



California Statewide Gas Emerging Technologies

Research Project Update



Cristalle Mauleon
Project Manager – Linucs Inc.

06/13/2023

Agenda

- Project Goals
- Project Outline
- Project Findings
- Q&A
- Next Event

Today's Speaker

- Cristalle Mauleon



Program Overview

Background

- **Jointly funded by** Southern California Gas Company, Pacific Gas and electric, and San Diego Gas and electric
- **Represents** 11 million natural gas customers in California
- **Program launched** in 2021
- **Research timeline** 2022-2024



Pacific Gas & Electric	Other Natural Gas Utilities:
Southern California Gas	- City of Coalinga
San Diego Gas & Electric	- City of Palo Alto
Southwest Gas Corporation	- City of Vernon Gas System
Tuscarora	- Island Energy
Southern California Edison	- Long Beach Gas & Oil
	No Service



Project Goals

Project Goals

ET22SWG0001: Research and Analyze Water Heating Technology Market & Current Trends

Project Goal: Gather EE program participation and market data on energy efficient water heating technologies to provide an understanding of programmatic uptake and related drivers and barrier for these technologies.

Technologies: Existing technologies with measure packages



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Project Outline

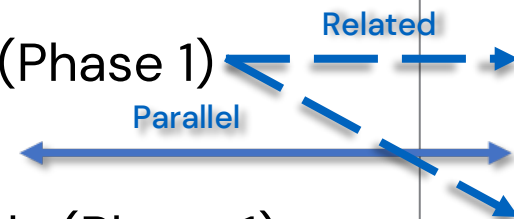
Project Outline

ETSWG220001 – Research and Analyze Water Heating Technology Market & Current Trends

- 1) Project Initiation Meeting
- 2) Water Heating Technology Table (Phase 1)
- 3) Interview Subject Matter Experts
- 4) Water Heating Participation Trends (Phase 1)
- 5) Water Heating Participation Trends (Phase 2)
- 6) Compare Historical Trends with Statewide Potential
- 7) Cost, Simple Payback and Total System Benefit (TSB) Charts for (5) Opportunities

ETSWG220002 – Evaluation of Emerging Water Heater Technologies

- 1) Project Initiation Meeting
- 2) Emerging Technology Prioritization
- 3) Interview Subject Matter Experts (SMEs)
- 4) Emerging Technology Additional Info
- 5) High-Level Energy Savings
- 6) Total Resource Costs (TRC), and Total System Benefits (TSB)





Project Task Findings

Project Findings – Subject Matter Experts

- (16) Interviews conducted across multiple categories:
 - (7) Manufacturers
 - (2) Technical Experts
 - (6) Installers/Contractors
 - (1) Technology Distributor
- Experts recruited from:
 - Hot Water Forum
 - Midstream Water Heating Participating Distributors
 - SCAQMD Rule 1146.2 & Rule 1121 List of Certified Units
 - Previous professional relationships

Project Findings – Subject Matter Experts

Key Findings:

- **Barriers – Overall Survey**
 - High initial costs
 - Lack of awareness
 - Lack of trained installer and maintenance personnel
- **Drivers**
 - Independent verification of performance
 - Improved performance
 - Environmental compliance



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Project Findings – Participation Trends: Overall

