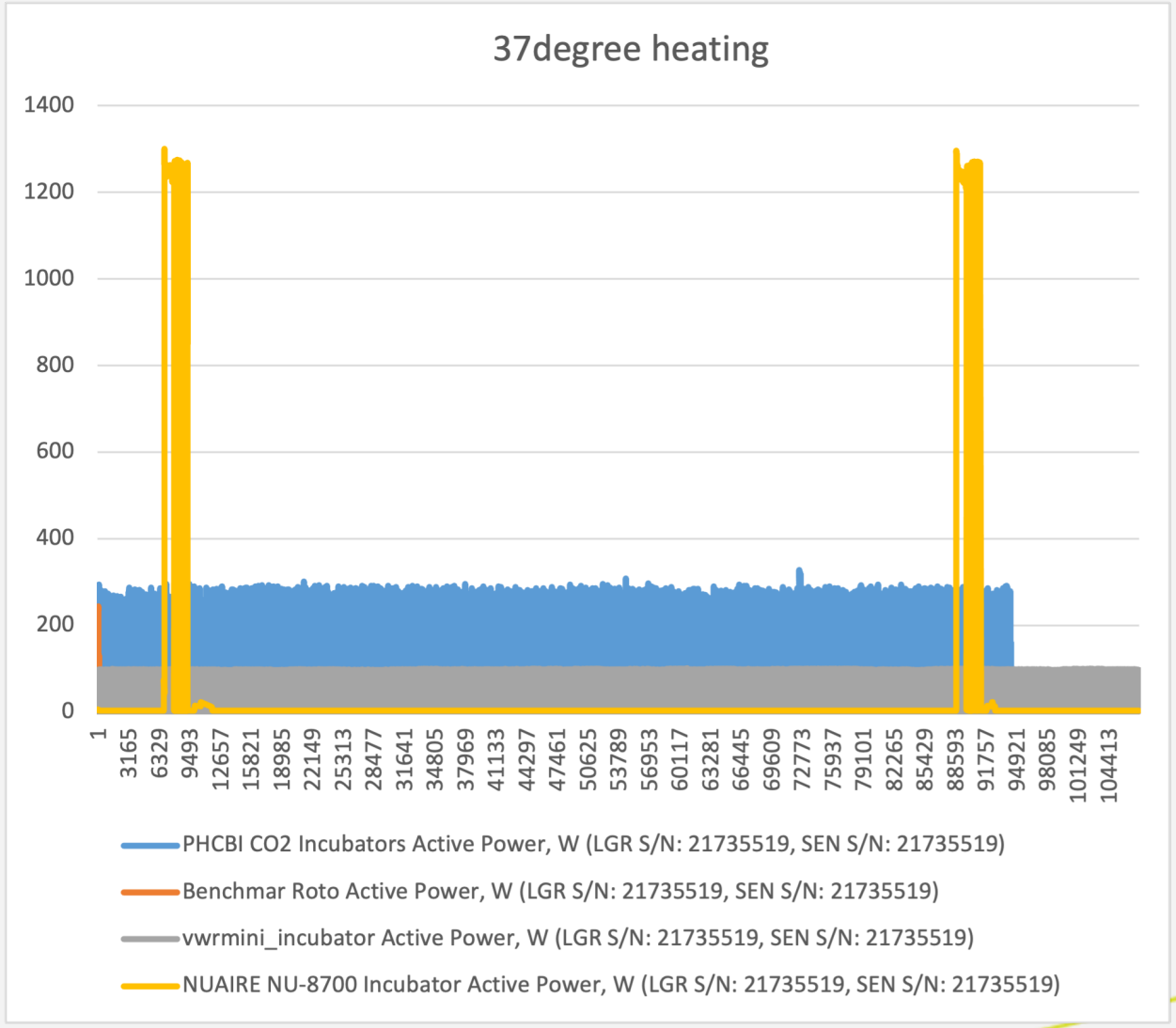
CSUN: Incubator

Name and state	heat 4	heat 10	heat 37
Benchmark INCU-SHAKER™ Incubators	45.937	25.38	NA
PHCBI CO2 Incubators	NA	NA	74.529
Benchmar Roto	NA	8.347	30.6189
vwrmini_incubator	NA	45.401	56.765
NUAIRE NU-8700 Incubator	NA	NA	37.3236



CSUN: Incubator





Next Steps

- **Test Results and Recommendations**
  - *Draft of complete results, analyses and interpretations, recommendations for codes and standards*

- **Technical Report on Testing Procedures**
  - *Test procedures and instructions for each device*

- **Engage TAC and Industry Stakeholders**
  - *Conduct additional Roundtables and Outreach to ensure the tools and results from this project will be utilized and adopted by industry*

- **Plug Loads: Codes and Standards Impacts Report**
  - *Incl. energy-use model, statewide energy savings and cost-effectiveness analyses using model, summary of findings and recommendations*

California Energy Alliance

Roundtable Discussion

Renewable Exterior and Advanced Lighting Systems (REAL)

CLTC RESEARCHES

Exterior Lighting for the Community

Design, Integration, Demonstration & Technology Transfer

Project Duration: July 2021 – March 2025

CEC Funding: $4,166,306
Match Funding: $1,250,000
Total Project Funds: $5,416,306

Partners

- **California Energy Commission EPIC Program**
- **California Lighting Technology Center**
- **California Energy Alliance**
- **DesignLights Consortium (DLC)**
- **Courtyard Village Apartments**
  - Health Education Council
  - Yolo County Children's Alliance
- **City of San Joaquin**
  - The Nueva Alianza
- **Self Help Enterprises**
  - Sand Creek Apartments (Orosi, CA)
  - Lincoln Plaza (Hanford, CA)
- **City of Moreno Valley**
  - Edgemont Women's Club
- **City of Chula Vista**
  - South Bay Community Services

HEALTH EDUCATION COUNCIL

California's Policy Targets

- Decarbonization
- Grid Resiliency
- Community Improvement

Pop Quiz: Current Events

On September 8, 2022, the California ISO issued a flex alert from 3 p.m. to 10 p.m. This was the 8th day in a row.

By 8 p.m. that day, what percentage of California was dark enough to have streetlights turn on?

- 30%
- 60%
- 90%

California ISO

NEWS RELEASE

FLEX ALERT

Sept. 8, 2022

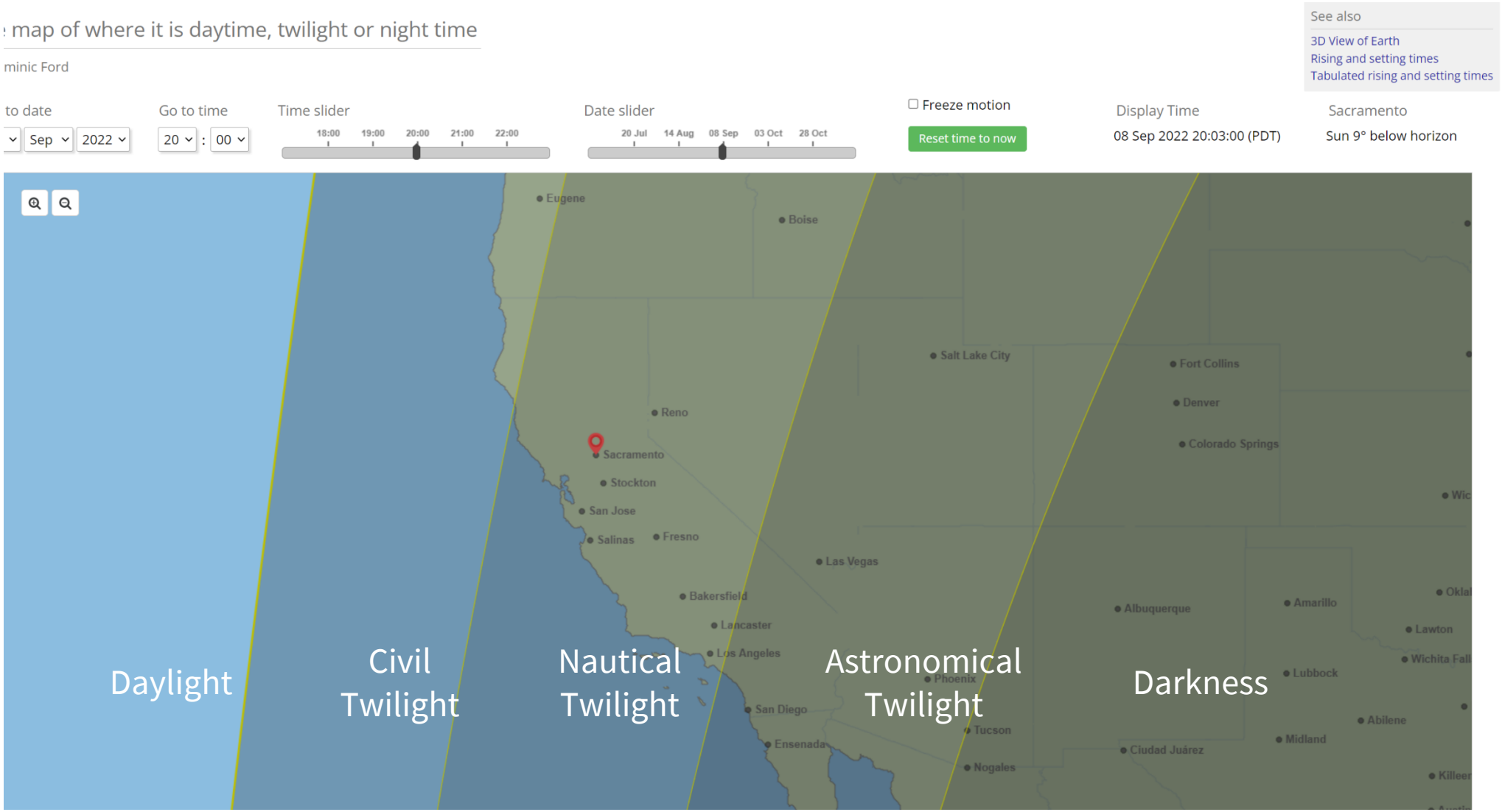
Contact: ISOMedia@caiso.com

California ISO extends Flex Alert to today from 3-10 p.m.

