

Energy Storage Technology Advancement Partnership
(ESTAP) Webinar

SMUD's Carbon-Reduction Strategies:
Smart Homes, Strategic Electrification,
and Energy Storage

December 5, 2019



U.S. DEPARTMENT OF
ENERGY

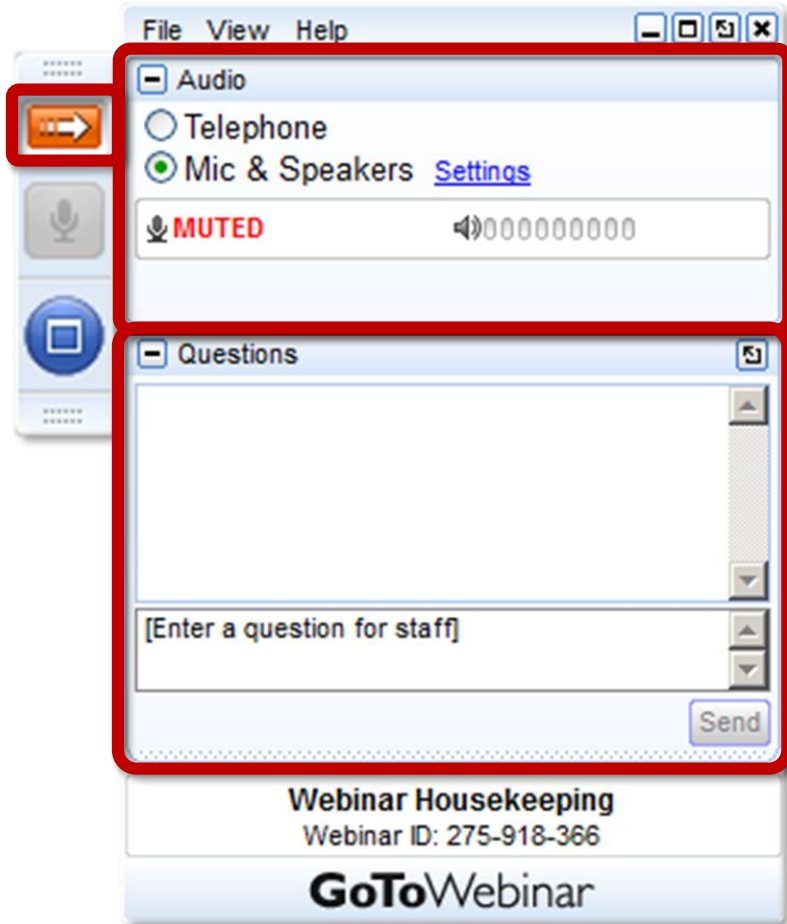


Sandia
National
Laboratories



CleanEnergy
States Alliance

Housekeeping



Join audio:

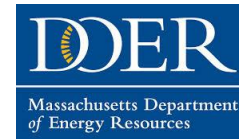
- Choose Mic & Speakers to use VoIP
- Choose Telephone and dial using the information provided

Use the orange arrow to open and close your control panel

Submit questions and comments via the Questions panel

This webinar is being recorded. We will email you a webinar recording within 48 hours. This webinar will be posted on CESA's website at www.cesa.org/webinars

CleanEnergy States Alliance



Energy Storage Technology Advancement Partnership (ESTAP) (bit.ly/ESTAP)

ESTAP is supported by the U.S. Department of Energy Office of Electricity and Sandia National Laboratories, and is managed by CESA.

ESTAP Key Activities:

1. Disseminate information to stakeholders

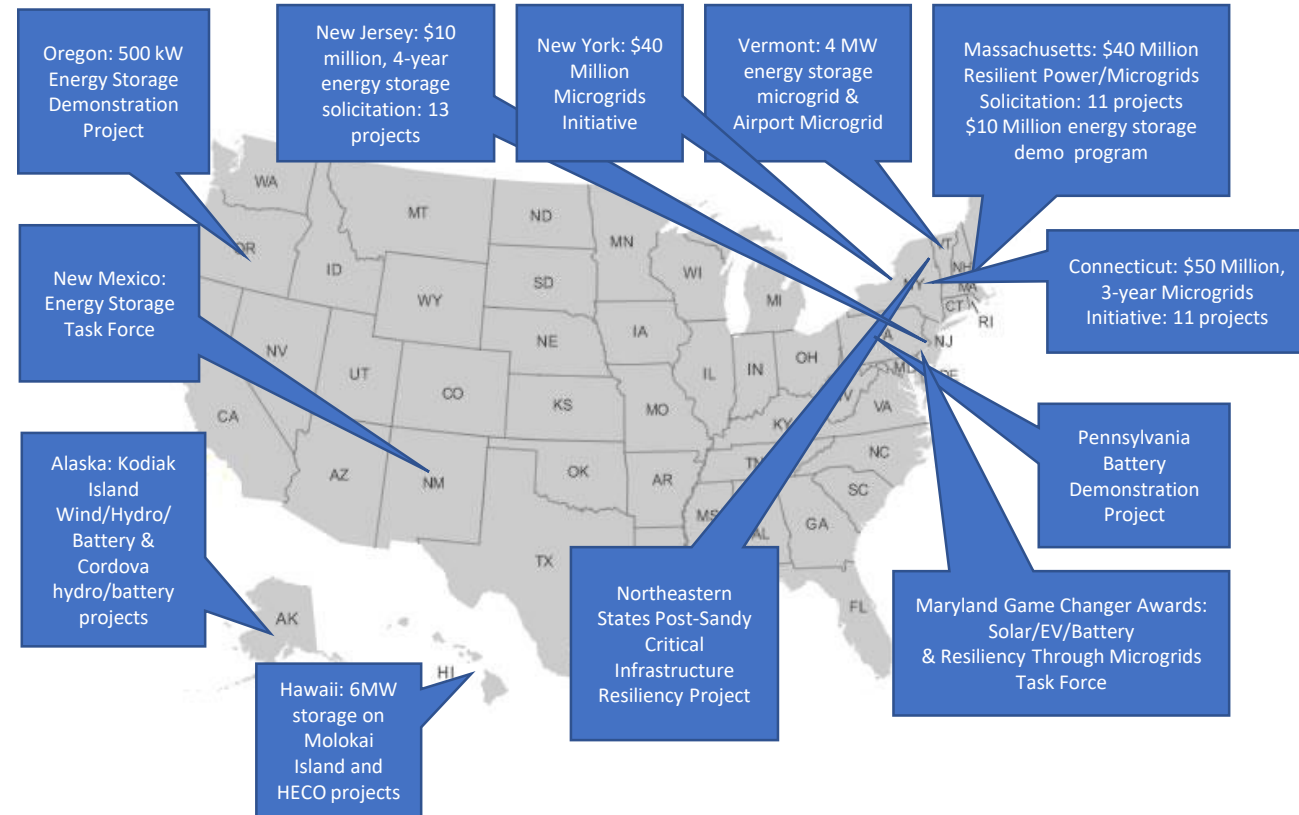
- ESTAP listserv >5,000 members
- Webinars, conferences, information updates, surveys.

2. Facilitate public/private partnerships to support joint federal/state energy storage demonstration project deployment

3. Support state energy storage efforts with technical, policy and program assistance



ESTAP Project Locations:



Webinar Speakers



Rachel Huang

Director, Energy Strategy, Research & Development,
Sacramento Municipal Utility District



Val Stori

Project Director,
Clean Energy States Alliance



The background of the slide is a photograph of a house with light-colored horizontal siding. A white utility meter is mounted on the wall, with a blue vertical pipe running down from it. To the right of the meter, there is a window with a white frame. In the foreground, there are green bushes and a small garden area with a stone border. A large, wavy graphic in shades of red, orange, and yellow is positioned at the bottom of the image, partially overlapping the text.

SMUD's Carbon Reduction Strategies: Smart Homes, Strategic Electrification, and Energy Storage

Rachel Huang
December 5, 2019

Powering forward. Together.



About SMUD

We're Community-Owned and Not-For-Profit



70+
Years

Est. 1946

6th largest
community-owned
in the U.S.



