AEG
APPLIED ENERGY GROUP

The Road to New Metrics: Evaluating Utility Programs based on GHG Emissions

November 14, 2022
Presented at BECC 2022
Barb Ryan | Applied Energy Group
Lisa Hannaman | Southern California Edison

Aligning Utility EE with State Goals

- State goals require a 40 percent reduction in GHG emissions below 1990 levels by 2030 and an 80 percent reduction in GHG emissions below 1990 levels by 2050.
- SCE's Clean Energy Optimization Pilot (CEOP) objectives:
  - Align goals to accelerate GHG reduction
  - Use a new and simplified performance payment framework to improve participant experience
  - Determine the feasibility of a meter-based approach
  - Inform future program design

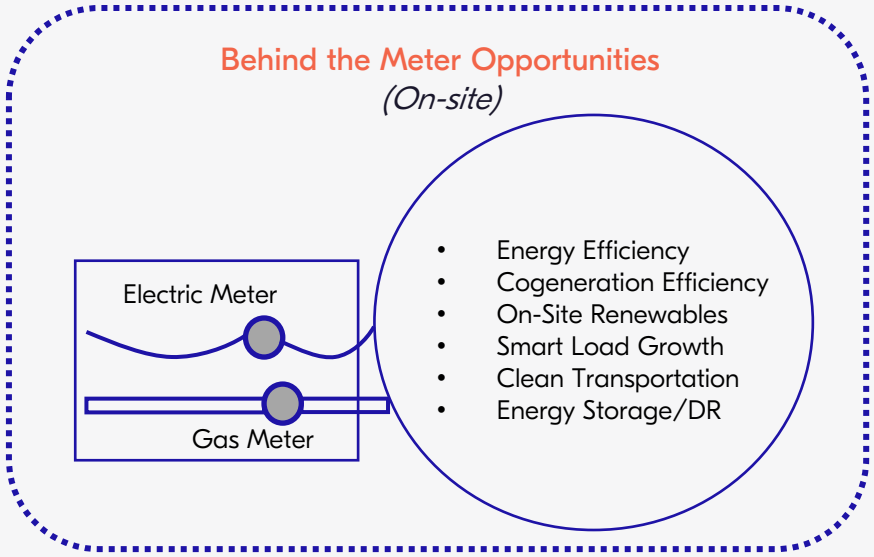
Clean Energy Optimization Pilot Overview

Background:

Part of SCE's pathway to enabling a clean energy future, focuses on helping our customers make cleaner energy choices. SCE is continuing to explore the development of programs that specifically focus on GHG emissions reduction that will allow customers to choose and implement technology solutions that best suit their needs, while helping California achieve its aggressive environmental goals.

Opportunity:

Incent and accelerate ***on-site, behind the meter*** opportunities.



Objective:

Through this pilot, SCE will demonstrate how a utility can facilitate offerings that directly ***incent*** and ***accelerate*** on-site behind the meter GHG emissions reduction opportunities with large customers through a performance based GHG incentive.

GOALS	BENEFITS
• Pilot an incentive framework to encourage customers to reduce GHG emissions	✓ Alignment with the State's and customers aggressive GHG reduction goals
• Determine the effectiveness and impacts of a performance based GHG incentive program	✓ Allows the flexibility to focus on multiple technologies
• Determine customer preferences of technology using performance based GHG incentive	✓ Incentive payouts are performance based
	✓ Allows for scalability of opportunities across multiple industry sectors

Pilot Customer: UC Office of the President and California State University System
Timeline: 4 pilot years
Funding: GHG Cap and Trade Auction Revenues (D. 14-10-033)
Approval: D.19-04-010 and PFM D.20-11-030

How the GHG Incentive Works

Step 1: Inputs (all meters within the "fence line")