Heat, high projected loads, and lower solar output lead to supply uncertainty

FOLSOM, Calif. – The California Independent System Operator (ISO) has issued a statewide Flex Alert, a call for voluntary electricity conservation, for today from 3 p.m. to 10 p.m., due to continuing forecasted high demand on the grid and tight power supplies.

With above-normal temperatures in the forecast across much of the state, the power grid operator is expecting high electricity demand, primarily from air conditioning use, and is calling for voluntary conservation steps to help balance supply and demand.



Source: in-the-sky.org

ANSWER: 90%
By 8 p.m. on September 8, 2022, almost all of California has reached Nautical Twilight, which is typically dark enough for streetlights to turn on via photocell operation.

Pop Quiz: Current Events

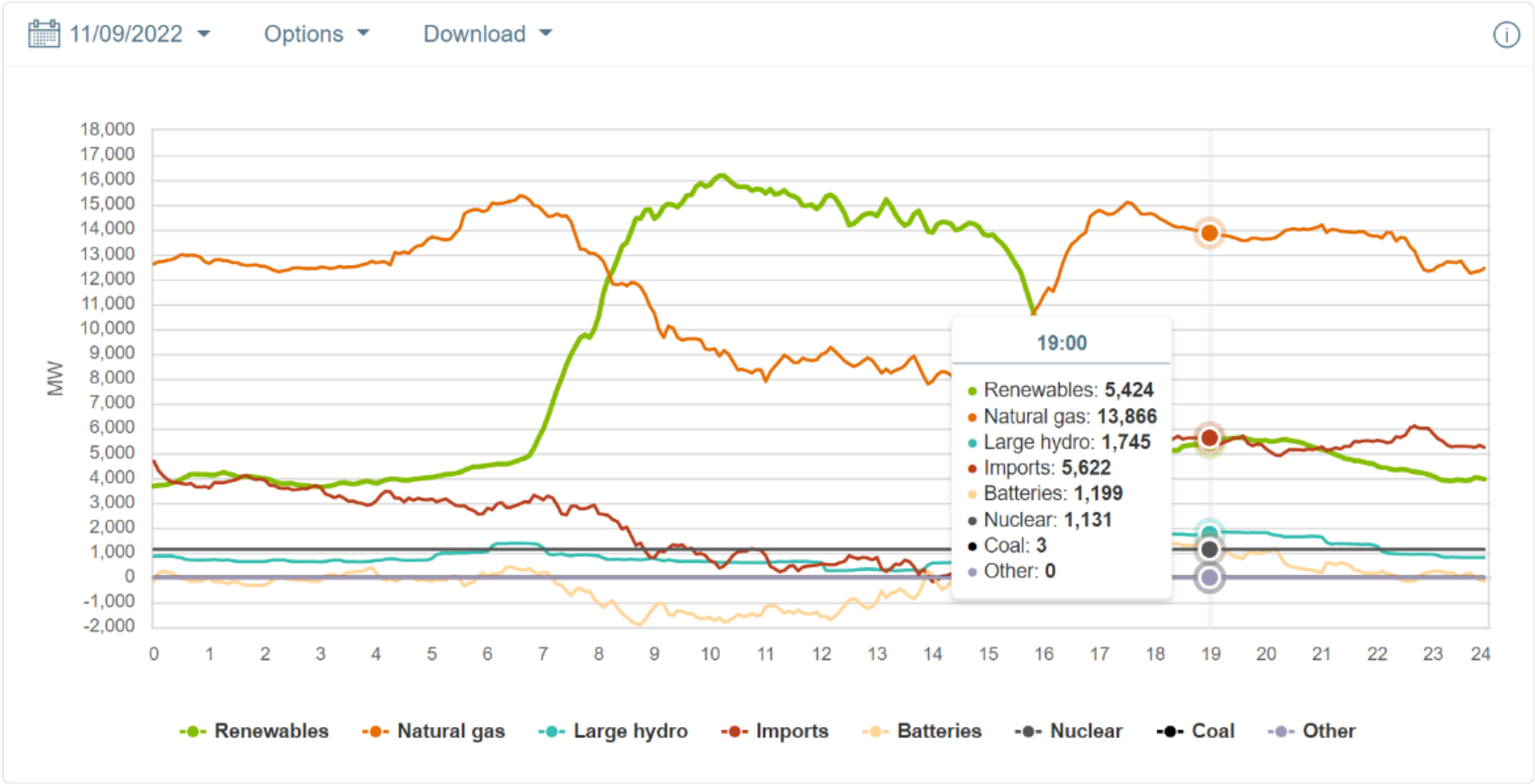
On November 9, 2022 from 7 p.m. to midnight, what percentage of the energy supplied by the California Independent System Operator (ISO) was from natural gas and coal?

- 10%
- 30%
- 50%
- 70%

ANSWER: 48% at 7 p.m.

Supply trend

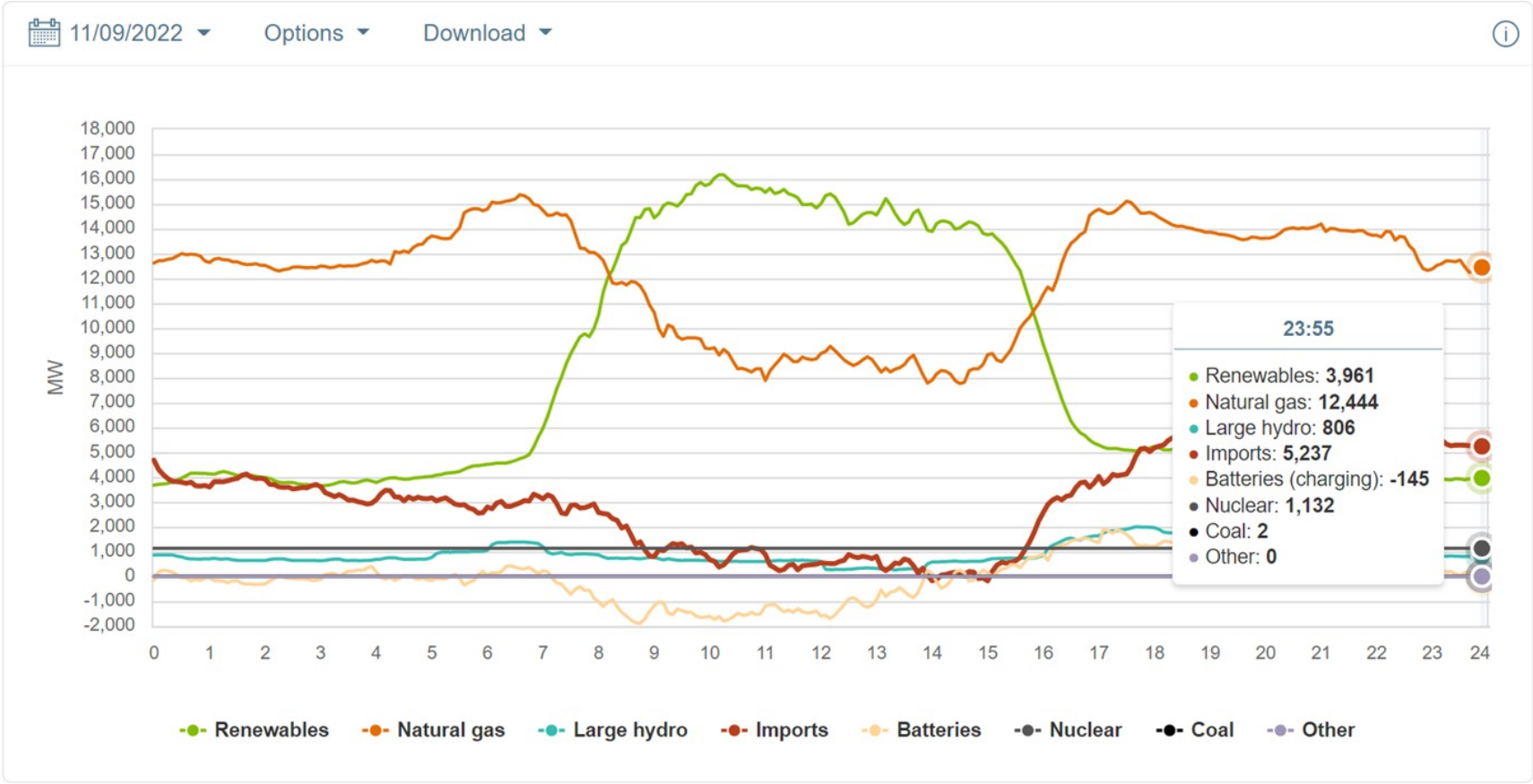
Energy in megawatts broken down by resource in 5-minute increments.



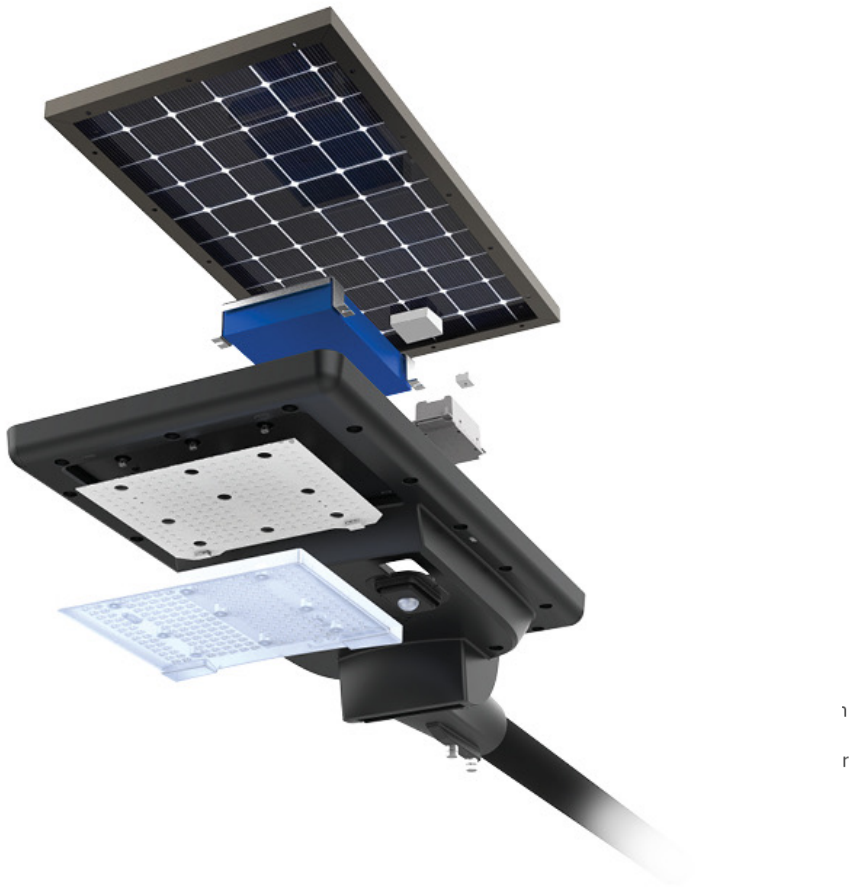
ANSWER: 53% at 11:55 p.m.