7 member
Elected Board of Directors

\$1.71
Billion
2019 Budget

635,000 Customers

2,278 Employees

What Guides SMUD

Strategic direction is set by a community elected 7-member Board

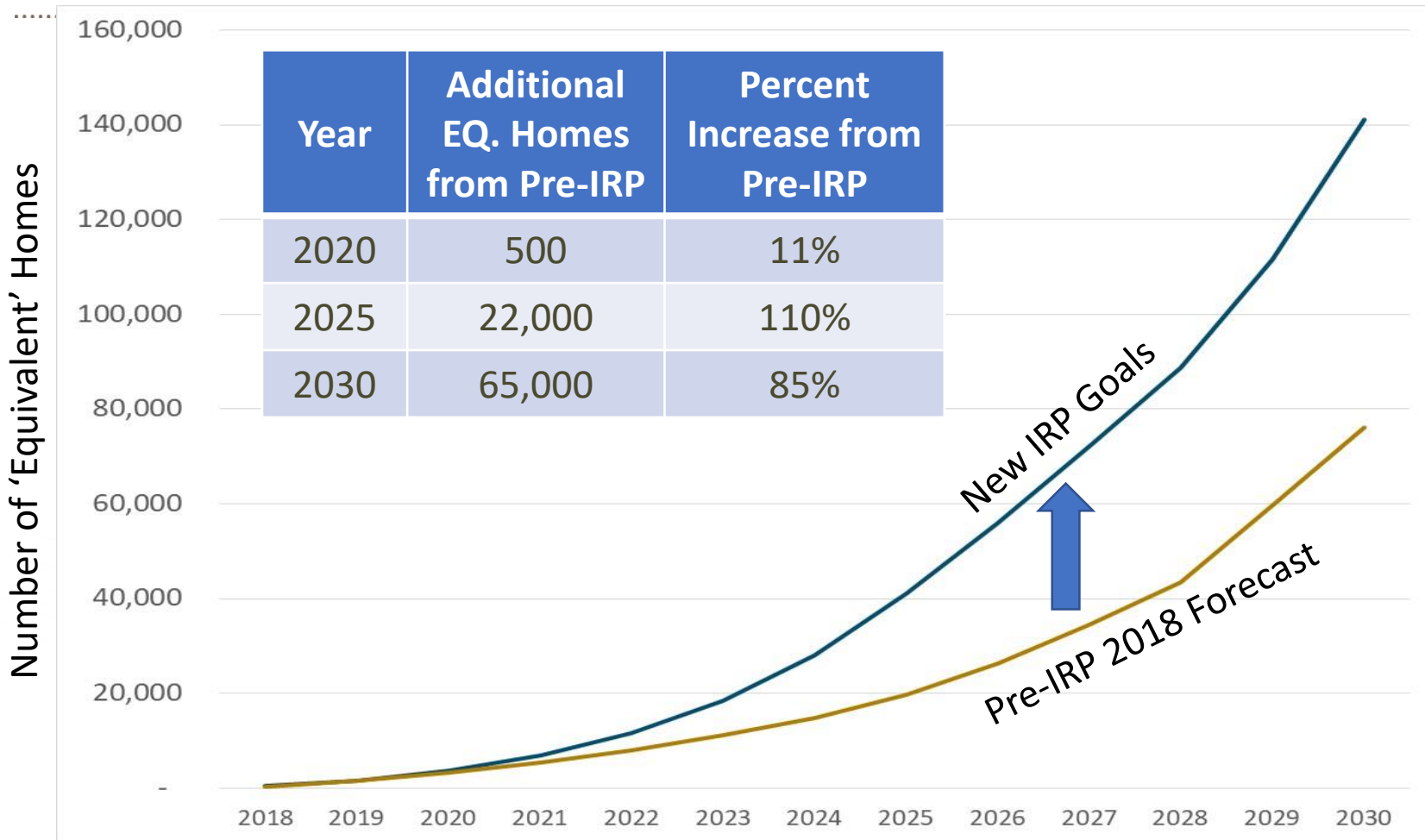
In 2018 SMUD's Board adopted a net-zero-carbon target by 2040.



NET-ZERO-CARBON
ELECTRICITY BY
2040

Impact On Residential Electrification

Equivalent Incremental Homes Electrified



An Equivalent home is the sum of individual appliance changeouts: HPWH = 0.3, HPSH = 0.6, Induction = .1

Electrifying New Construction



SMUD's Smart Home program provides incentives to design and construct carbon reducing homes.

