TECH Clean California Tariffed On-Bill Investment Pilot

Stakeholder Working Group, Workshop #3

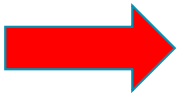
Customer Economics

November 4, 2021

TECH CLEAN CALIFORNIA

The TECH Clean California initiative is funded by California gas corporation ratepayers under the auspices of the California Public Utilities Commission.

We Are Here:



Session	Date	Topic
#1	Sept. 23	Goals and metrics, workplan and timeline
#2	Oct. 7	Tariff terms, authority to adopt, ownership of assets
#3	**Nov. 4**	**Customer economics**
#4	Nov. 18	Consumer protections
#5	Dec. 2	Information system requirements
#6	Dec. 16	Supply Chain, Quality Assurance, Risk Mitigation
#7	Jan. 6	Implementation Plan, Timeline, Budget

Workshop #3 Agenda

1 Introductions

2 Customer Operating Impacts

3 Capital Stack

4 Program Costs

Who's In the Room?

- Name, preferred pronoun, organization, role

  Please note:

  - Are there other members of your organization working/likely to work on TOB?
  - What do you hope to get out of these working group meetings?
  - Do you expect to have design ideas, proposals or research to share during these workshops?

Workshop Format & Ground Rules

Workshop objective: Information sharing and feedback on opportunities and challenges, pros and cons of program design alternatives from stakeholders who might implement a program.

Not a joint decision-making process.

Workshop discussions are **off the record**. Notes and recordings are for the benefit of Working Group participants only.

All meetings will be recorded and shared with workshop stakeholders

Resources: to be posted on SharePoint site for workshop attendees, recordings, presentation slides, draft documents, etc

Gathering Feedback & Information

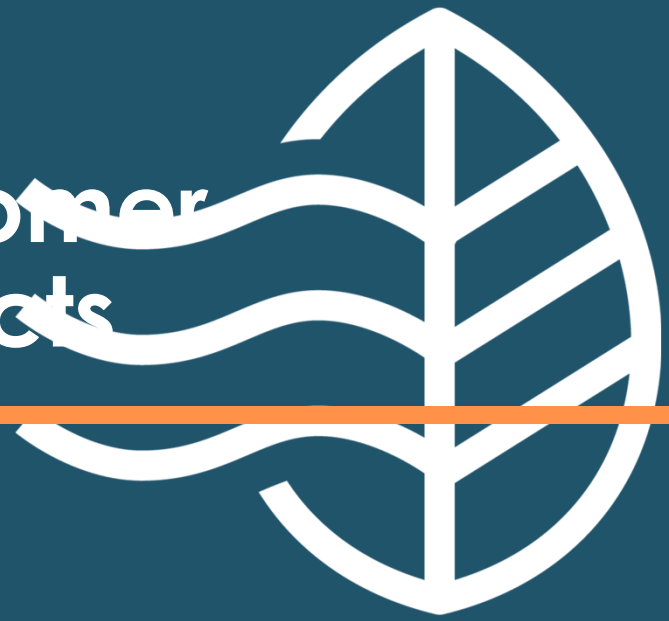
During Workshops

- Opportunities for Q&A
- TOB team will solicit direct feedback through questions and open discussion
- Participants can share their proposals or information on different topics (ideally scheduled ahead of time)

Following each Workshop:

- A survey will be sent to each participant giving them opportunity to provide answers or feedback on key issues
- Sometimes (including today), the survey will include material mentioned but not described in detail during the presentations
- We encourage you to complete those right away, following each workshop, but no more than one week later
- Surveys are to generate feedback to TECH team; results will not be distributed

2 Analysis of Customer Operating Impacts

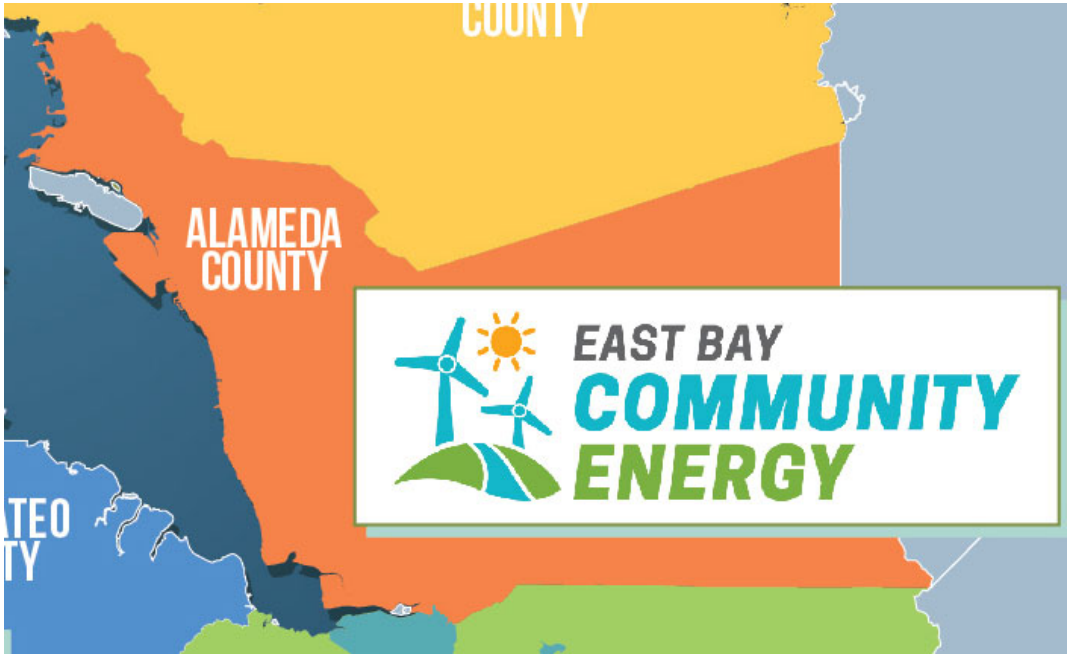


Source Data

- **Thank you to EBCE for making data available!**
- 237k non-solar customers in analysis frame
  - 89% climate zone 3
  - 11% climate zone 12
- 47k CARE non-solar customers in analysis frame