Supply trend

Energy in megawatts broken down by resource in 5-minute increments.

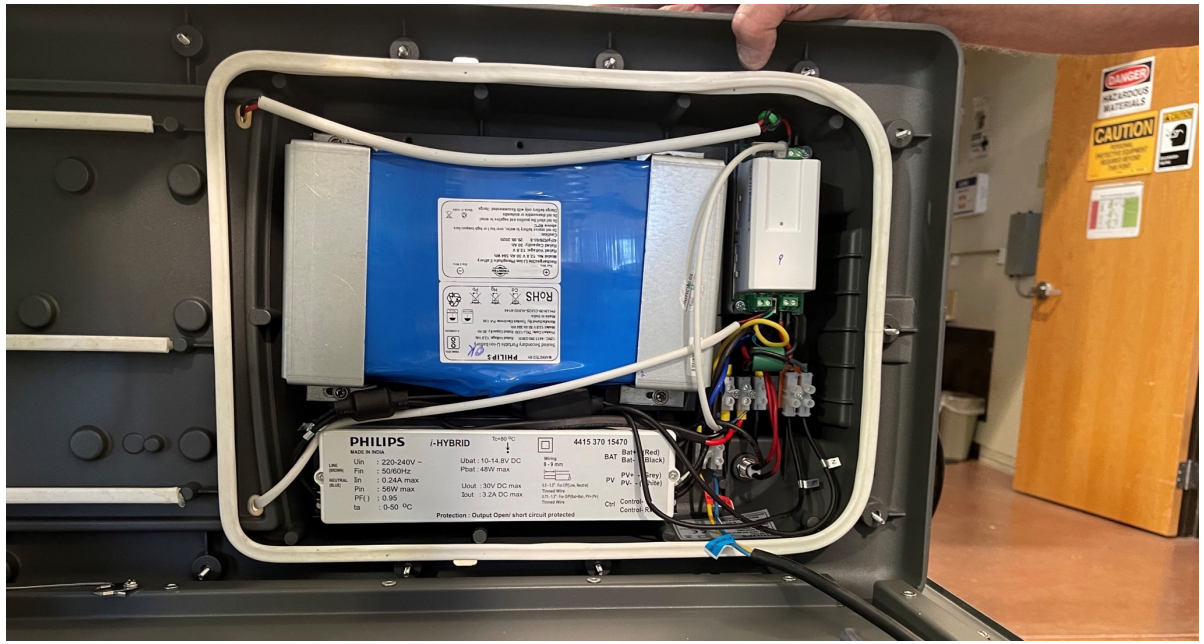


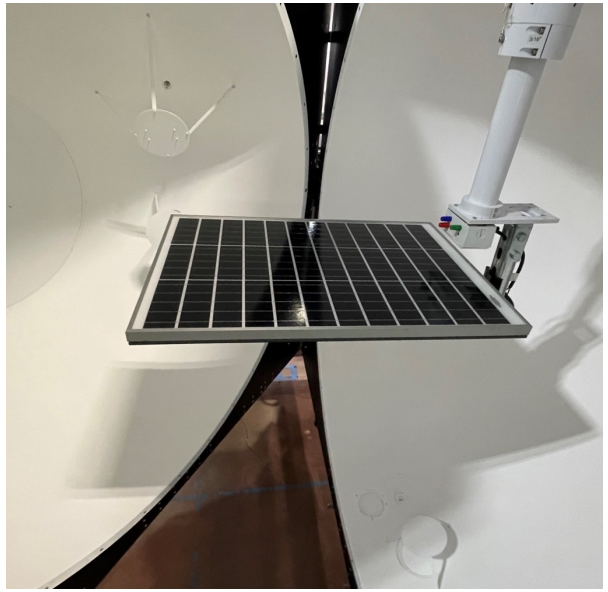
Project Goals & Objectives



Develop & demonstrate renewable energy and advanced lighting (REAL) systems equipped with advanced features absent from today's commercial exterior lighting systems, including:

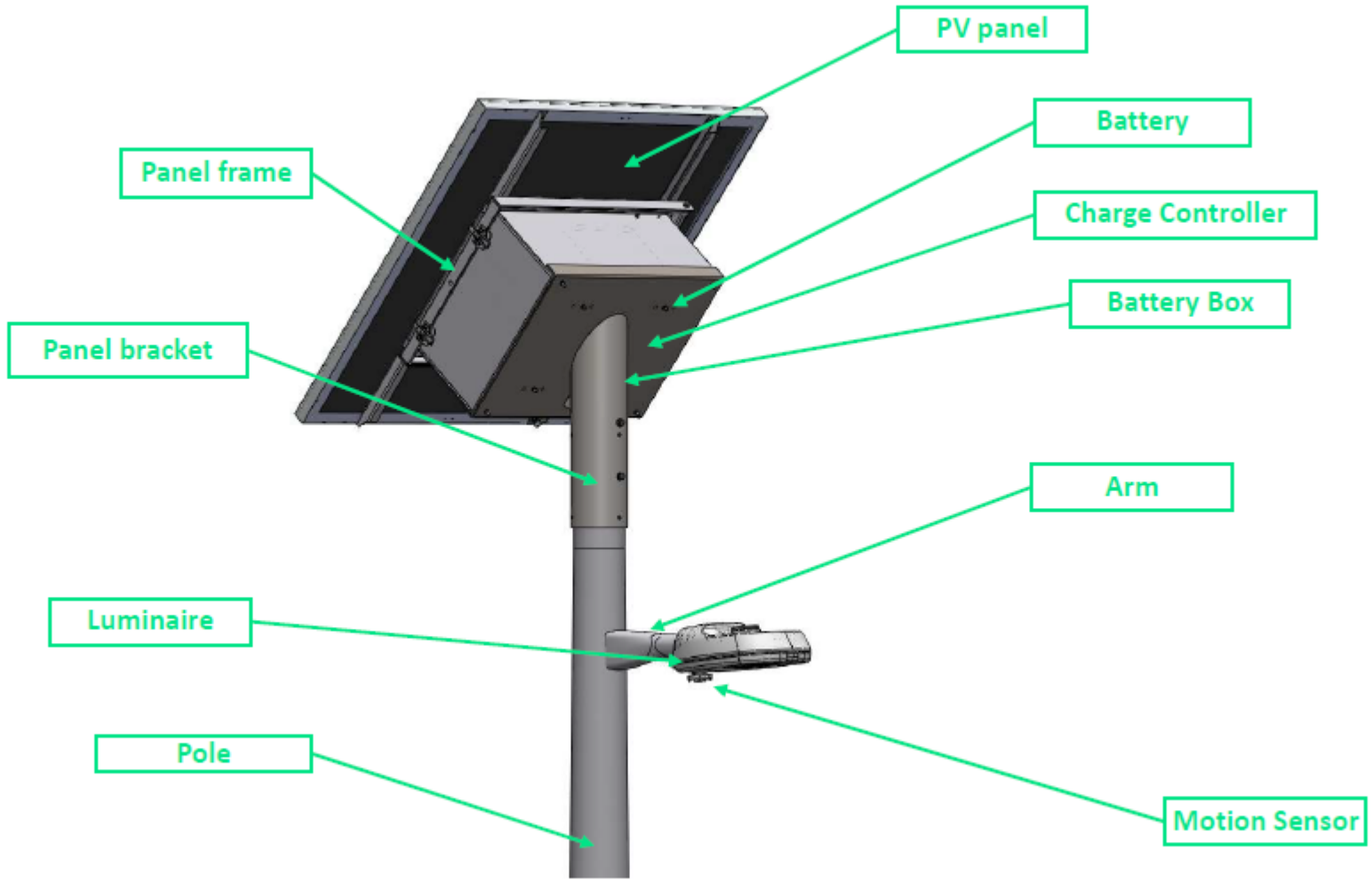
- Hybrid power (solar & grid-tied)
- Advanced control systems with two-way communication with grid/utility for real-time updates
  (i.e., time-of-use rates, fuel mix, PSPS events)
- Smart battery energy storage
- Best-in-class energy-efficiency
- Predictive & adaptive occupancy-based dimming
- Circadian-appropriate lighting spectrum


PHILIPS
i-HYBRID
4415 370 15470
MADE IN INDIA
Uin : 220-240V ~
Fin : 50/60Hz
In : 0.24A max
Pin : 56W max
PF( ) : 0.95
ta : 0-50 ºC
Ubat : 10-14.8V DC
Pbat : 48W max
Uout : 30V DC max
Iout : 3.2A DC max
Protection : Output Open/ short circuit protected
BAT
PV
Ctrl
DANGER
HAZARDOUS MATERIALS
CAUTION