All Electric

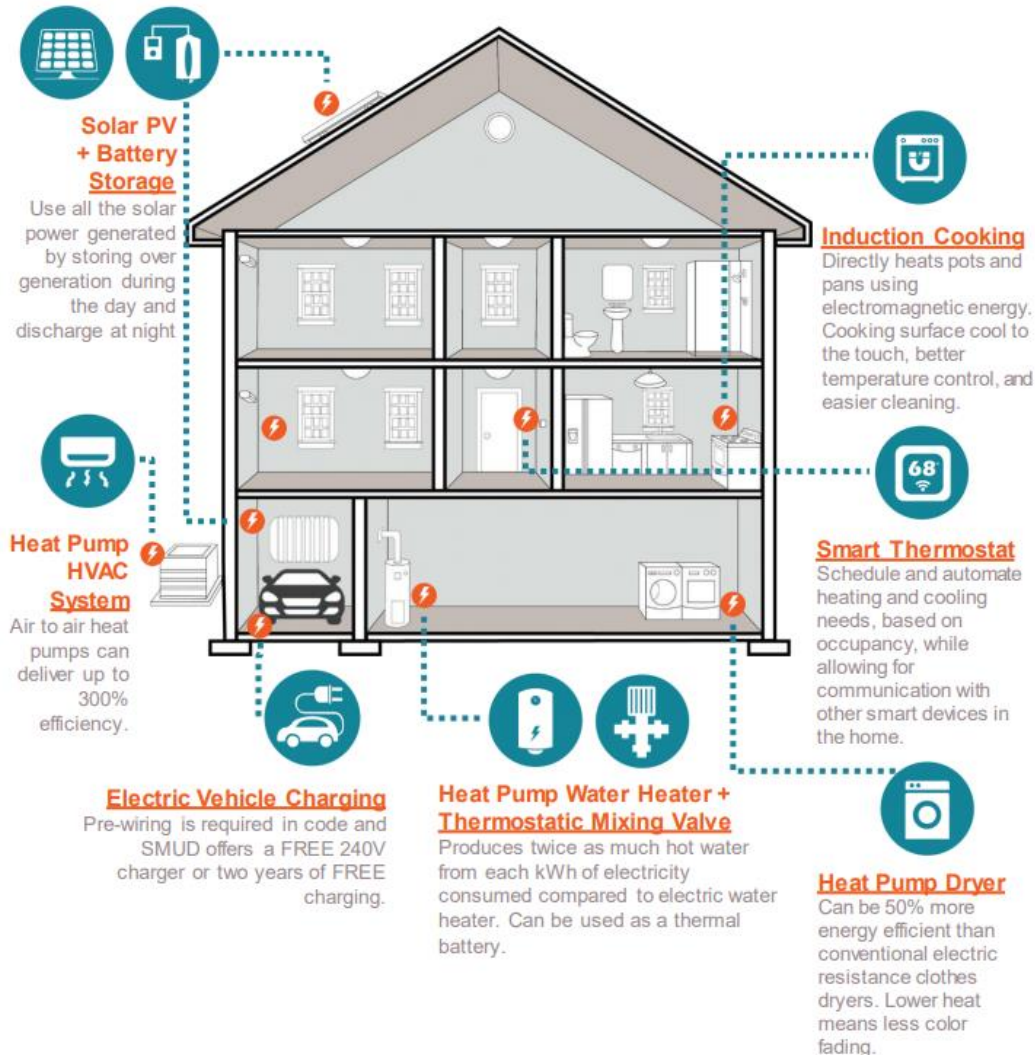
Mixed Fuel

Up to
\$7,000

Up to
\$5,000

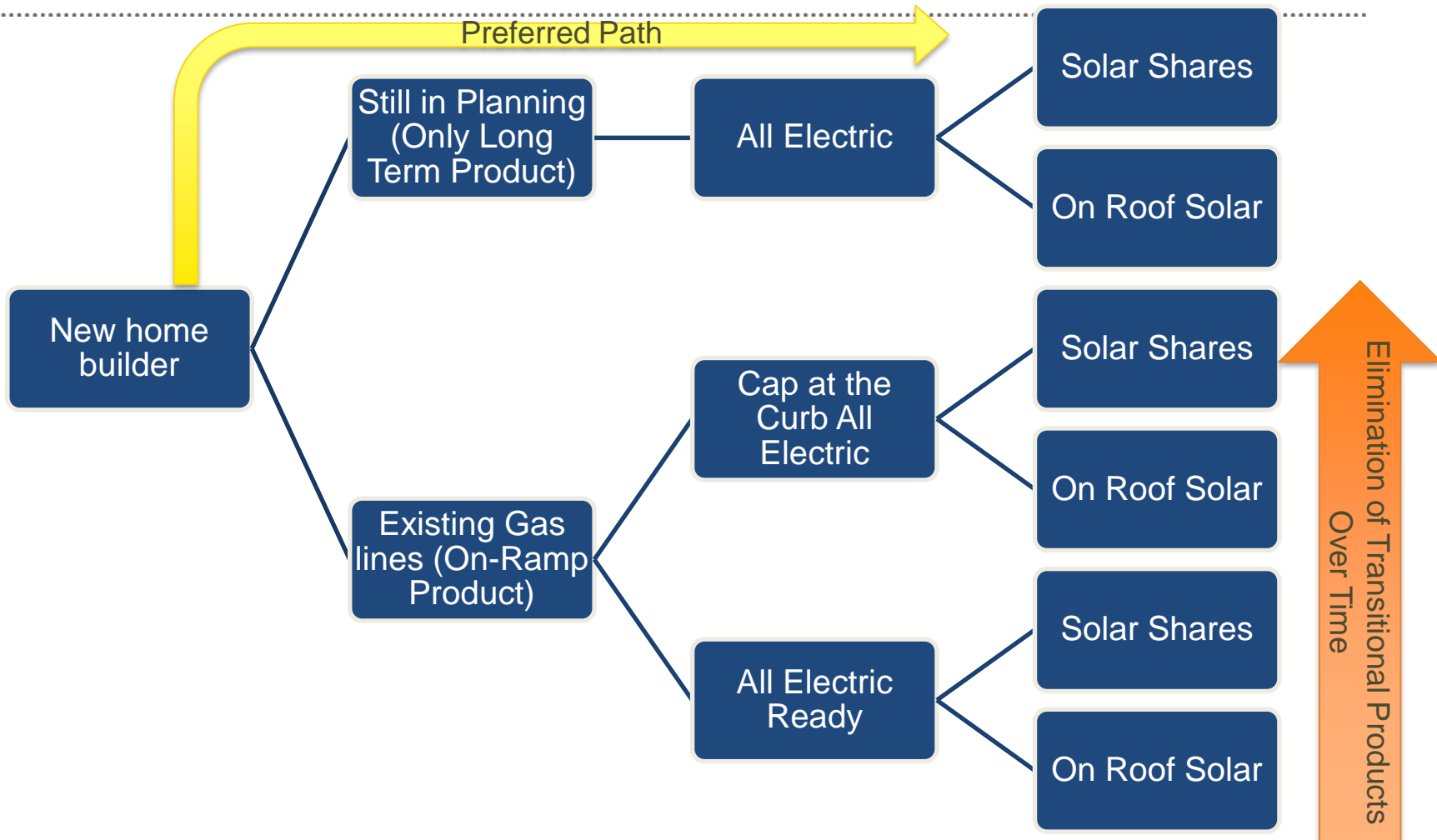
Level	Fuel Source	Solar	Battery System	Pre-Wired All Electric	Pre-Wired EV Charger	Transformer Space Commitment
1	Mixed	Required, On-Roof	Optional	Required	Required	50kVA/10 homes
2	Mixed	Neighborhood SolarShares	Optional	Required	Required	50kVA/10 homes
3	All Electric	Required, On-Roof	Optional	Required	Required	50kVA/10 homes
4	All Electric	Neighborhood SolarShares	Optional	Required	Required	50kVA/10 homes

Electrification is Catching On



- Approaching 3,000 Homes Under Contract
- The Mayors' Commission on Climate Change Mandate all-electric construction to eliminate fossil fuel use in new buildings by 2023.