- Climate Zone 3
  - mild winters (~2900 HDD)
  - mild summers (~128 CDD)
  - ~47% of households have mechanical cooling

- Climate Zone 12
  - milder winters (~2600 HDD)
  - warmer summers (~1580 CDD)
  - ~84% of households have mechanical cooling



Analysis Inputs

- **Space Heating**
  - 80% AFUE existing furnace
  - 10 HSPF (2.9 COP) replacement Heat Pump
  - Observed metered heating load
- **Space Cooling**
  - 10 SEER existing central AC
  - 18 SEER replacement Heat Pump
  - Observed metered cooling load
- **Domestic Hot Water**
  - 58% EF existing gas water heater
  - 3.1 COP replacement Heat Pump Water Heater
  - 74.5 gallons used per day
- **Energy Efficiency**
  - 30% reduction in heating & cooling loads
- **PV**
  - 3 kW system, 4,500 kWh per year (50% during summer)
- **Gas Rates**
  - PG&E G-1 baseline price, $1.8814
  - PG&E GL-1 CARE baseline price, $1.50263
- **Electric Rates**
  - Reference case:
    - PG&E TOU-C Summer Off-Peak price, $0.3563
    - PG&E TOU-C Winter Off-Peak price, $0.3053
    - Schedule D CARE discount on above: 34.95%
    - No baseload discounts on TOU-C rates
  - Emerging Rate case:
    - PG&E EV2 Summer Weighted Ave of Partial-Peak and Off-Peak price, $0.2278
    - PG&E EV2 Winter Weighted Ave of Partial-Peak and Off-Peak price, $0.2208
  - All cooling at summer rates
  - All heating at winter rates
  - DHW at weighted ave.: 67% winter, 33% summer

Analysis Scenarios

1. Reference case: electrification of space heating & cooling, DHW, PG&E TOU-C and G-1 rates
2. Reference + energy efficiency
3. Reference + PV
4. Reference + EE + PV
5. Emerging rate
6. Emerging rate + EE + PV
7. CARE + EE + PV

Histogram of Annual Bill Savings: Reference Case

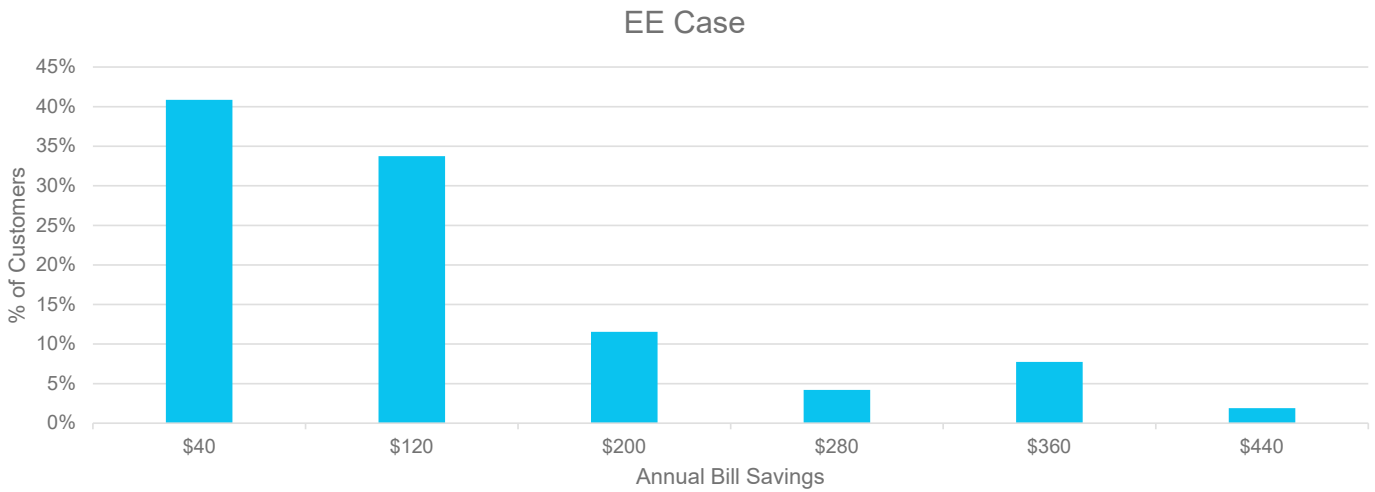
HP+HPWH, PG&E electric TOU-C, gas G-1, no energy efficiency

Color Code
- Negative Savings
- Positive Savings
- Savings > $625 / yr

- 65% of customers see net bill increases; 2% of customers save more than $200/yr
- Customer savings are negatively correlated with GHG reductions
- **Target no one**

Energy Efficiency Case

HP+HPWH, PG&E electric TOU-C, gas G-1, 30% improvement in heating and cooling loads