WERNER

Non-Integrated Solar System

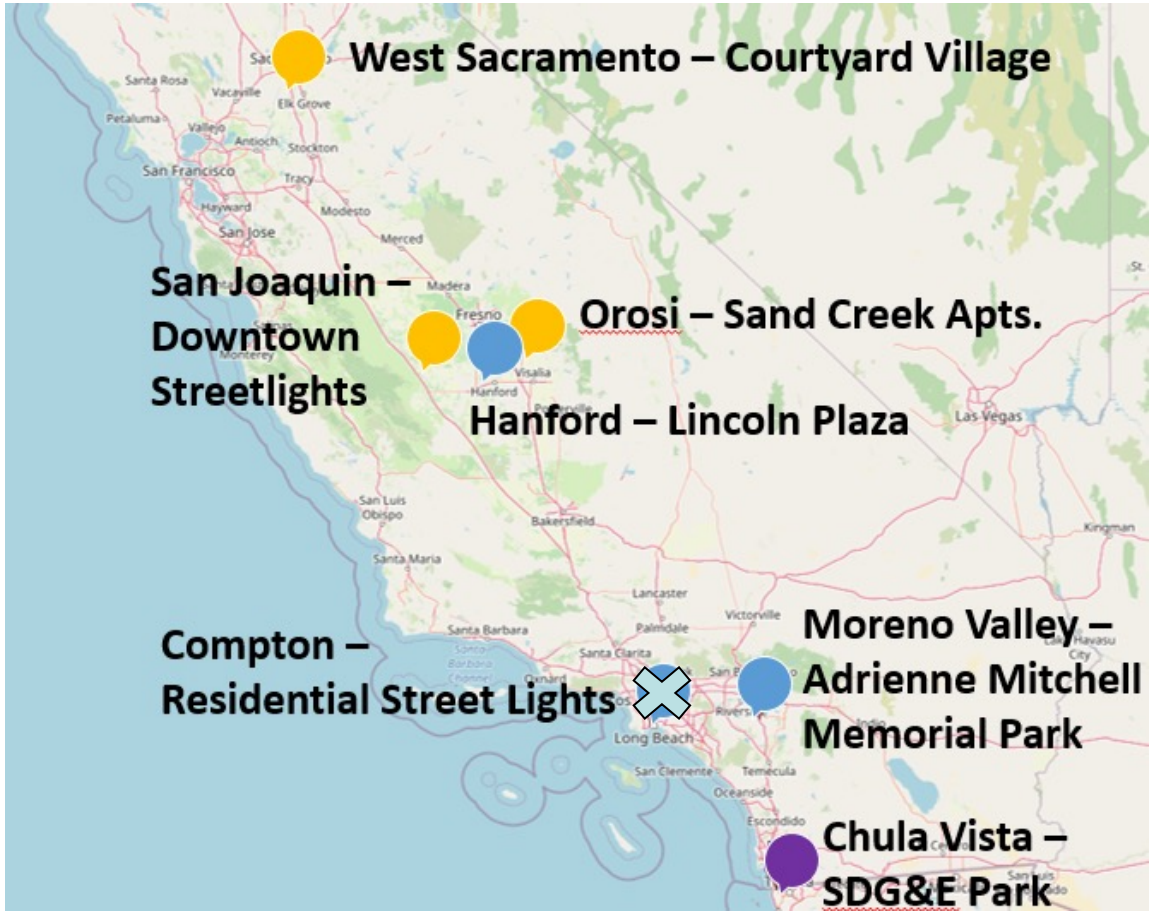


Signify

PV Panels – Vertical vs Horizontal

Specifications	Horizontal	Vertical
		
Energy Collection Index	1.0	0.3
Benefits	Wider range of PV power Can be tilted to maximize energy collection More efficient Faster charging	Lower dust accumulation More wind-resistant May fit existing poles Less expensive pole foundation

Demonstration Sites & Community Based Organizations



- Health Education Council, serving City of West Sacramento
- Yolo County Children's Alliance, serving City of West Sacramento
- Self Help Enterprises, serving Sand Creek & Lincoln Plaza apartments
- The Nueva Alianza, serving City of San Joaquin
- Edgemont Women's Club, serving City of Moreno Valley
- South Bay Community Services, serving City of Chula Vista

UCDAVIS California Lighting Technology Center

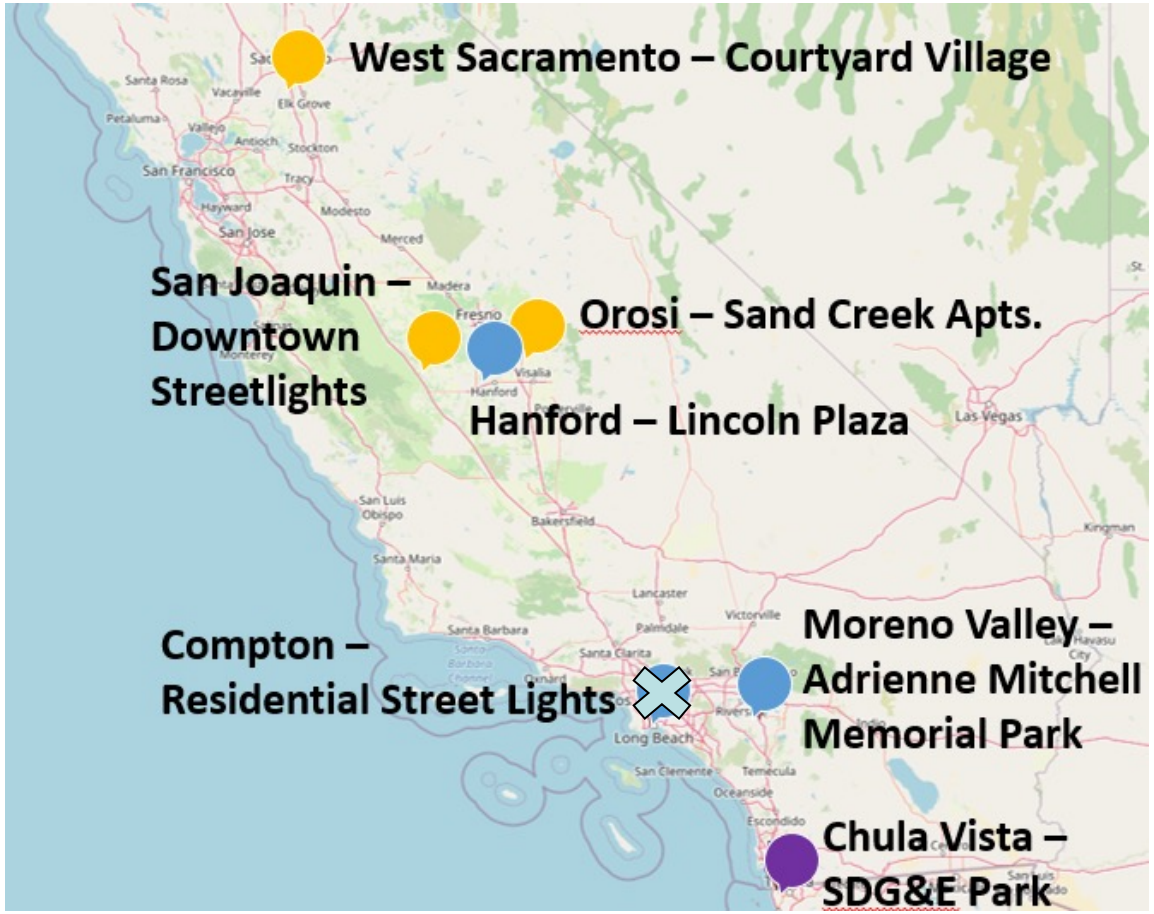
STATE OF CALIFORNIA ENERGY COMMISSION

Demo Site – Park in Moreno Valley, CA

Pan Am Blvd
Pan Am Blvd
22631 Bay Ave, Moreno Valley, CA 92553
Adrienne Mitchell Memorial Park
E
N
S
W

Proposed Design

Installation Timeline



- Moreno Valley park – January 2024
- Hanford apartments – January 2024
- Orosi apartments – January 2024
- Chula Vista park – February 2024
- West Sacramento apartments – March 2024
- San Joaquin streets – April 2024
- TBD Site 7 – TBD

UCDAVIS California Lighting Technology Center

STATE OF CALIFORNIA ENERGY COMMISSION

Technology Transfer Activities

- General Technology & Knowledge Transfer Activities
- Community Based Outreach
  In partnership with Community Based Organizations
- Installer Training
  In partnership with US Department of Labor
- Stakeholder Education
  In partnership with Community Based Organizations
- Utility Program Assessment & Development
  In partnership with TRC
- Codes & Standards Development
  In partnership with California Energy Alliance
- Technology Adoption via Policy Pathways
  In partnership with UC Davis Policy Institute
- Specification Launch
  In partnership with DesignLights Consortium (DLC)

Timeline: Now through October 2024

Community Engagement Activities

1. **Exterior Lighting Needs Assessment/Pre-retrofit Survey, per community (100 response target)**
2. Community roundtables including key stakeholders (i.e., police, fire, school board, PTA, etc.), per community
3. Post-retrofit survey, per community (100 response target)
4. Post-retrofit site walk for community-based organizations, key community stakeholders & other community members that express interest during surveys
5. Outreach material development and translation support (i.e., site signage, flyers, case studies, best practice guides, webinars)
6. Ongoing community engagement to identify critical feedback on new lighting systems by end of project March 2025

Downtown Street Light in San Joaquin

Completed Surveys

Site	Number Completed	Target	% Complete
Courtyard Village Apartments - West Sacramento	61	100	61%
Main Street - San Joaquin	103	100	103%
Lincoln Plaza – Hanford	100	100	100%
Sand Creek Apartments – Orosi	101	100	101%
SDG&E Park – Chula Vista	129	100	129%
Adrienne Mitchell Memorial Park – Moreno Valley	201	200	100%
TOTAL	**695**	**700**	**99%**

Codes & Standards Development

- Identify relevant codes and standards that may support current or future requirements for cost-effective REAL systems, such as
  - Local or state codes & standards
  - Municipal standards
  - California Department of Transportation standards
- Develop model language, code change proposal components, and similar support materials necessary for transitioning the technology into the identified codes and standards.

Thank you!