Market Transformation



Batteries Included

Battery Incentive for
New Construction

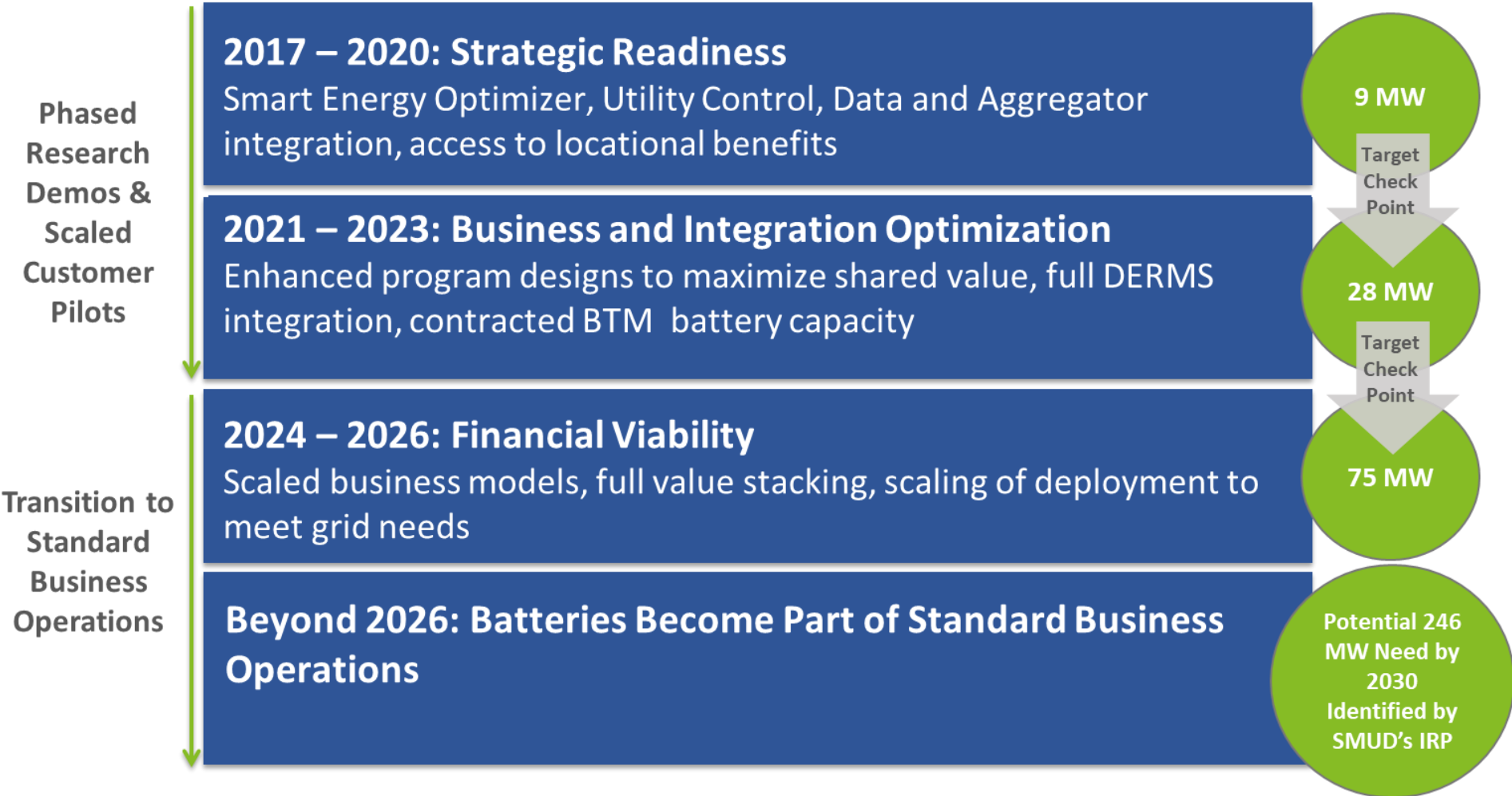
Up to
\$2,000



2019 Title 24 Code provides compliance credits to batteries.

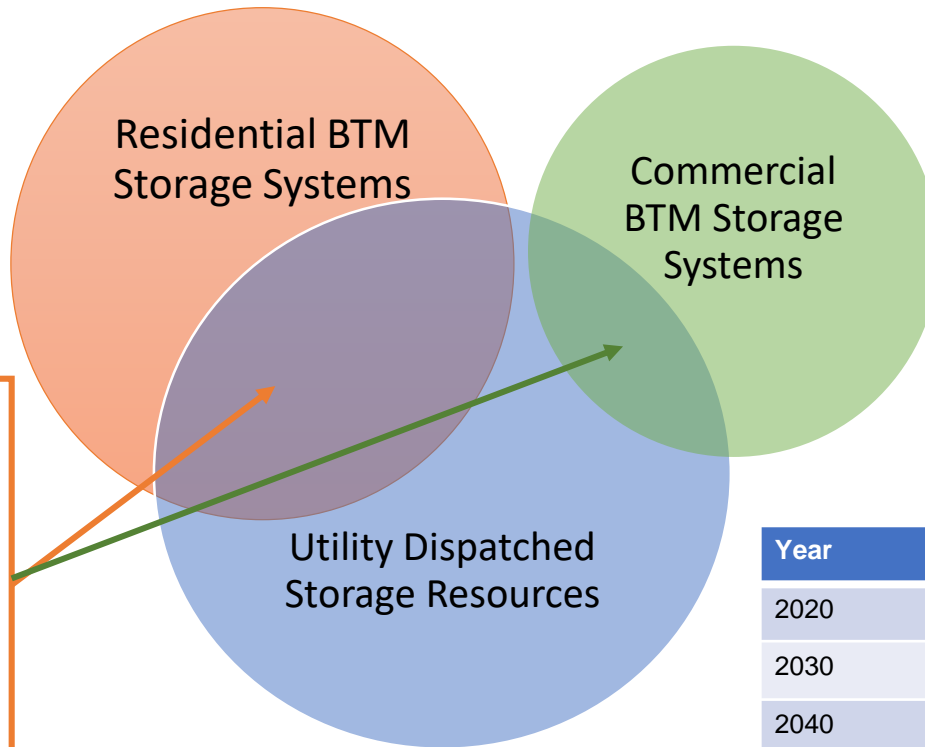
- Credits can be used by builders to meet the Design Rating for the home.
- or-
- Credits can be used to reduce the required size of the PV array by 25%

Overall Energy Storage Targets and Objectives



Energy Storage Forecast

Year	Forecast
2020	2 MW
2030	140 MW
2040	405 MW



Year	Forecast
2020	1 MW
2030	60 MW
2040	173 MW

- Utility dispatch and behind the meter storage are not mutually exclusive.
- An increase in utility dispatched BTM storage decreases the need for utility scale storage.