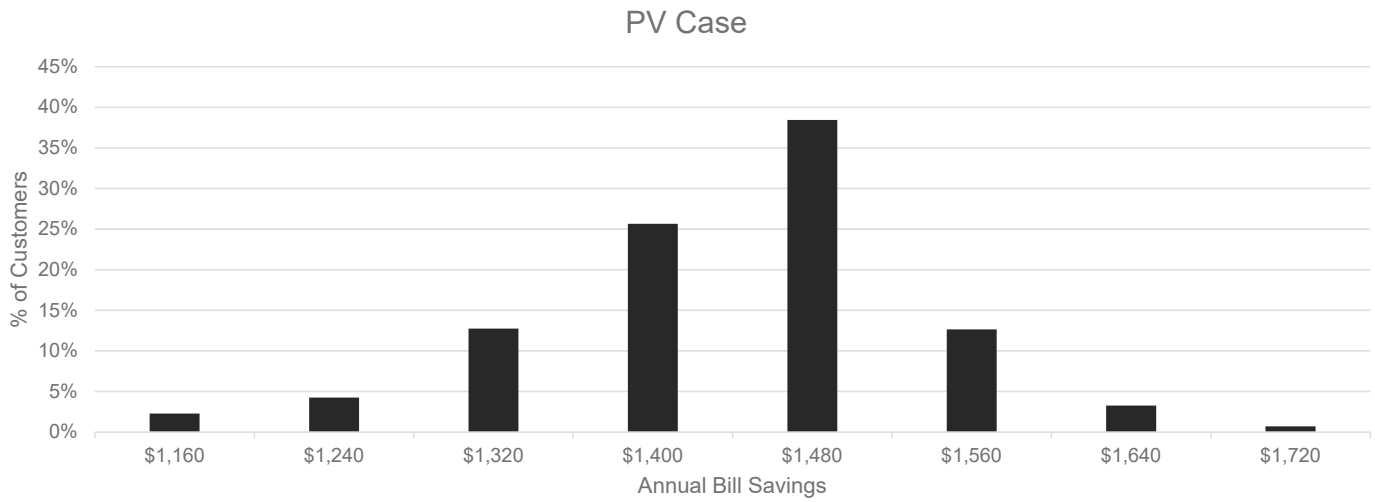


Color Code
- ❖ Negative Savings
- ❖ Positive Savings
- ❖ Savings > $625 / yr

- All customers cash-positive on operations; no customers save $625 / yr
- Benefits from EE and cooling savings overcome space heating penalty
- Customer savings are somewhat correlated with GHG reductions
- **Target customers with HIGH cooling electric usage and HIGH heating gas usage**

PV Case

HP+HPWH, PG&E electric TOU-C, gas G-1, no energy efficiency, 3 kW PV

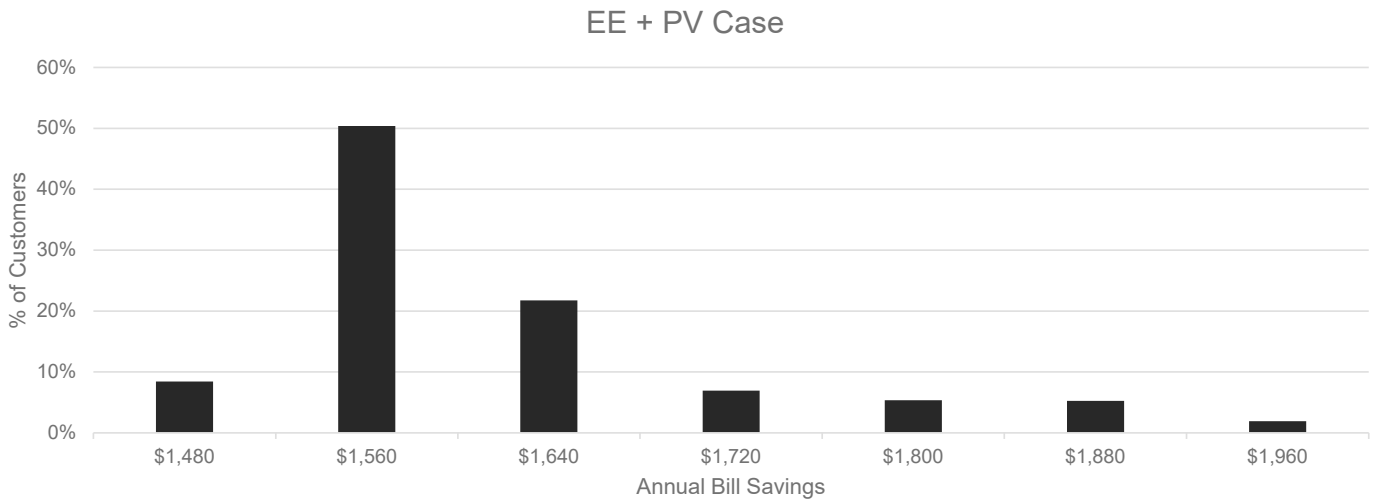


Color Code
- ❖ Negative Savings
- ❖ Positive Savings
- ❖ Savings > $625 / yr

- All customers save > $625/yr
- Customer savings are still negatively correlated with GHG reductions
- **Target customers HIGH cooling electric usage, good solar access**

EE+PV Case

HP+HPWH, PG&E electric TOU-C, gas G-1, 30% improvement in heating and cooling loads, 3 kW PV