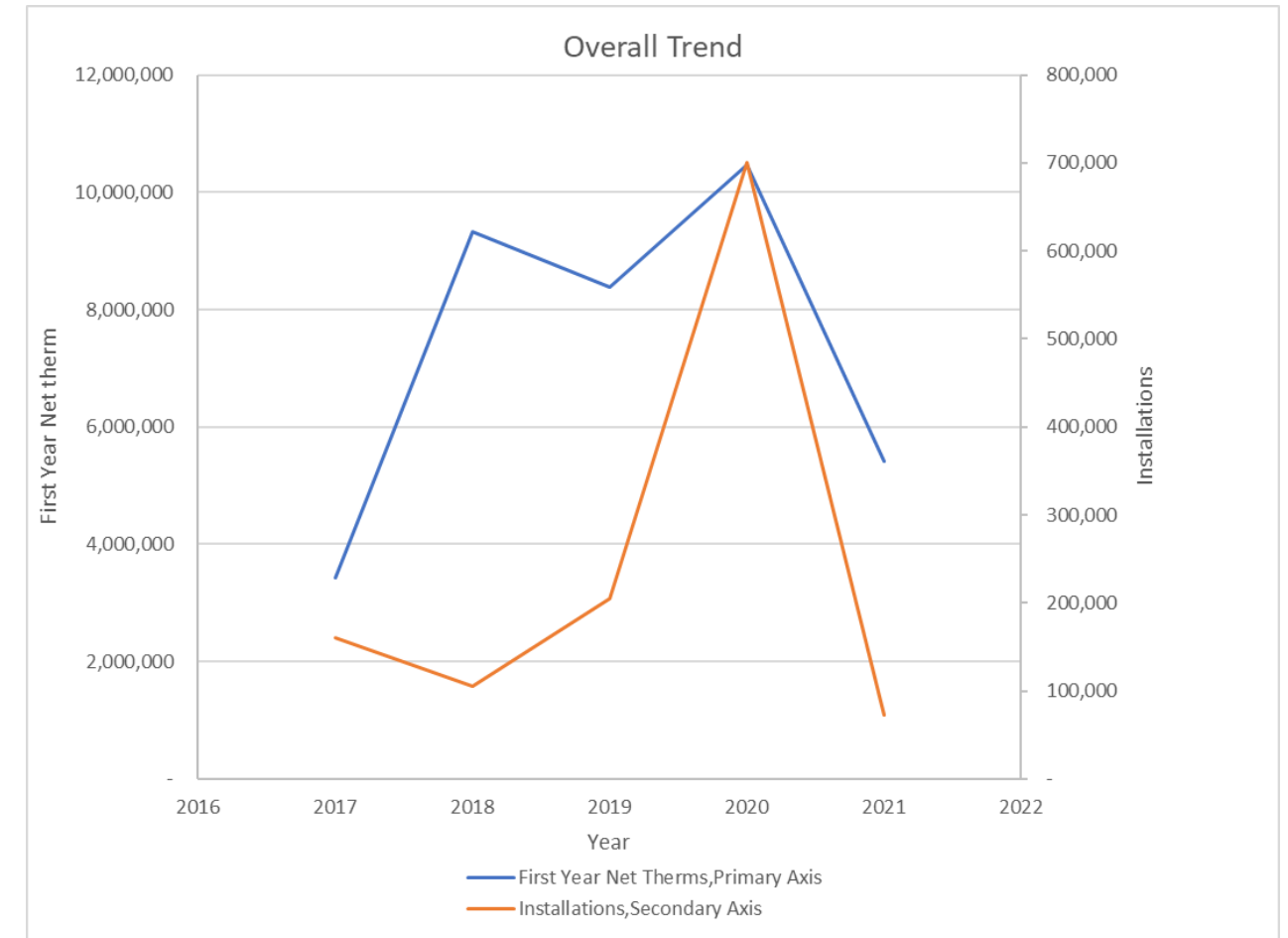
CEDARS data (2017–2021) used to analyze participation trends

Successes:

- 1) Residential Tankless Condensing Water Heaters
- 2) Commercial Tankless Condensing Water Heaters
- 3) Commercial Tankless Non-Condensing Water Heaters

Opportunities:

- 1) Domestic Hot Water Loop Temperature Controller (SWWHO16)
- 2) Solar Thermal Water Heating System – Residential (SWWHO32)
- 3) Solar Thermal Water Heating System – Multifamily (SWWHO34)
- 4) Boiler – Multifamily (SWWHO10)
- 5) Boiler – Commercial (SWWHO05)
- 6) Pool Heater – Commercial (SWRE003)