Year	Forecast
2020	4 MW
2030	246 MW
2040	560 MW

IRP

Utility Control of Storage is Necessary

Today, battery dispatch follows economic signals

- Default signal is TOD
- Operation is not behavior based

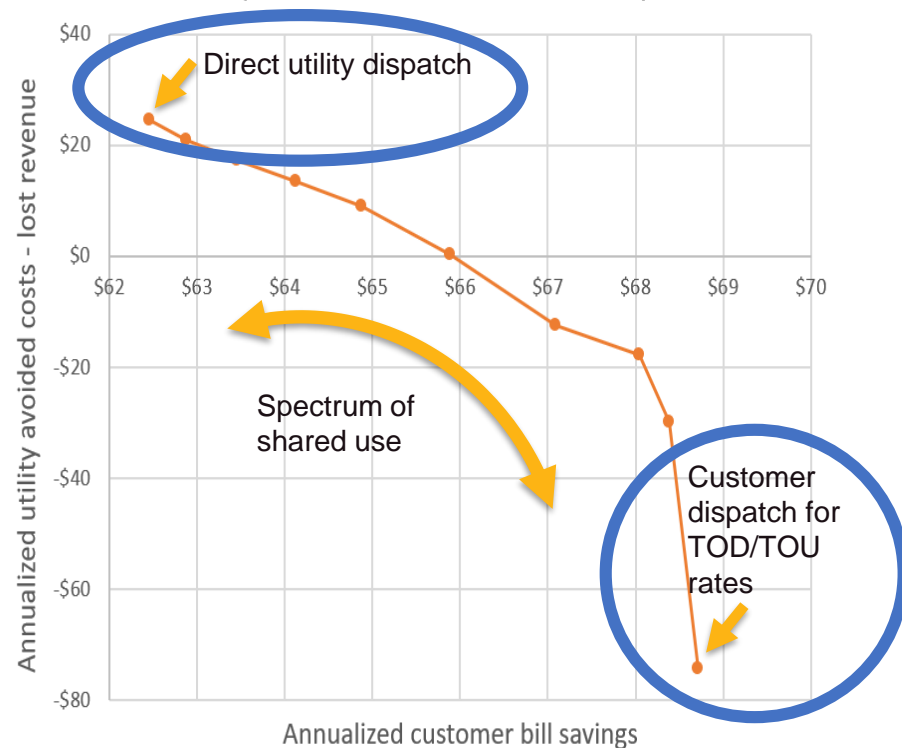
Customer savings does not guarantee grid savings

- Arbitrage of TOD rates affects fixed cost recovery
- Demand charge reduction without locational need

SMUD control is required to ensure grid savings

- Contracted capacity with reliable response
- Grid planning certainty

Economic Impact of 4 kW Residential Battery with PV



*Illustrative analysis based on SMUD ToD rates and CAISO day ahead/real time prices. Actual prices will vary.