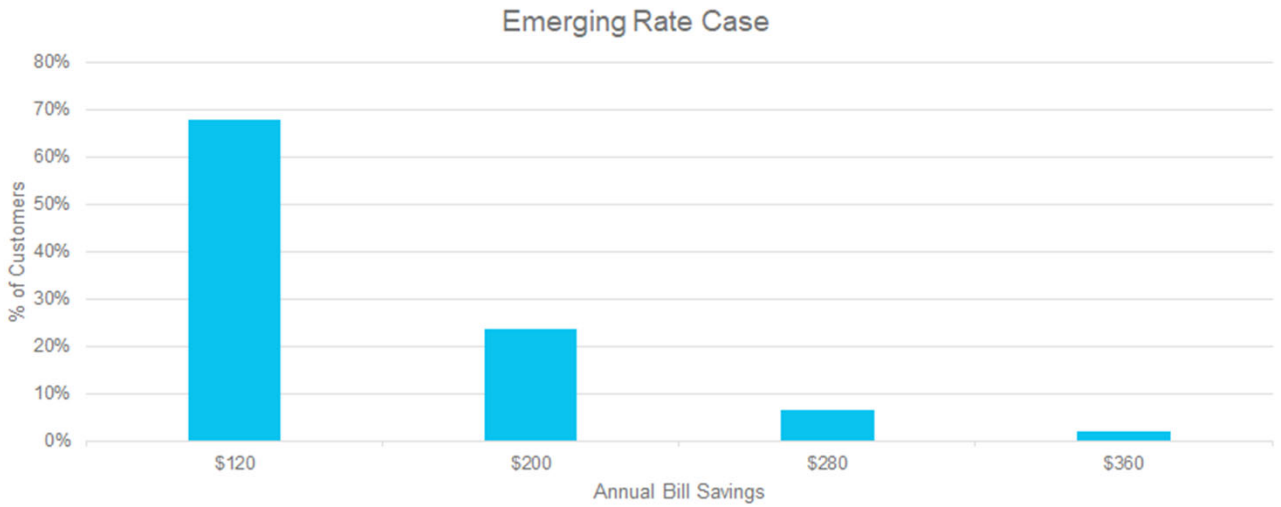


Color Code
- ❖ Negative Savings
- ❖ Positive Savings
- ❖ Savings > $625 / yr

- All customers save > $625/yr
- Customer savings are positively correlated with GHG reductions
- **Target all customers with good solar access**

Emerging Rate Case

HP+HPWH, PG&E electric EV2, gas G-1, no energy efficiency

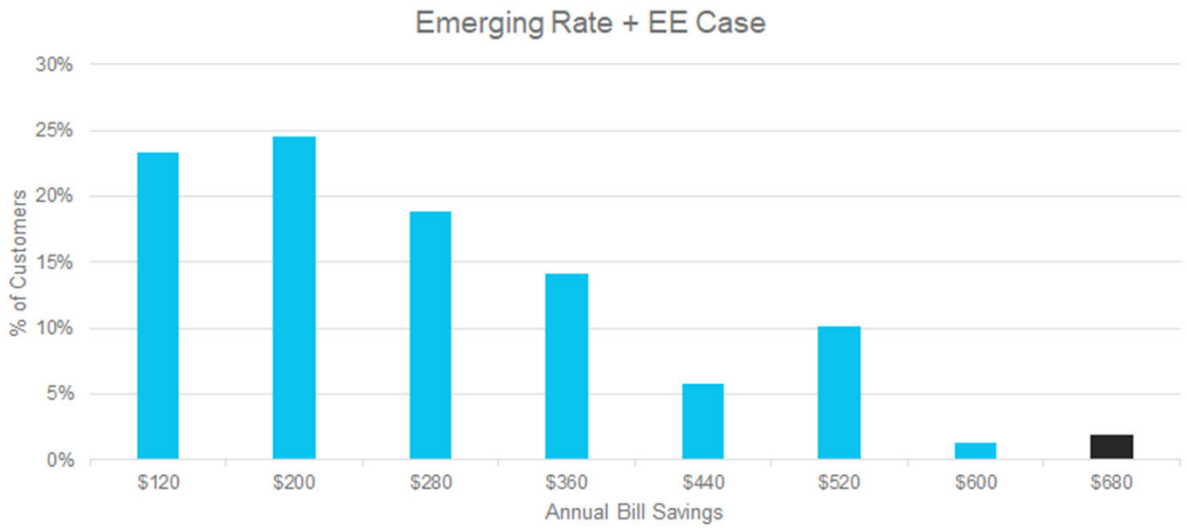


Color Code
- ❖ Negative Savings
- ❖ Positive Savings
- ❖ Savings > $625 / yr

- **All customers are now cash-positive on operations**
- **Customer savings are now positively correlated with GHG reductions**
- Heating contributes 24%, cooling 20%, DHW 56%
- **Target customers with HIGH cooling electric usage and HIGH heating gas usage**

Emerging Rate + EE Case

HP+HPWH, PG&E electric EV2, gas G-1, 30% improvement in heating and cooling loads