Roundtable Discussion

Break

- *5 minutes*

2025 Energy Code Development

Bernadette Boudreaux, CEA

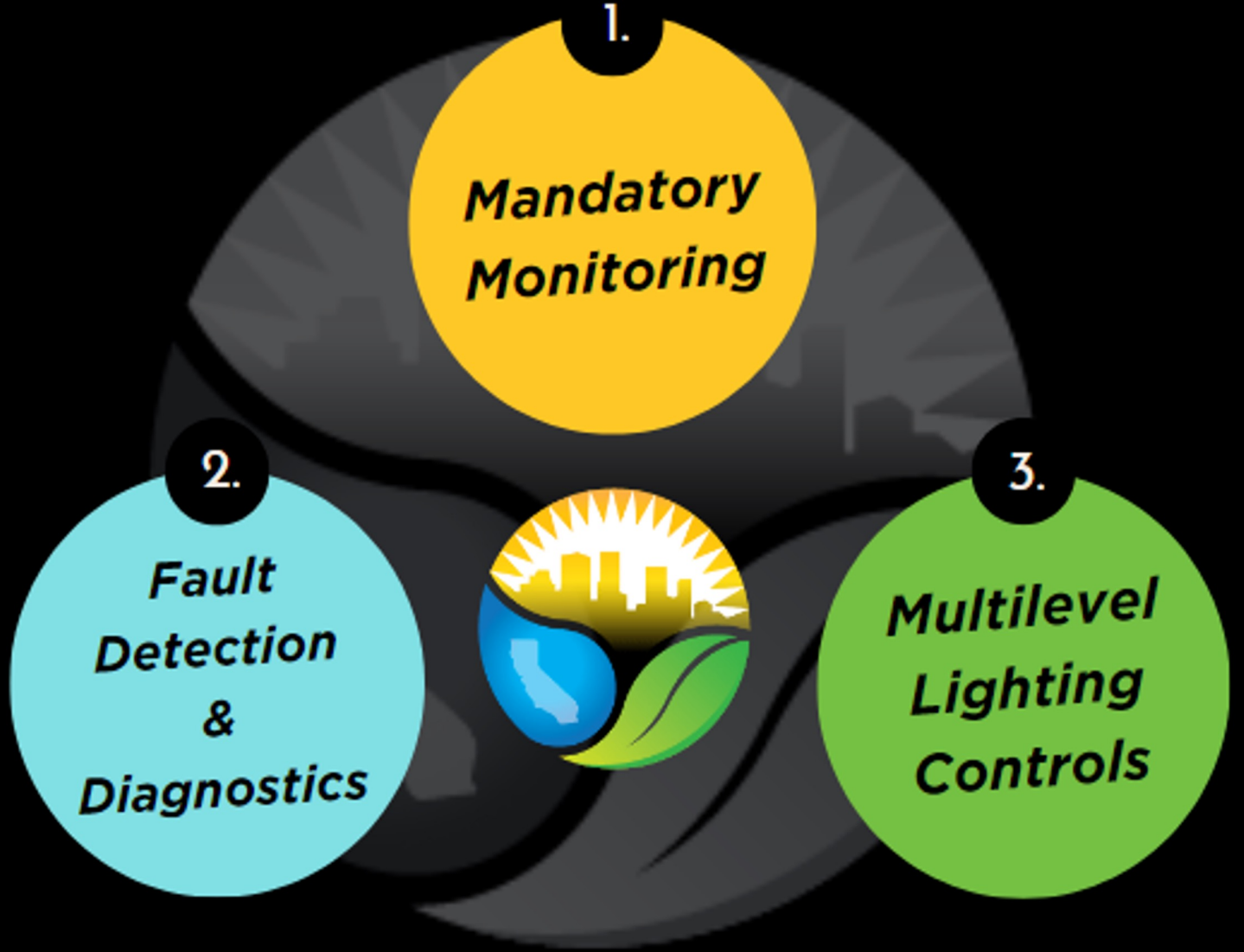
CEA Involvement in 2025 Energy Code Development

Discuss CEA Energy Code Measures, Lessons Learned, & Next Steps

- Bernadette Boudreaux, CEA
- Michael Jouaneh, Lutron
- Wayne Stoppelmoor, Schneider Electric
- Shii-Anna Mudie, Resolument Vert Solutions

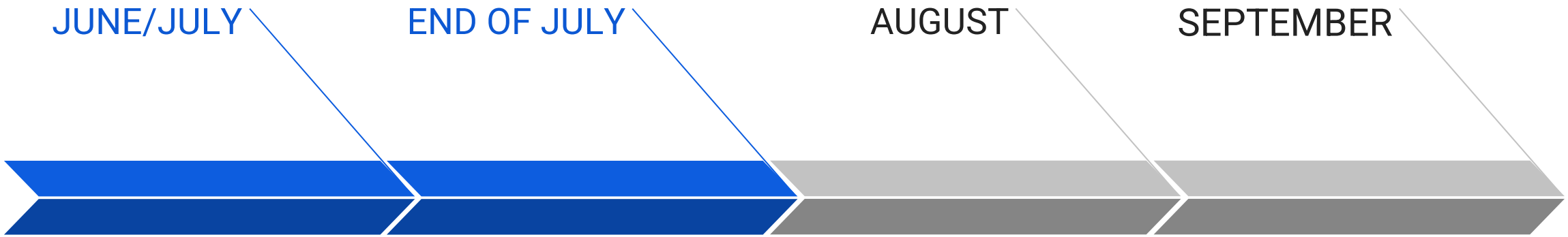
California Energy Alliance

2025 CODE INITIATIVES



MEASURE	STATUS	NEXT STEPS
Multilevel Lighting Controls *Mike J*	76 page proposal submitted to CEC	Follow up w/ CEC to ensure it is included in 2025 code
Fault Detection and Diagnostics *Wayne S*	Drafts Complete Need to submit to docket Proposals Being Drafted for CalNEXT or other Grant to gain additional data	Include in ASHRAE and look to incorporate into next code cycle
Mandatory Monitoring *Wayne S*	Drafts Complete Need to submit to docket Proposals Being Drafted for CalNEXT or other Grant to gain additional data	Include in other standards and look to incorporate into next code cycle

TIMELINE



DATA COLLECTION
COST & ENERGY ANALYSIS

Data Collection: 2 weeks

- Energy Modeling: 3-4 weeks
- Energy Savings Analysis: 2 weeks

PUBLIC REVIEW & DRAFT

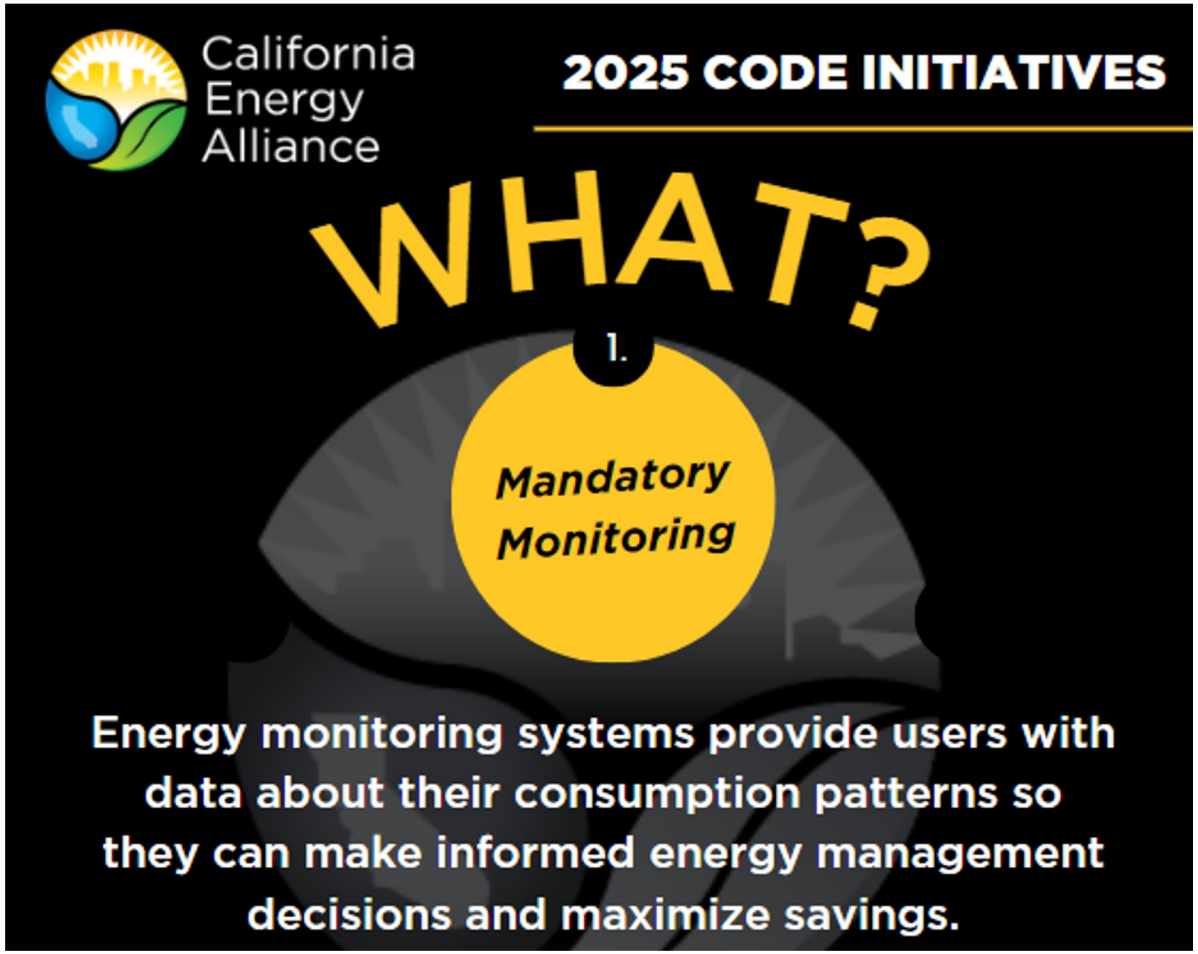
- Recommendations: 1 week
- Reporting: 2 weeks