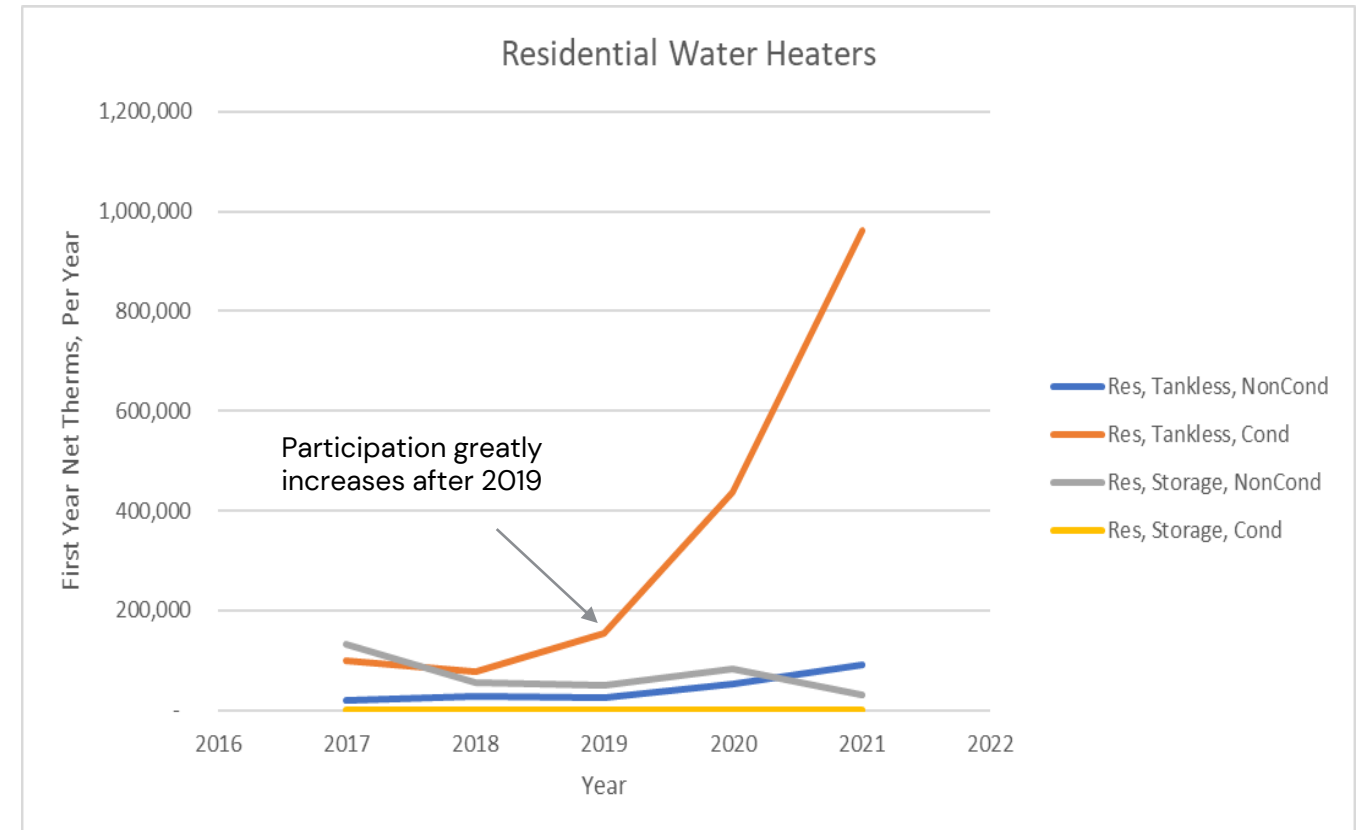


Project Findings – Participation Trends: Single-Family Residential

SF Residential Key Findings:

- Tankless > storage
- Tankless condensing > tankless non-condensing
- Tankless condensing 2020–2021 > 2017–2019