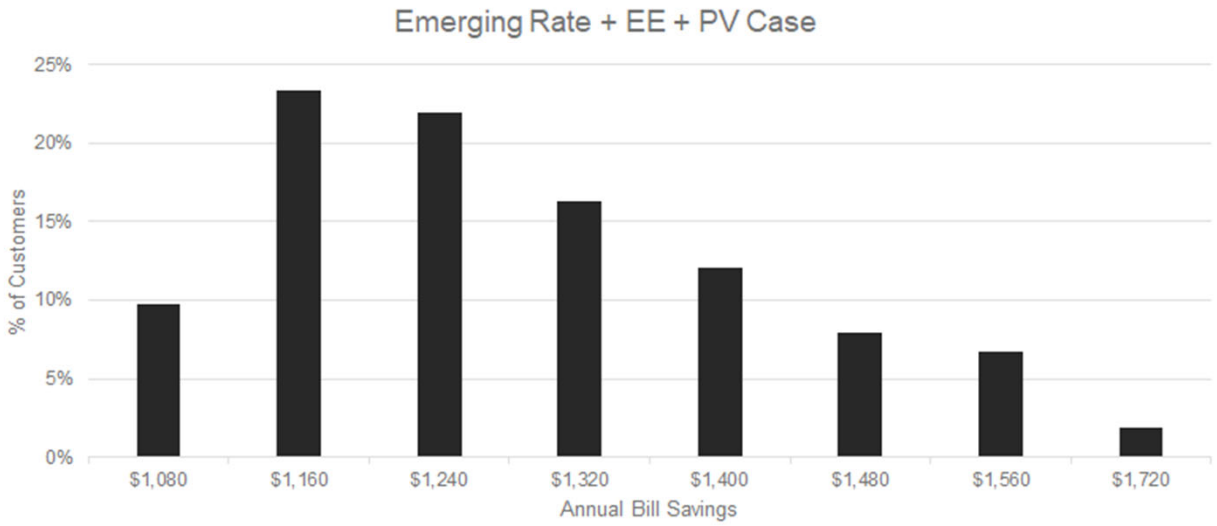


Color Code
- ❖ Negative Savings
- ❖ Positive Savings
- ❖ Savings > $625 / yr

- **All customers are cash-positive on operations**; 2% of customers save > $625/yr
- **Target customers with HIGH cooling electric usage and HIGH heating gas usage**

Emerging Rate + EE + PV Case

HP+HPWH, PG&E electric EV2, gas G-1, 30% improvement in heating and cooling loads , 3 kW PV

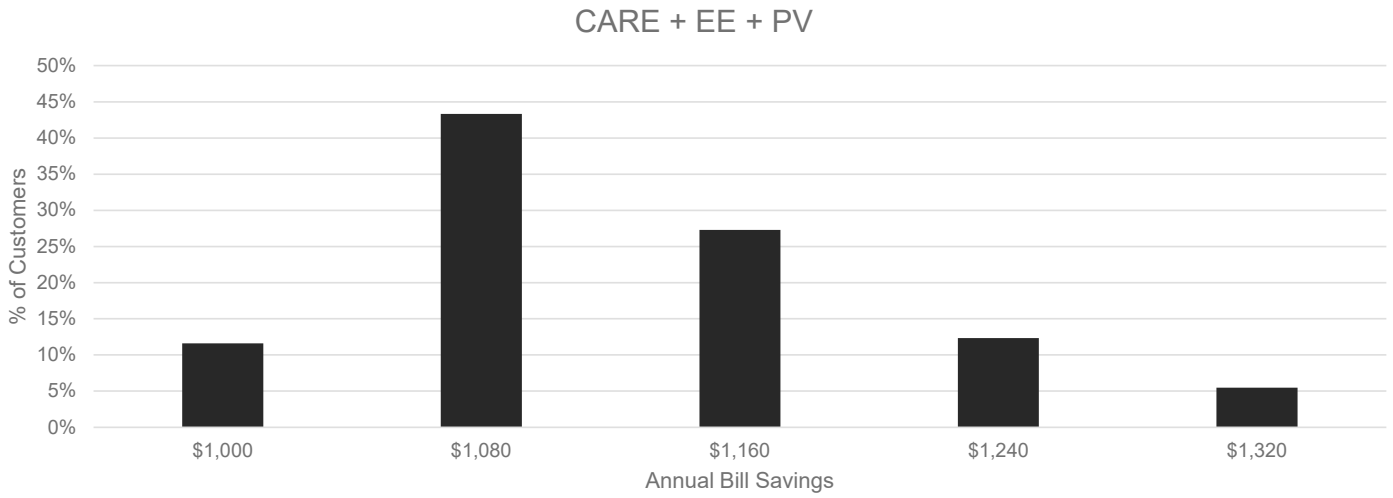


Color Code
- ❖ Negative Savings
- ❖ Positive Savings
- ❖ Savings > $625 / yr

- **All customers save > $625/yr**
- Value of solar declines with lower off-peak and partial-peak rates
- Target all customers with good solar access

CARE + Energy Efficiency + PV Case

HP+HPWH, PG&E electric & gas CARE rates, 30% improvement in heating and cooling loads, 3 kW PV



Color Code
- ❖ Negative Savings
- ❖ Positive Savings
- ❖ Savings > $625 / yr

- Annual savings declines in proportion to CARE discount
- All customers save > $625/yr
- **Target everyone**

Some Take-Aways

- EBCE could be considered a near worst-case scenario, with high electric rates and low cooling loads
- Customers in hotter climates and customers with access to cheaper electricity should see better results
- Eligible decarbonization measures should be comprehensive—electrification, EE, PV, storage, etc—to support mix-and-match solutions depending on each home's needs
- New electrification rates will support climate investments:
  - PG&E: EV2, E-ELEC
  - SCE: TOU-D-PRIME
- Reduced savings for CARE customers translates into reduced subsidies from ratepayers. Consider passing through the reduction to the CARE customer.