Commitment to Operate Programs

Residential

Commitment to Operate (CTO)

Incentive: \$300 - \$600 (one time).

Intent: Encourage utilization of interconnection process. Optimization renewable self consumption and time of day pricing.

Smart Energy Optimizer

Incentive: \$500 - \$1,000 (One Time) and \$10/month

Intent: Provide a price based dispatch signal to behind the meter systems to align customer retail benefit with grid needs.

Commercial

Commitment to Operate (CTO)

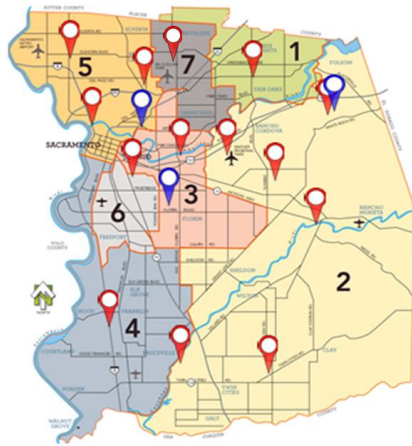
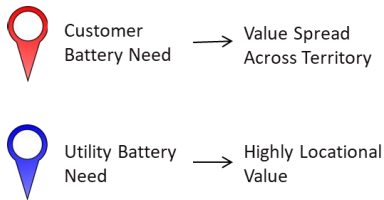
Incentive: \$600 - \$5,000 (one time).

Intent: PV/TOD Optimization. Utilization of interconnection process.

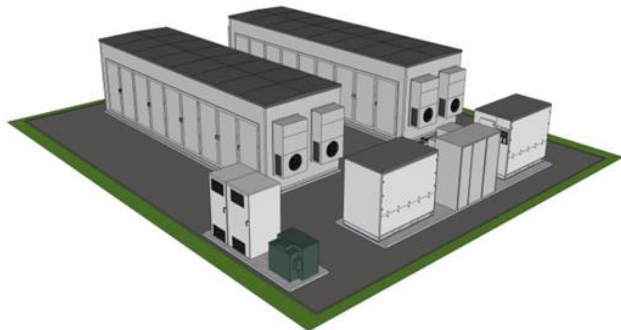
Next Steps: Launch data integration and basic dispatch pilot.

Sector	Battery Storage Installed		Battery Storage Procured (not installed)	
	Total Customers	KW	Total Customers	KW
Residential	130	820.14	78	500.08
Commercial	2	290	0	0

Aligning Customer Value with Grid Needs – Location, Location, Location



*Representative Example. Not based on actual location needs.



- Active RFP for a 4MW/8MWh battery
- Locational value
 - Peak load reduction
 - Near indoor agriculture future demand, residential community with rooftop solar
 - Operations
 - DERMS integration
 - Market participation (EIM)
 - Power generation
 - Mitigate renewable intermittency issues
 - SMUD Power Academy
 - Train SMUD & others on utility-scale battery
- Customer value
 - Demand charge reduction through StorageShares pilot program

Questions?

Thank you for attending our webinar

Val Stori
Project Director, CESA
val@cleanegroup.org

Find us online:

www.cesa.org

facebook.com/cleanenergystates

@CESA_news on Twitter

Upcoming Webinars

Sharing Solar Benefits - Expanding Residential Solar in Connecticut's Communities of Color

Friday, December 6, 1-2pm ET

Energía resistente en Puerto Rico: Cómo el Solar+Almacenamiento está remodelando el panorama energético

Tuesday, December 10, 1-2pm ET

Solar with Justice: A New Report on Solar for Under-Resourced Communities

Thursday, December 12, 1-2pm ET

Read more and register at: www.cesa.org/webinars