Residential Tankless vs Storage Water Heaters First year net therms 2017–21



Project Findings – Participation Trends: Multi-Family

MF Boiler/Water Heater

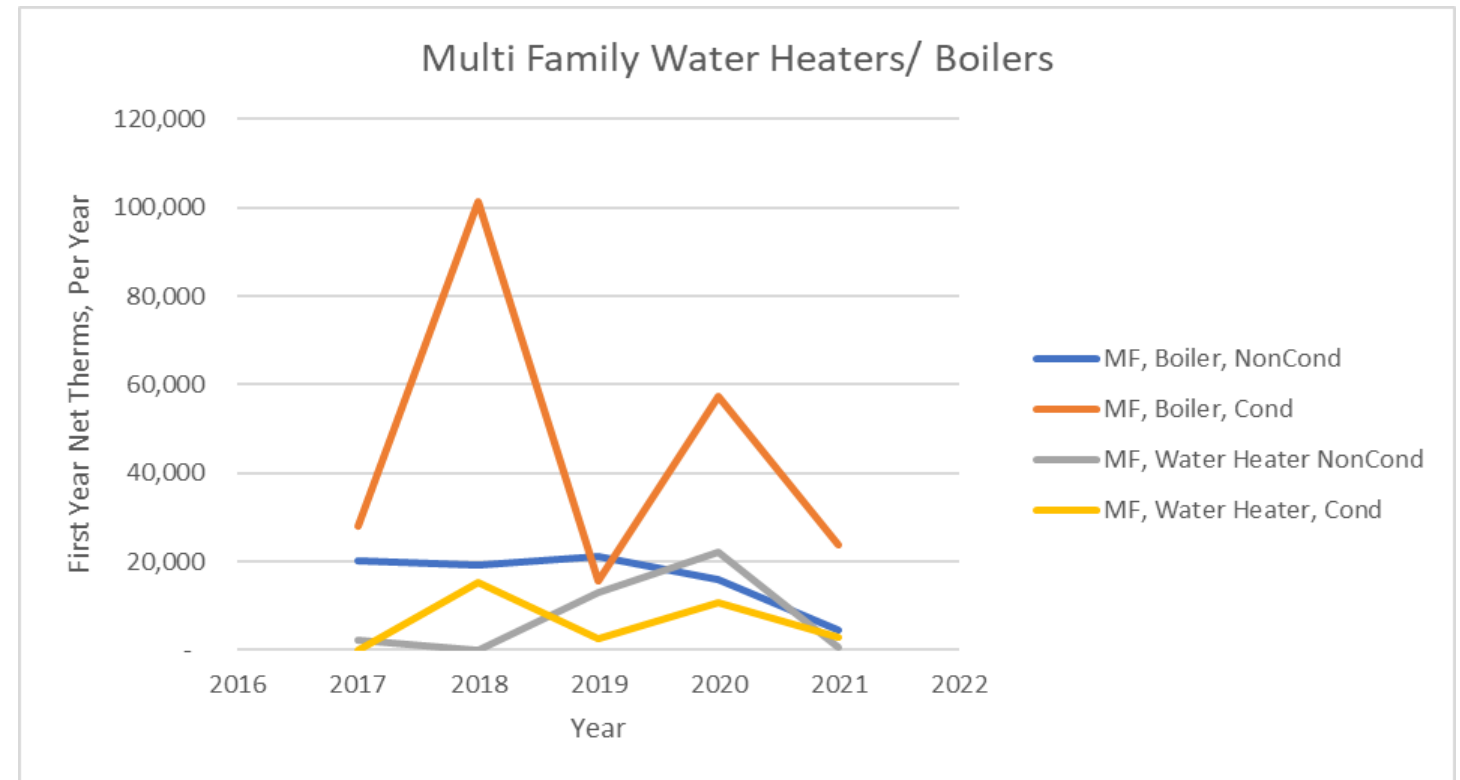
Key Findings:

- Condensing > non-condensing (except central storage)
- Overall boiler/storage participation decrease

Table 6: Summary of Water Heating Measures in Multi-Family Buildings

Program	Total Net Therm Savings (Water Heating Measures, 2017-2021)	Note
RES-Residential Energy Efficiency Program (SCG3702)	739,279	In 2019, this program absorbed SCG 3704
RES-MFEER (SCG3704)	117,255	In 2019 this program was absorbed into SCG 3702
Enhance Time Delay Relay (PGE21008)	53,215	
Multifamily Energy Savings (MCE01)	19,013	
Multifamily Program (PGE_Res_003)	17,201	