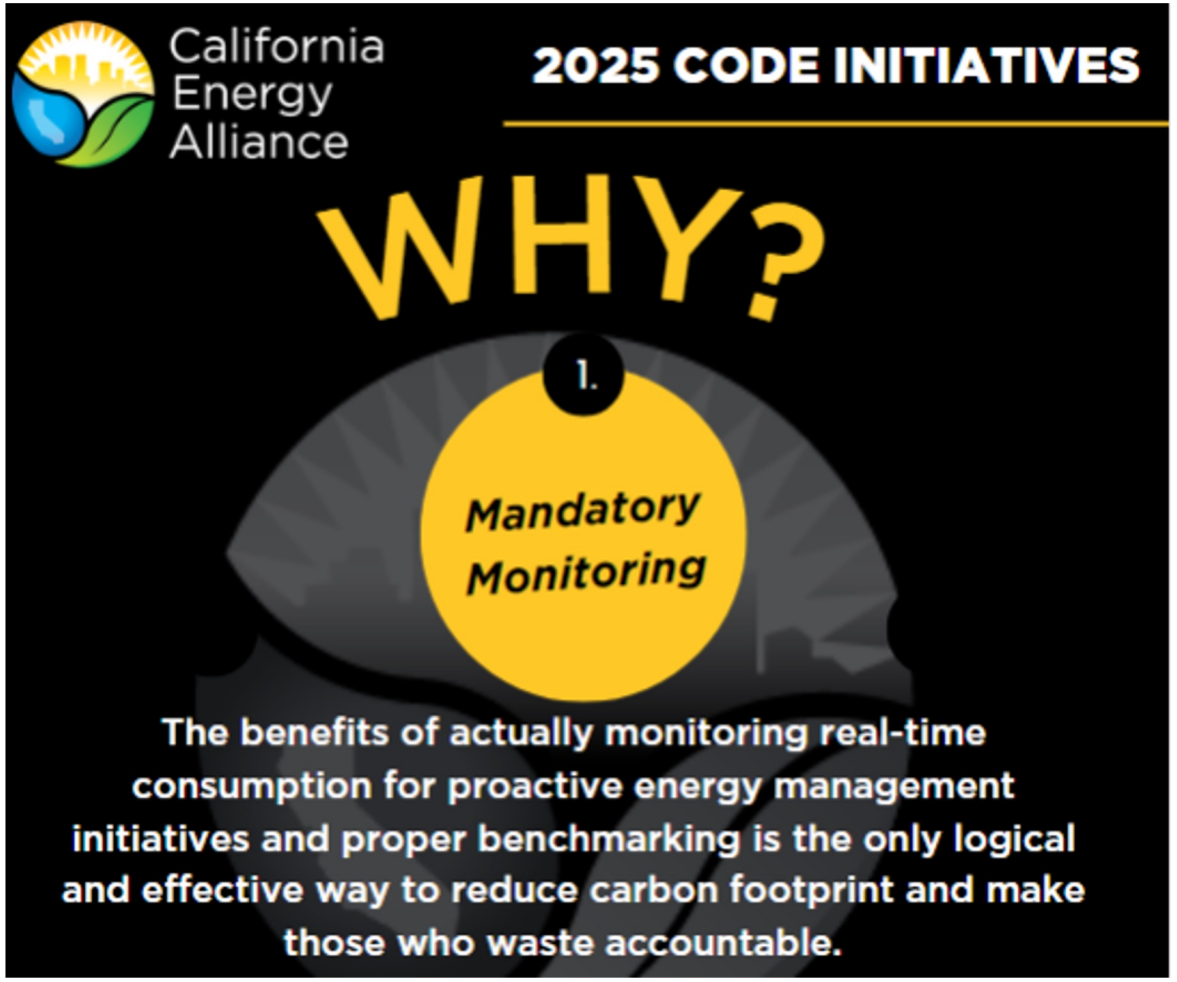
DRAFT TO CEC

FINAL CODE PROPOSAL

California Energy Alliance

MANDATORY MONITORING





MANDATORY MONITORING MARKUP

(b) ~~Separation of Electrical Circuits for~~ Electrical Energy Monitoring. ~~Electrical power distribution systems shall be designed so that measurement~~ Measurement devices ~~can~~ shall be installed to measure, monitor and record the electrical energy usage of load types according to TABLE 130.5-B to enable effective energy management. The electrical energy usage for all loads shall be recorded a minimum of every 15 minutes and reported at least hourly, daily, monthly, and annually. The data for each tenant space shall be made available to that tenant. In buildings having a digital control system, the energy usage data shall be transmitted to the digital control system and graphically displayed. The system shall be capable of maintaining all data

collected for a minimum of 36 mon

Table 1: Code Change Scope of Work

Energy Code Section(s)	Regulation Type(s): M, Ps, or Pm	Reference Appendices	Modeling Tools	Forms	Other Supporting Documents
Section 130.5(b of Title 24 Part 6)	M	N/A	N/A	N/A	N/A

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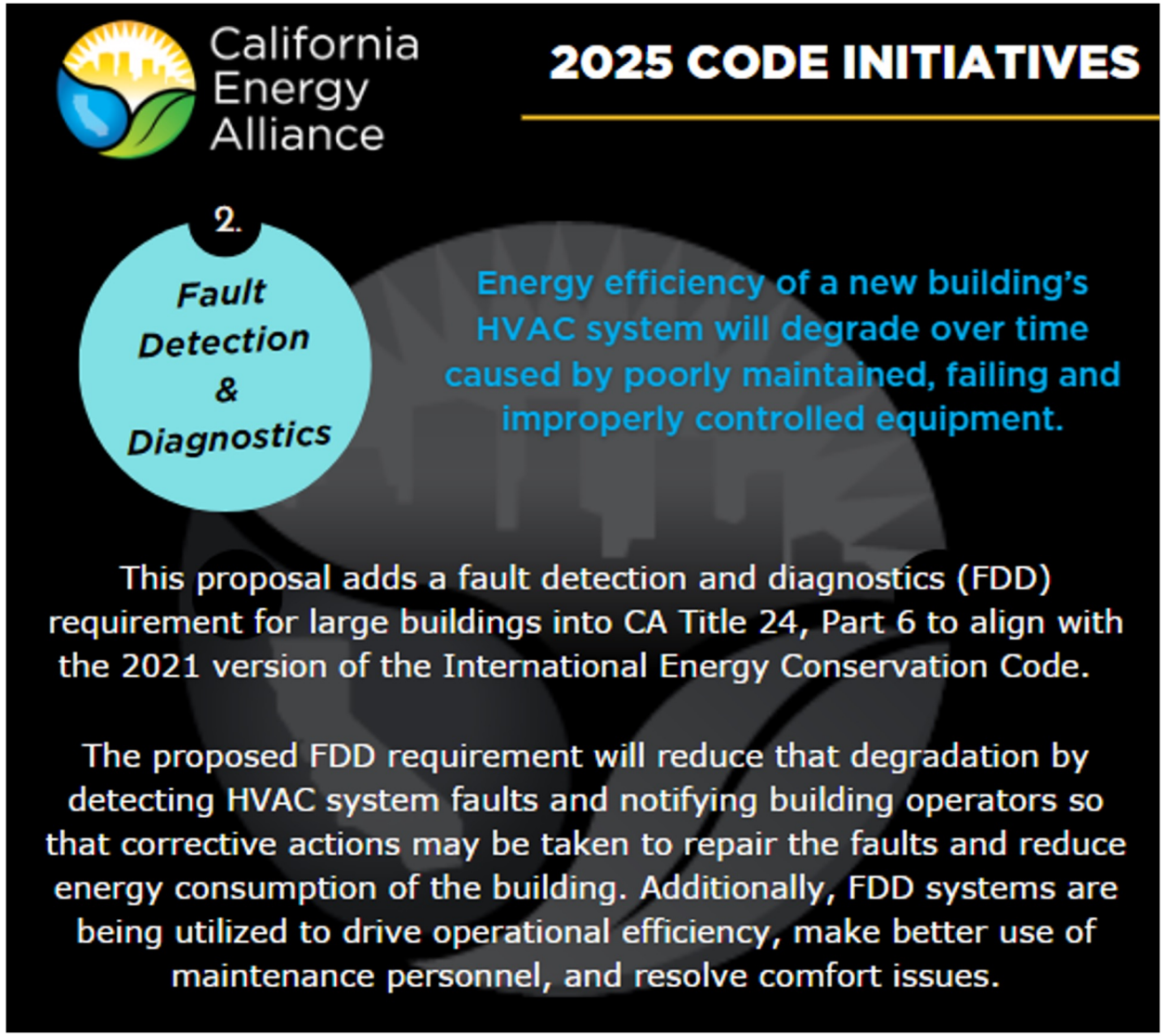
Fault Detection & Diagnostics



New Section

Energy Code

California Title-24

Part 6

California Energy Alliance

What is FDD?