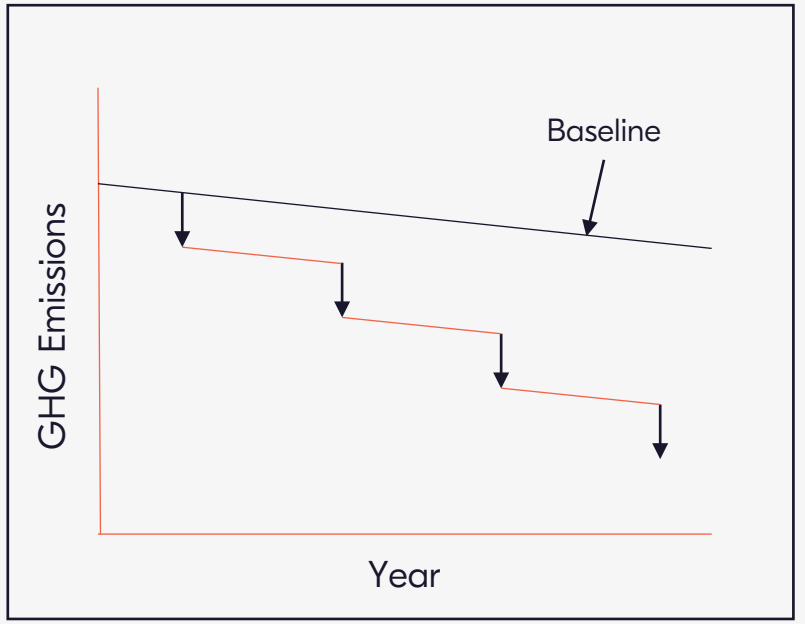
- Electric Meter(s)
- Natural Gas Meter(s)
  - Both co-generation and heating

Step 2: Adjustments

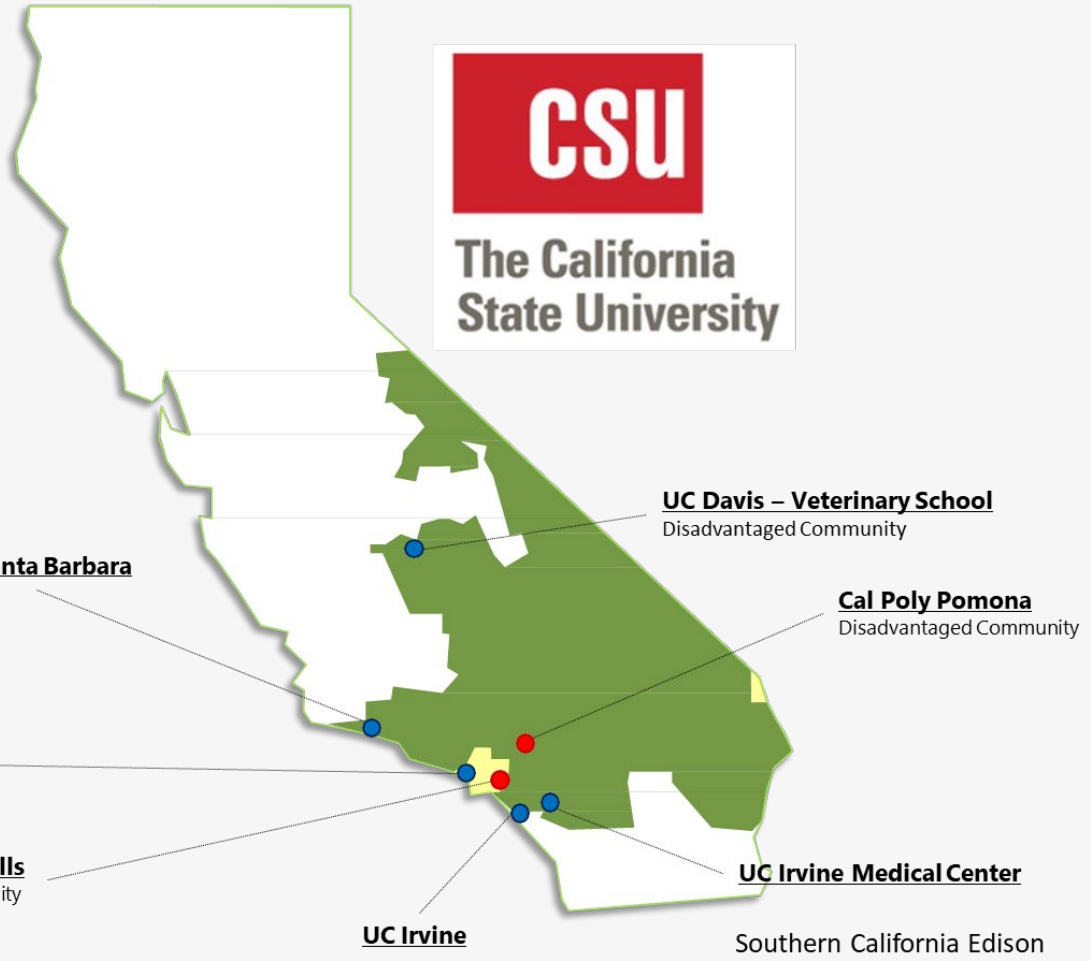
- Electricity used for Transportation
- Control Factors – Weather and Square Footage