Questions

3 Capital Stack Analysis

Proposed Technology Package

Technology	Specification	Measure Cost		
		Low.	Med.	High
Heat Pump	Package, split, mini/multi-split, 18 SEER, 10 HSPF	$13,679	$17,047	$20,633
Heat Pump Water Heater	COP 3.1 or better, > 55 gal.	$3,599	$ 4,239	$4,662
Energy-efficient upgrades	30% reduction in space heating & cooling loads	$423	$2,157	$3,986
PV system	3 kW	$8,385	$9,300	$11,400
Internet-enabled Smart Thermostat	ecobee3 lite or equivalent	$160	$205	$250
Pre-wiring for electric appliances & car charging		$750	$750	$750
Total		**$26,996**	**$33,698**	**$41,681**
Costs Excluded from Analysis				
Home WiFi network		-	-	-
Service panel upgrade, as needed	Span or equivalent smart panel	-	$4,275	$9,000
End use submeter	Sense, eGauge, or equivalent	$700	$1,000	$1,500
Optional battery storage system	Lithium-ion battery	$7,000	$10,500	$14,000

TECH DRAFT Incentives (Single Family) – HP HVAC

Base Offering (Statewide)	Tier	Seasonal/Part-Load Cooling Efficiency	HSPF	Total Incentive per Unit
Package, split, mini/multi-split	Title 20 Code Minimum			$3,000

Enhanced Offering (in areas with partner PAs)	Tier	Seasonal/Part-Load Cooling Efficiency	HSPF	Total Incentive per Unit
Package, split, mini/multi-split	1	16.0 SEER	9.5	$3,600
	2	18.0 SEER	10.0	$4,200
	3	20.0 SEER	12.0	$4,800

Enhanced Offering Measures	Qualifier	Total Incentive per Unit
Manual-J	Provide calculations	$600
Duct Testing and Sealing	5% total leakage or less	$600
Field System Performance Testing	80% or better	$600

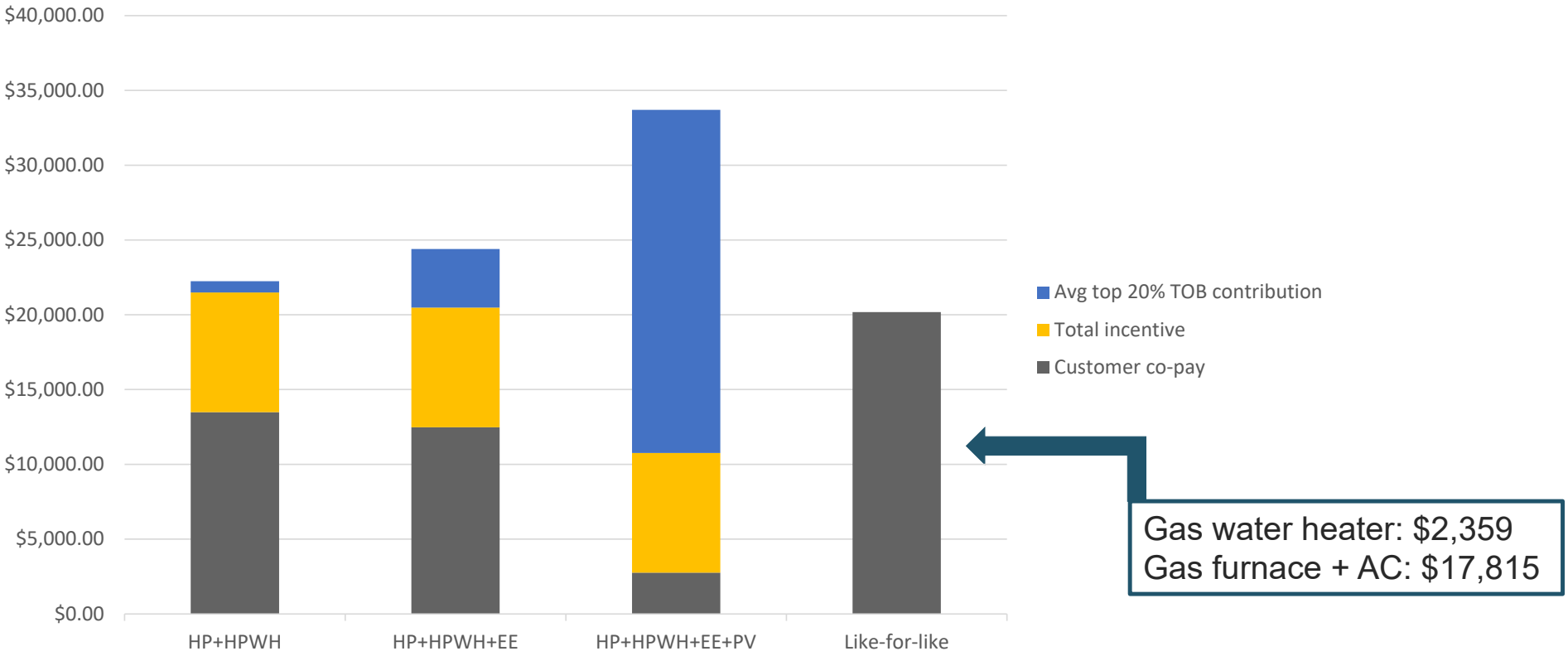
TECH DRAFT Incentives (Single Family) – HPWH

Base Offering (Statewide)	Measure Criteria	Maximum Total Incentive Available (TECH only)
Gas/Propane to HPWH	All HPWH sizes	$3,100
Electric Resistance to HPWH	All HPWH sizes	$1,000

Enhanced Offering (in areas with partner PAs)	Measure Criteria	Maximum Total Incentive Available (TECH + Local Program)
Gas/Propane to HPWH	~~HPWH < 55 Gallons~~	~~$3,100~~
	HPWH > 55 Gallons	$3,800
Electric Resistance to HPWH	~~All HPWH sizes~~	~~$1,500~~
Panel Upgrade / Load Center	Sizing up to 200amps	$2,800