Multifamily Water heaters vs Boilers First Year net therms 2017-21

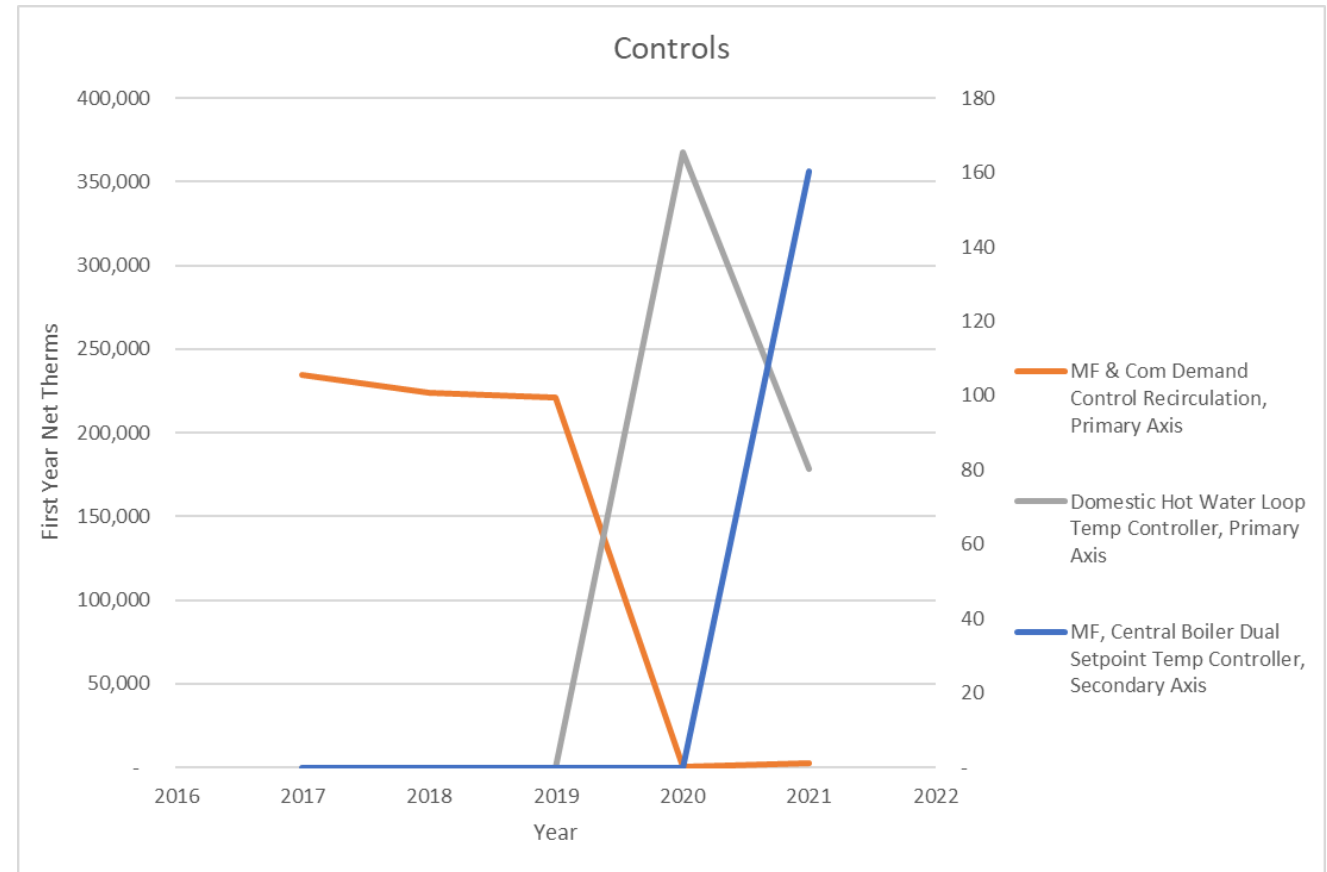


Project Findings – Participation Trends: Multi-Family

MF Controls Key Findings:

- Domestic Hot Water Loop Temperature Controllers have only seen participation in 2020 and 2021
- Demand control recirculation **declined**
- Domestic hot water loop temperature controller **increased**.
- Central boiler dual setpoint temperature controller **very low**

Multifamily Controls

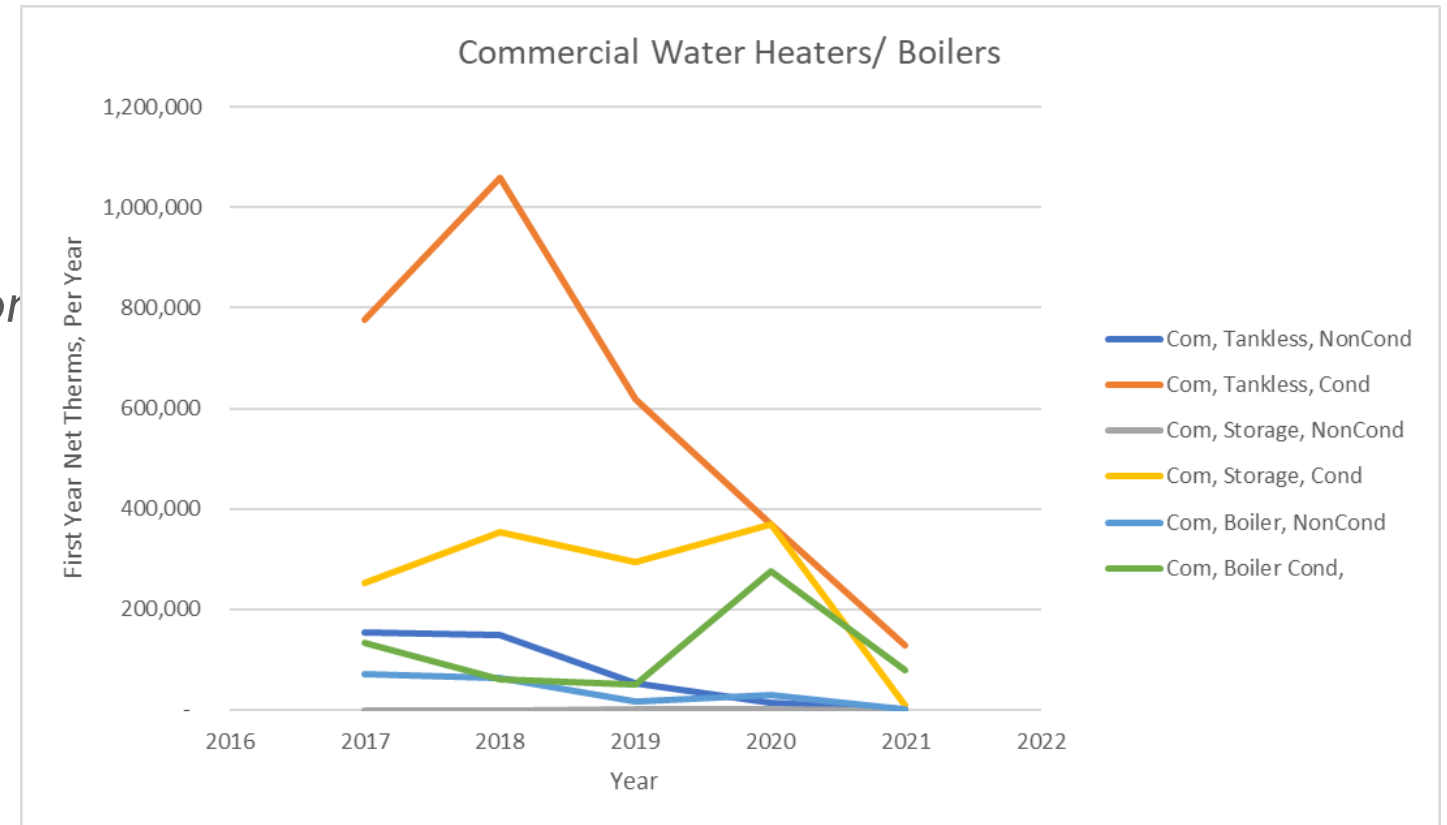


Project Findings – Participation Trends: Commercial

Commercial Key Findings:

- Condensing > non-condensing
- Tankless > storage
- Almost 0 participation for non-condensing storage water heaters (*opposite of SF res: 0 participation for condensing storage water heaters*)

Commercial Water Heaters and Boilers First year net therms 2017-21



Project Findings – Participation Trends

1) AQMD Ultra-low NO_x requirements:

- (41) residential storage water heaters on Energy Star & AQMD QPL
- (147) residential tankless water heaters on Energy Star & AQMD QPL

2) Barrier for tankless and condensing

- From SME interviews – cost a **top barrier**
- Higher participation of tankless condensing water heaters
- Probably other drivers
- Ex: tankless water heater saves space which has material value
- Consider other factors

3) Controls measures typically need support from workforce education & training, so savings persist over time

4) Controls gaps

Project Findings – Existing Technology TRC and TSB

Key Findings:

- Pool/Spa heater payback
- Multifamily measures

Measure Offering Description	Normalizing Unit	Incentive	TSB	TRC	Simple Payback	Comments
Tier 1 Commercial Pool/Spa Heater (TE >= 84%)	Cap-kBtuh	\$0/\$2/\$5.80	\$1.11-\$2.38	0.14 – 0.20	4.0 – 10.2	Simple payback w/incentive sometimes longer than equipment life
Tier 2 Commercial Pool/Spa Heater (TE >= 94%)			\$4.41-\$5.69	0.37 – 0.59	2.2 – 4.4	
Central domestic hot water boiler, 90% TE	Cap-kBtuh	\$0.00/\$4.00	\$35	6.42 – 9.53	0.3 – 0.7	Less than 1 yr payback w/o incentives
Central domestic hot water boiler, 96% TE		\$0.00	\$55	8.21	0.8	
Domestic Hot Water Loop Temperature Controller, Multifamily & Commercial (1-35 units)	Household/	\$0/\$700	\$44	0.72 – 0.93	2.0 – 3.3	Less than 5 yr payback w/o incentives
Domestic Hot Water Loop Temperature Controller, Multifamily & Commercial, (36-50 units)	Dwelling	\$0/\$1,400		1.4 – 2.09	0 – 1.0	
Single Family solar thermal water heating system with storage gas backup	Each	\$0/\$3500/\$5359	\$486	0.08 – 0.12	9.9 – 39.8	Long paybacks/Low TRC
Single Family Solar thermal water heating system with tankless gas backup		\$0/\$4500/\$5359	\$931	0.13 – 0.22	6.0 – 24.1	
Single Family Solar thermal water heating system with tankless gas backup		\$0/\$4500/\$5359	\$407	0.07 – 0.12	10.5 – 42.1	
Multifamily solar thermal water heating system	Area-Ft ²	\$0-\$204	\$36	0.18 – 0.32	0 – 16.2	Long paybacks/Low TRC



Project Overall Findings

Project Findings – Overall

- Barriers: high cost, lack of awareness, lack of training
- Drivers: independent verification, better performance, environmental compliance
- AQMD Ultra-Low NO_x regulations limit participation
- High participation of tankless condensing water heaters
- Gaps in water heating controls
- Multifamily segment has less participation – needs marketing to and education for customers and training for installers/maintenance