Step 3: Conversion to GHG

- **Output**
  - **Baseline** GHG trajectory (bold line), or
  - **Performance** in GHG tons/sq. ft. (green arrows)



Pilot Participants



Changes Due to COVID – Performance Payment

	Original Design	Proposed Modified Design
Baseline and Performance Period	Annual	Month
Pilot Year 1	12 months	9 months
Baseline and Performance Period Comparison	Lowest Baseline Year	Lowest Baseline Month (of normal operation)
Normalization	Weather and Sq. Ft. Annually	Weather and Sq. Ft. Monthly
Optimal/Sub-Optimal	Sub-Optimal = Year-over-year emissions increase	Sub-Optimal = Net GHG emissions increase in a given Pilot Year

Evaluation Approach

Clean	Collect, clean, and process participant energy data
Create	Create normalized energy models
Estimate	Estimate annual GHG reduction
Analyze	Analyze grid impacts
Verify	Verify performance payment calculations
Conduct	Conduct participant interviews

First Year Projects Completed

- Five of the seven participants completed projects designed to reduce their GHG emissions
- Projects fell into 5 distinct categories
- Traditional EE projects were the most popular — undertaken by all 5 campuses that actively participated

Campus	Electrification	Traditional EE	Energy Storage	Building Optimization / Automation	Generation
CSUDH	√	√	-	√	-
Cal Poly Pomona	√	√	-	-	-
UC Irvine	√	√	-	√	√
UC Santa Barbara	-	√	-	√	-
UCI Med. Center	-	√	√	√	-
UCLA Med. Center	-	-	-	-	-
UC Davis VMC	-	-	-	-	-

CEOP Results — First Year*

First Year GHG Reduced

- 7,565 tonnes of CO_2

Incentives Paid

- $4.6 million

Reduced Peak Consumption

- 84 MWh or 7%

Persisting reduction (7 years)

- 53,008 CO_2 tonnes

Avoided T&D Costs

- $435

First Year Results - CEOP

In total, the participants reduced between almost 7,600 tonnes of CO_2 during the first pilot year which is equivalent to the CO_2 emissions from approximately:

- 1,728 passenger vehicles driven for one year
- 900,191 gallons of gasoline consumed
- 8,814,902 pounds of coal burned

Campus	Total Calculated tonnes CO_2/Yr	Paid Incentive	% CEOP CO2 Reduction from PY0
CSUDH	2,044	$1,158,158	18.5%
Cal Poly Pomona	751	$425,551	3.3%
UC Irvine	2,502	$1,399,188	-1.6%
UC Santa Barbara	1,544	$874,525	2.8%
UCI Med. Center	1,371	$776,605	2.8%
UCLA Med. Center	(627)	-	4.9%
UC Davis VMC	(20)	-	-3.7%
Total	**7,565**	**$4,634,027**	3.4%

Evaluated Results

Evaluated results are based on the regression methodologies used to estimate normalized changes in consumption

CEOP results are based on the incentive calculator.

Year Two Projects

- Projects remain focused on traditional EE but electrification, building optimization and generation projects are growing

Campus	Electrification	Traditional EE	Energy Storage	Building Optimization / Automation	Generation
CSUDH	√	√	-	√	√
Cal Poly Pomona	-	√	-	√	√
UC Irvine	√	√	-	√	√
UC Santa Barbara	√	√	-	√	-
UCI Med. Center	-	√	-	√	-
UCLA Med. Center	√	-	-	-	-
UC Davis VMC	-	-	-	-	-

Lessons Learned

Program support and transparency is key

- Provide participants with tools to estimate GHG reductions and incentive payments during the program year
- Promote knowledge sharing among participants

Data issues remain

- Gas data is not readily available at a granular level (e.g., hourly data, building level data)
- Building-level analysis is a challenge
- EV data is not as comprehensive as anticipated

Thoughts on Future Program Design

Aligning the goal and the metric is crucial

- Measurements at the meter only can work
- Encourages beneficial electrification

The CEOP approach encourages flexibility and innovation

- Instead of a prescribed catalog of accepted improvements, participants choose how to meet the goal
- Avoids stringent requirements and hassles of traditional EE programs

Thank You.

Applied Energy Group

appliedenergygroup.com