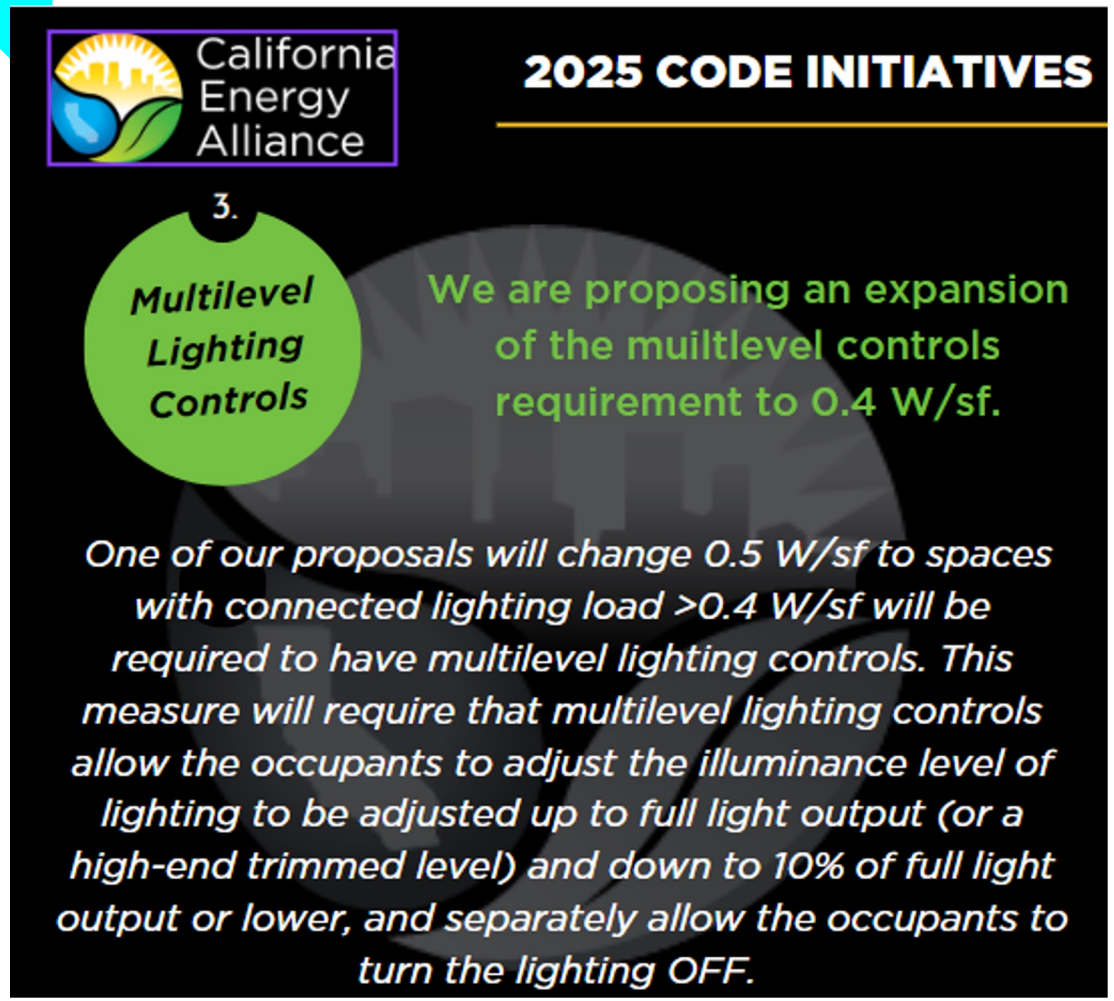
Section 10-102 - Definitions

Fault Detection and Diagnostics (FDD) System.

A software platform that utilizes building analytic algorithms to convert data provided by sensors and devices to automatically identify faults in building systems and provide a prioritized list of actionable resolutions to those faults based on prioritized performance impact.

California Energy Alliance

MULTILEVEL LIGHTING CONTROLS



Energy Code Section(s)	Regulation Type(s): M, Ps, or Pm	Reference Appendices	Modeling Tools	Forms	Other Supporting Documents
Section 130.1(b) of Title 24 Part 6	M	N/A	N/A	N/A	Table 130.1(a) Multi-level lighting Controls and Uniformity

California Energy Alliance

MULTILEVEL LIGHTING CONTROLS CODE LANGUAGE

Multilevel lighting controls. The general lighting of any enclosed ~~area 100 square feet or larger~~ space with a connected lighting load that exceeds 0.~~5~~4 watts per square foot shall provide multilevel manual lighting controls that allow the occupants to adjust the illuminance level ~~of lighting to be adjusted~~ up to full light output (or a high-end trimmed level) and down to 10% of full light output or lower, and separately allow the occupants to turn the lighting OFF ~~The multi-level controls shall:~~

~~Provide the number of control steps specified in Table 130.1-A; and~~

~~**Exception to Section 130.1(b)1:** Classrooms with a connected general lighting load of 0.6 watts per square foot or less shall have a minimum of one control step between 30 and 70 percent of full rated power, regardless of luminaire type.~~

~~Meet the uniformity requirements specified in Table 130.1-A.~~

Exception 1 to Section 130.1(b): An area enclosed by ceiling-height partitions that has only one luminaire with no more than two lamps or has only one inseparable SSL luminaire with a maximum labelled rated wattage of less than 20 watts.

Exception 2 to Section 130.1(b): Restrooms, laundry area, locker room, copy room, and exercise/fitness center (but not gymnasium).

Exception 3 to Section 130.1(b): Healthcare facilities.

California Energy Alliance

Spaces gained (not currently required to have multi-level lighting controls but would going forward).	**Spaces exempted currently will continue to be exempt going forward.**
• Audience seating area	• Laundry area
• Dining areas for bar/leisure/fine dining/fast food/cafeteria	• Locker room
• Gymnasium	• Copy room
• Motion picture theater	• Exercise/fitness center
• Transportation ticketing area	• Restrooms
• Classrooms	• Healthcare facilities
• Spaces using more than 0.4 W/sf and with only one luminaire using 20W or more lighting power (conference rooms, private offices…)	• Warehouse storage
• Small spaces less than 100 sf using more than 0.4 W/sf of lighting power	• Electrical, mechanical, telephone rooms

Lessons Learned

- Wins
- Challenges
  - Data
  - Energy Models
- Cost Effectiveness
- Timing

CEA Involvement in 2025 Energy Code Development

Lighting Language Cleanup Initiative:

- Nicole Hathaway, California Lighting Technology Center
- Martin Vu, RMS Energy Consulting
- Sally Blair, NORESCO
  - Energy Code Restructuring Update

Title 24 Lighting Language Cleanup

Status Update

California Energy Alliance Member Meeting—Fall 2023
November 16, 2023

UCDAVIS California Lighting Technology Center

Goals & Objectives

- Establish a working group of industry stakeholders to develop recommendations that simplify & clarify the nonresidential & residential lighting language contained in the 2022 Energy Code
- Improve code comprehension & compliance among designers, contractors, code officials, building owners, and others involved in lighting projects in California

SOUTHERN CALIFORNIA EDISON
An EDISON INTERNATIONAL Company

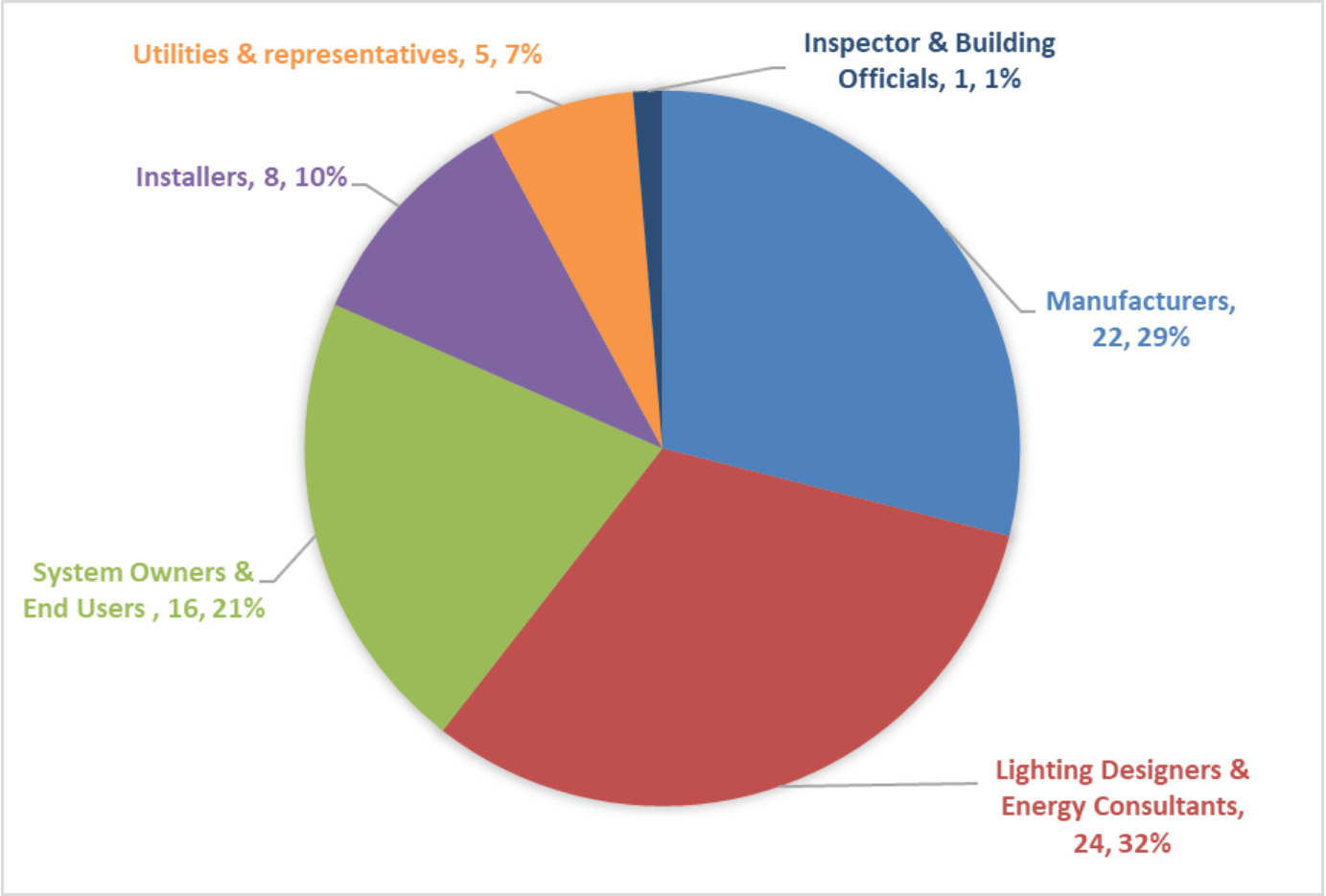
RMS Energy Consulting, LLC

UCDAVIS California Lighting Technology Center

California Energy Alliance

Public Participation

- 76 individuals representing 6 key stakeholder groups were invited to participate in Q1 2022
- Public call to participate on the CLTC website
- Graph shows breakdown by stakeholder group, number of individuals invited, and percent of total invited.
- 40 participants are actively participating (53%)



Targeted Topics

Topic	Stakeholder Participants	Stakeholder Engagement (Out of 40)
Automatic Daylighting Controls	10	29%
Demand Responsive Controls	10	29%
Multilevel Lighting Controls	9	26%
Outdoor Lighting	9	26%
Control Interactions	8	24%
Shut-OFF Controls	7	21%
Lighting Power Allowances	7	21%
Controlled Environment Horticulture Lighting	7	21%
Overall Structure of the Energy Code	6	18%
Residential	6	18%
Manual Area Controls	5	15%
Multifamily Buildings	5	15%
Sign Lighting	5	15%
Power Adjustment Factors	3	9%
Lighting Wattage Exclusions	3	9%
Acceptance Testing Requirements	3	9%
Electrical Power Distribution	3	9%
Compliance Manual	2	6%
Lighting Definitions	2	6%