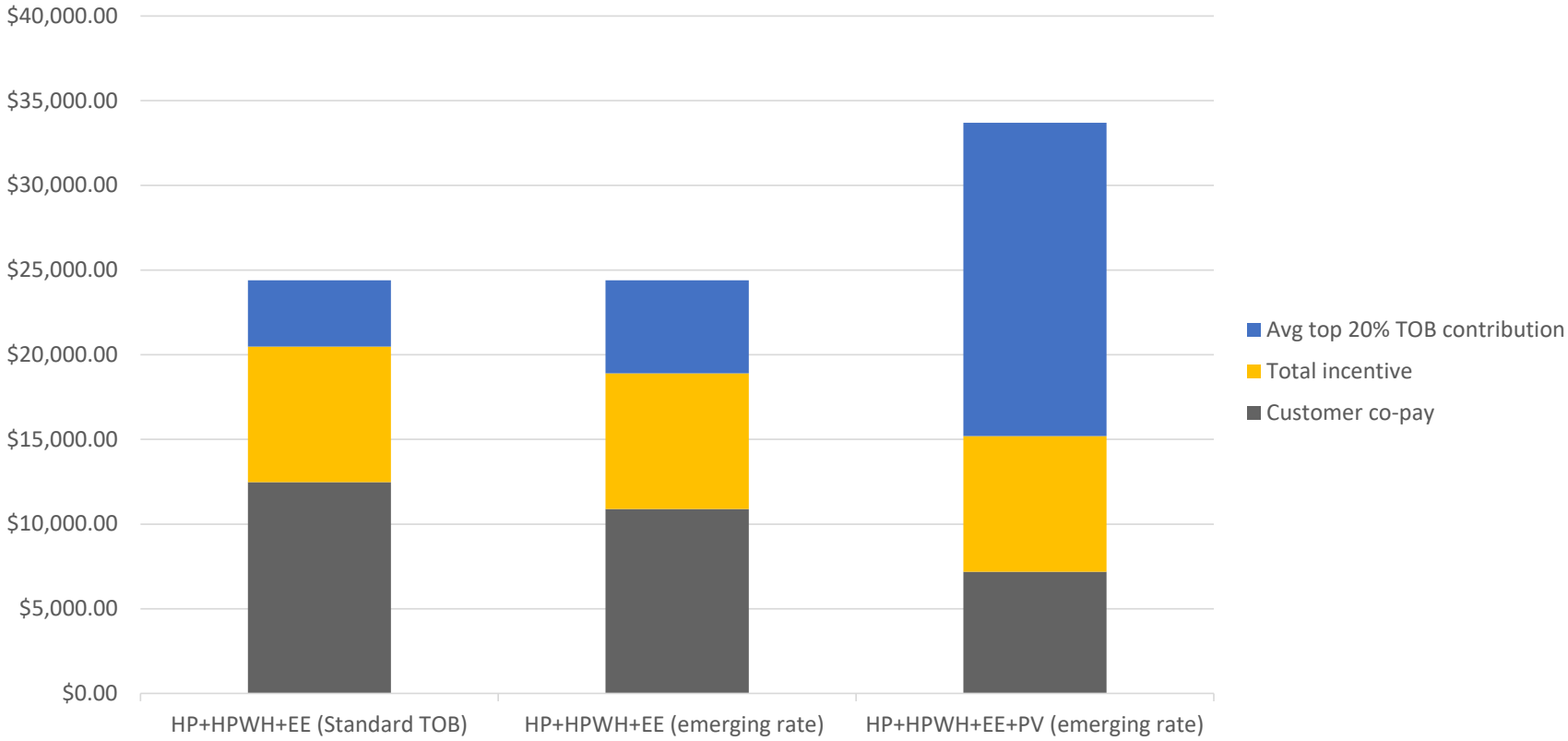
Capital Stack, TOU-C Rate

Top 20% of customers, PG&E electric TOU-C, gas G-1, 30% energy efficiency improvement (if included), 3kW PV system (if included)