→ Q&A

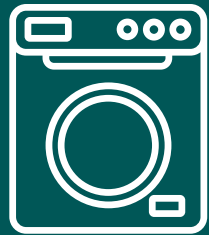
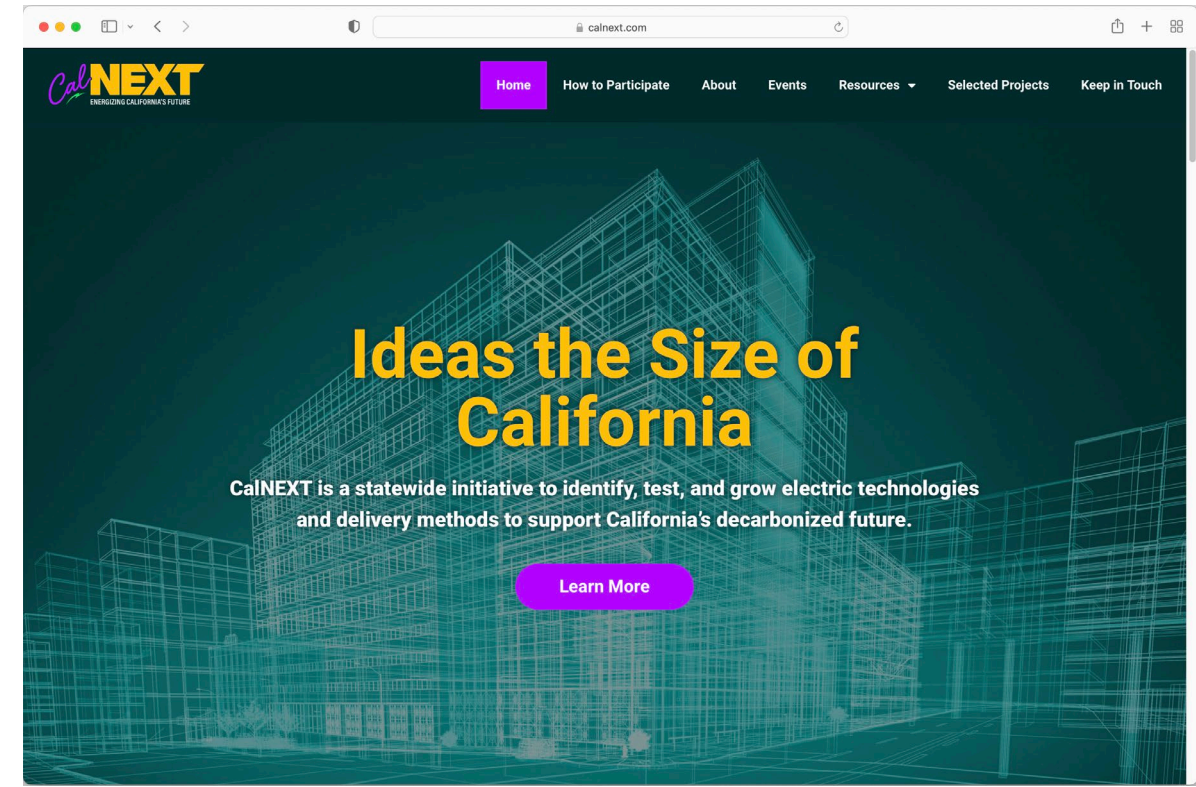
Next Event: July 18, 2023, 1-2PM – ET22SWG002 – Emerging Water Heating Technologies Results



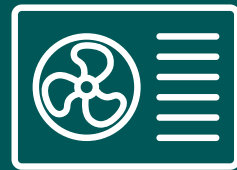
CalNEXT

CalNEXT's vision is to identify emerging electric technologies across six priority areas and bring them to the IOU energy efficiency programs portfolio.

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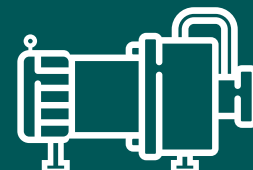
Appliances
& Plug
Loads



HVAC



Lighting



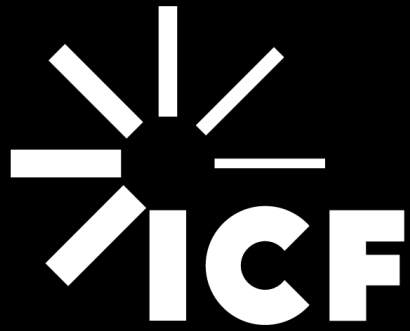
Process
Loads



Water
Heating



Whole
Buildings



Get in touch with us:
Alfredo Gutierrez

Program Manager
1.909.241.6356
alfredo.gutierrez@icf.com

icf.com

 [linkedin.com/company/icf-international/](https://www.linkedin.com/company/icf-international/)

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