Timeline

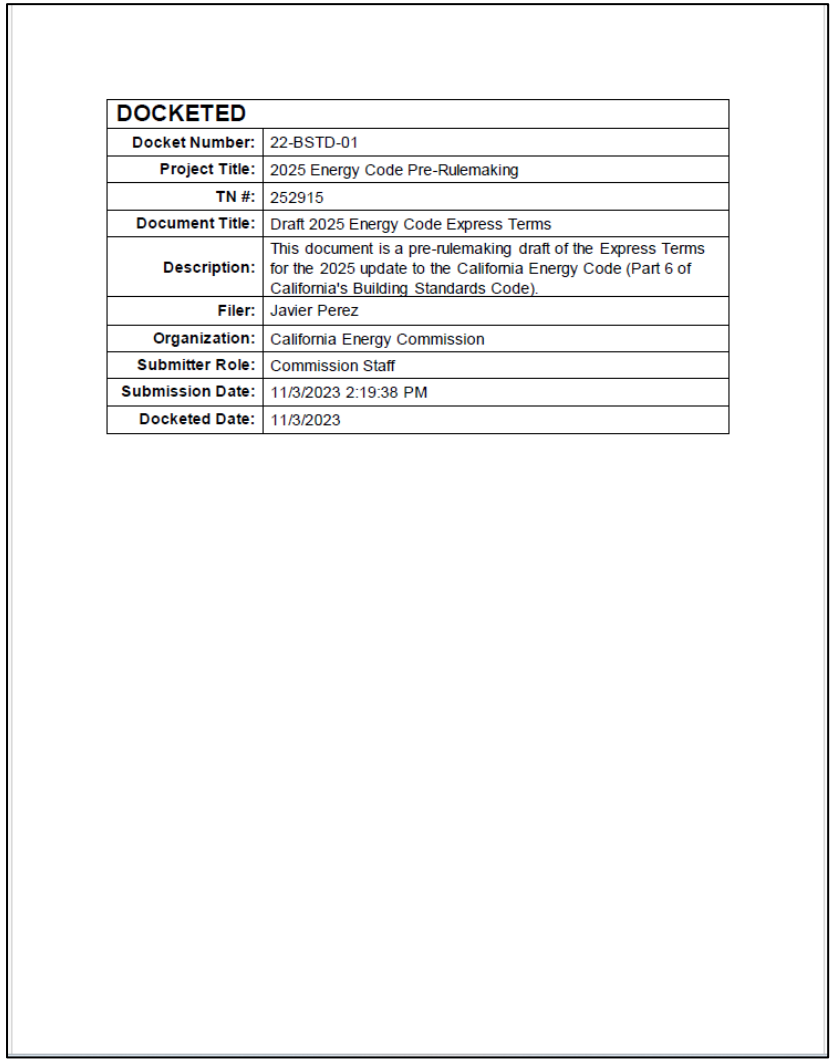
- **Subcommittee meeting development & brainstorming**
  - March 2022–June 2023
- **CEC Stakeholder Workshops**
  - February 2023—August 2023
- **Express Terms Released by CEC**
  - November 3, 2023
- **Comment Period**
  - Written comments due to CEC Docket by 5 P.M. November 17, 2023

Major Changes

- **Tailored Method Updates**
  - Removal of Tailored method. Remove Table 140.7-D, E, F, and G.
  - Added additional lighting power for lighting applications of "Convention, Conference, Multipurpose and Meeting Area," "Bar/Lounge and Fine Dining," "Lobby, Main Entry," "Grocery Sales," "Retail Merchandise Sales"—as new entries to Table 140.6-C.

- **Multilevel Lighting Updates**
  - Removed Table 130.1-A
  - Removed Items 1 and 2
  - Revised language to accommodate the above changes

- **Residential High Efficacy Updates**
  - Deleted Table 150.0-A; added compliance requirements to JA8
  - Miscellaneous clarification updates to the luminaire requirements, the indoor lighting controls requirements, and the outdoor lighting controls requirements.



DOCKETED	
Docket Number:	22-BSTD-01
Project Title:	2025 Energy Code Pre-Rulemaking
TN #:	252915
Document Title:	Draft 2025 Energy Code Express Terms
Description:	This document is a pre-rulemaking draft of the Express Terms for the 2025 update to the California Energy Code (Part 6 of California's Building Standards Code).
Filer:	Javier Perez
Organization:	California Energy Commission
Submitter Role:	Commission Staff
Submission Date:	11/3/2023 2:19:38 PM
Docketed Date:	11/3/2023

Other Notable Changes

- **Daylighting control changes & wattage exceptions**
  - Clean up recommendations (naming convention, organization)
  - Measure proposal (75 Watts)
- **Shut-off controls for stairwells/corridors**
  - Remove 130.1(c)7
  - Moved parts of it into 130.1(c)6
- **Outdoor motion sensing requirements**
- **Overall removed exceptions & added to the body of the requirement**

Comments?

- Comments related to express term language are due to CEC by 5 P.M. on November 17th

  (TOMORROW)

Public Comment
Written comments may be submitted to the Docket unit by 5:00 p.m. on November 17, 2023.

The CEC encourages the use of its electronic commenting system. Visit the e-commenting page for this docket at https://efiling.energy.ca.gov/Ecomment/Ecomment.aspx?docketnumber=22-BSTD-01. Enter your contact information and a subject title that describes your comment. Comments may be included in the "Comment Text" box or attached as a downloadable, searchable document in compliance with California Code of Regulations, Title 20, Section 1208.1. The maximum file size allowed is 10 MB.

Written comments may also be submitted by email. Include docket number 22-BSTD-01 and Pre-Rulemaking Draft Express Terms in the subject line and email to docket@energy.ca.gov.

A paper copy may be mailed to:
California Energy Commission
Docket Unit, MS-4
Docket No. 22-BSTD-01
715 P Street
Sacramento. California 95814

Codes & Standards Working Group

Engagement with 2025 Energy Code Rulemaking and Other Industry Codes & Standards:

- 2025 Energy Code
  - Draft Pre-Rulemaking Express Terms released
    - Comments due Fri. 11/17
  - Respond to Draft 2025 Energy Code
    - ATTs - reinstate language in Section 130.4(a)1
    - MLC – submit a letter encouraging the CEC to review CEA's proposal
      - Ask CASE Team support this proposal (email Kelly w/ PG&E)
    - *Western States Council to share comment letter on ATT/HERS*
  - Track and respond to upcoming Energy Code Rulemaking Proceeding
    - January - June 2024
    - C&S WG leads and then ask others to join
- Other C&S
  - ASHRAE 90.1 - FDD proposal
  - CALGreen

Morning Session Wrap-Up

Josh Dean

Lunch / Break

- *Will resume at 1:00 pm PT*

Overview of Afternoon Session

Josh Dean

Agenda

Afternoon Session

1:00 p.m.	Overview of Afternoon Session • *Josh Dean*
1:05 p.m.	Working Group Breakouts • *All* • *Discuss involvement with updated CEA Strategic Plan* • *Develop Work Plans for 2024*
2:40 p.m.	Developing a Coordinated Effort for 2024 • *All* • *Brainstorm New Strategic Priorities, Identify Research Needs & Opportunities, and Develop Action Items*
3:50 p.m.	Afternoon Session Wrap-up • *CEA Leadership*
4:00 p.m.	Adjourn

Working Group Breakouts

All

Working Group Breakouts

Goals for Breakouts:

- OBP Position Statement
  - Definition(s)
  - What's in scope
  - What's out of scope

- Backward Goal Setting w/ Milestones
  - Target Date = 2028 Energy Code Cycle
  - Identify funding needs
  - Identify potential stakeholders/partners
  - Overlap w/ Legislation
  - Other policy levers

- SWOT Analysis

Definitions

CEA: What is outcome-based code?

In order to determine compliance with energy codes, **Outcome-Based Code (OBC) relies on measured energy use instead of estimates based on expected connected load or modeling. OBC also captures whole building energy use including process loads and other Miscellaneous Electric Loads (MELs), which often go unaddressed by performance or prescriptive energy code compliance approaches. With an OBC approach, buildings are often monitored, post-occupancy, for a predetermined time period or periodically over many years. This data can then be used to determine if additional energy conservation measures are needed to bring the building in-line with minimum energy requirements. Strategies such as equipment tune-ups and retro-commissioning may then be deployed to improve building energy performance**

"Outcome-based energy codes use a building's actual, measured/metered energy performance as the compliance metric," said Cori Jackson, program director for the California Lighting Technology Center at UC Davis and president of the California Energy Alliance. "They can eliminate all of the complex and lengthy prescriptive requirements and replace these with a list of energy budgets by building type and/or application."

https://lightingcontrolsassociation.org/2021/07/23/outcome-based-the-future-of-energy-codes/

Outcome-Based – Therefore, the term 'Outcome Based' is used to refer to a code or policy that is directly based on actual, measured performance outcome of a building.
New Building Institute

Outcome-based codes, however, are based on design, construction, commissioning AND operations, instead of just the first three. They force building owners to measure and monitor the ongoing performance of a building.

https://www.facilitiesnet.com/energyefficiency/tip/What-Are-OutcomeBased-Codes--22728#:~:text=Outcome%2Dbased%20codes%2C%20however%2C,ongoing%20performance%20of%20a%20building.

To better align building performance improvement over time with widely accepted policy goals and public expectations, it will be necessary to move to an outcome-based code strategy, one where actual energy use is the metric by which building performance is judged. This approach focuses on real and measurable energy performance improvement rather than on the relationship of the buildings' energy characteristics compared to a theoretical building built to a code baseline.

https://newbuildings.org/code_policy/outcome-based-energy-codes/

2028 Energy Code Development Timeline

Developing a Coordinated Effort

All

Breakout Report Back

- Strategic Priorities
  - OBP Position Statement
- 2024 Work Plans w/ Milestones
- How to engage SVCC Fellows
- Project & Funding Needs
- How will YOU participate? - *Jamboard*

2023 Fall Meetings Wrap-Up

Josh Dean

CEA 2024 Strategic Vision

- OBP Position Statement
- Identify Research Needs & Opportunities
- Working Group Roles & Responsibilities
- Increased Engagement from Members
- Milestones

California Energy Alliance

Thank You
For Attending
CEA's 2023 Fall Member Meetings - Day 2

Meeting Materials are available to
CEA Members via the member portal at
caenergyalliance.org