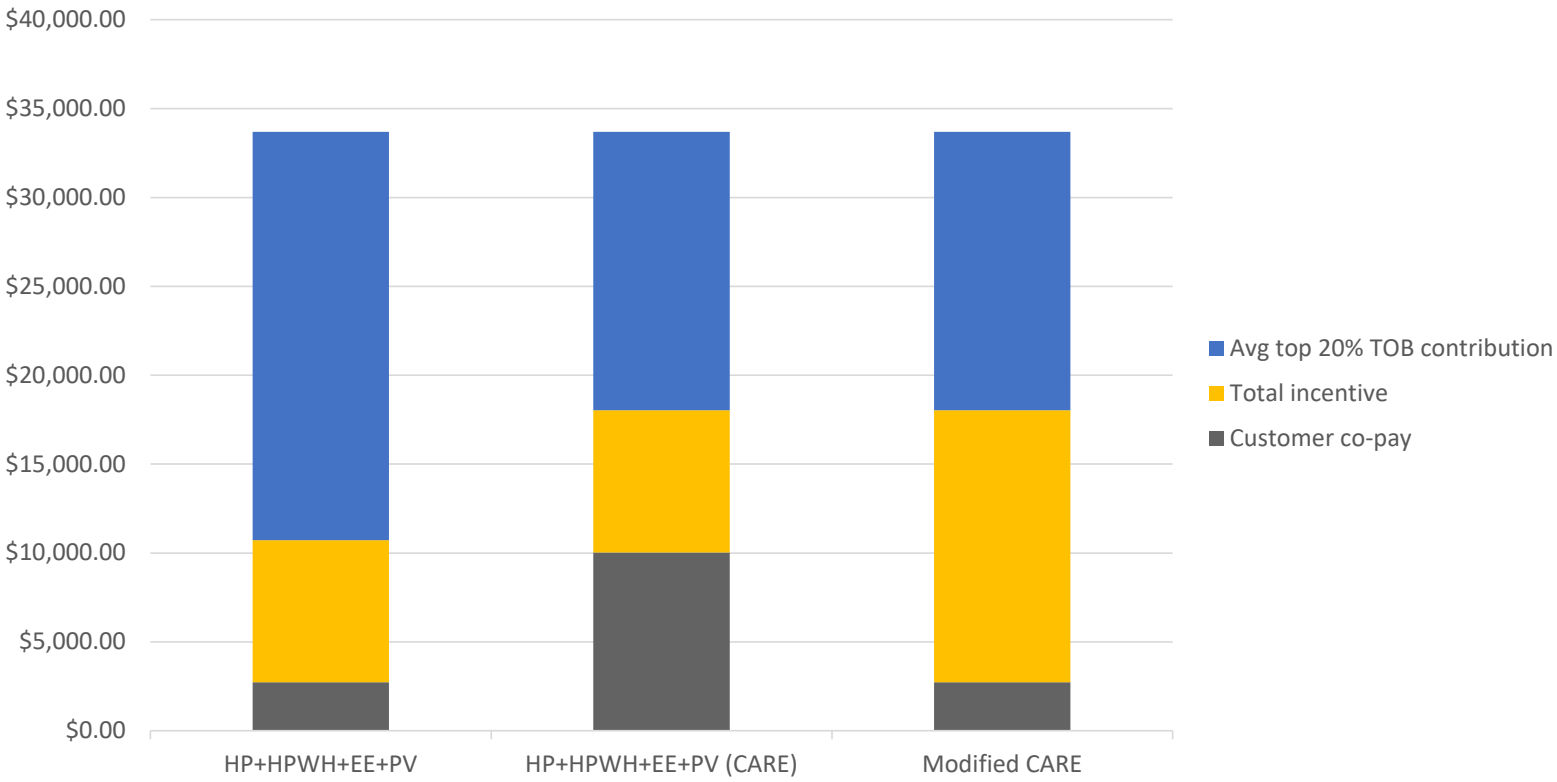
Capital Stack, Emerging Rate

Top 20% of customers, PG&E electric TOU-C vs. EV-2, gas G-1, 30% energy efficiency improvement; 3 kW PV system



Capital Stack, CARE Rate

Top 20% of customers, PG&E electric TOU-C vs. D-CARE, gas GL-1, 30% energy efficiency improvement; 3 kW PV system

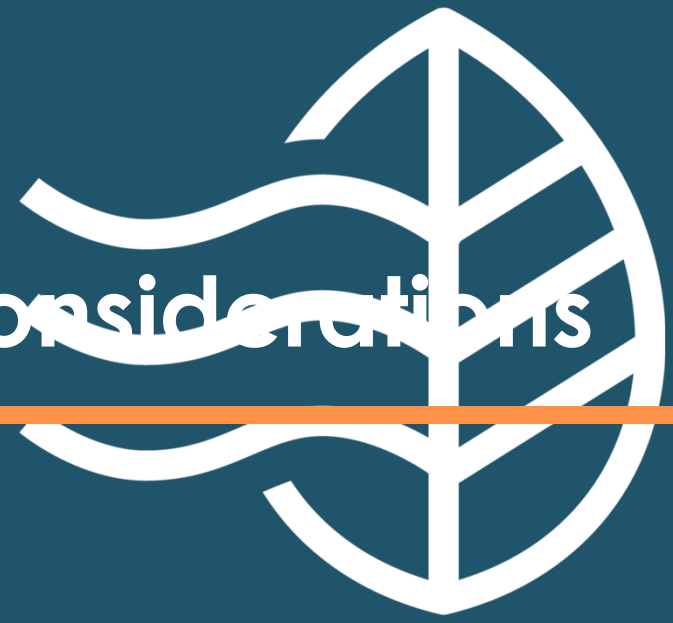


Some Take-Aways

- All scenarios reduce customer co-pay below like-for-like replacement costs. End-of-life equipment replacement is financially viable
- PV increases total capital requirement but reduces customer co-pay
- EV and electrification rates are an improvement over standard TOU; still less attractive than PV (for now)
- Tariffed investments are viable alternative versus like-for-like replacement costs for CARE customers but TOB offer will be stronger if CARE customer keep their intended bill savings
- New Federal tax credits & incentives (Build Back Better) could dramatically improve capital stack outcomes

Questions

4 Program Cost Considerations



Who pays for cost of capital, program costs?

Design principle:

- Allocate principal cost recovery to TOB. Allocate cost of capital, other program costs to rate base.
- How much needs to go to rate base? What is the potential leverage?

Pro-Forma Budget, Pilot Phase, Top 20% of Customers

Number of projects	833	Goal
Total capital investment	$28,070,434	HP+HPWH+EE+PV
TOB capital contribution (EV2 rate)	$15,415,698	64% of expected life cycle savings
Utility incentives @ $8,000 each	$6,664,000	TECH + Utility
Total customer copay	$5,990,736	Minimize
Total cost of TOB capital @ 3%	$5,307,843	Rate base
Utility reserves (3% of TOB contribution)	$462,471	TECH TOB
Submetering @ $1,000 each	$833,000	TECH TOB
Customer performance reserves (5% of TOB)	$770,785	TECH TOB
Total Program operating costs	$2,000,000	TECH TOB provide in-kind support
Total Ratepayer expend. (Utility + TECH)	$16,038,099	
Leverage	1.75	
Ratepayer expenditure / mt eCO2 @ 57.5 mt / project	$335	

Questions

Thank You

For more information, contact:

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