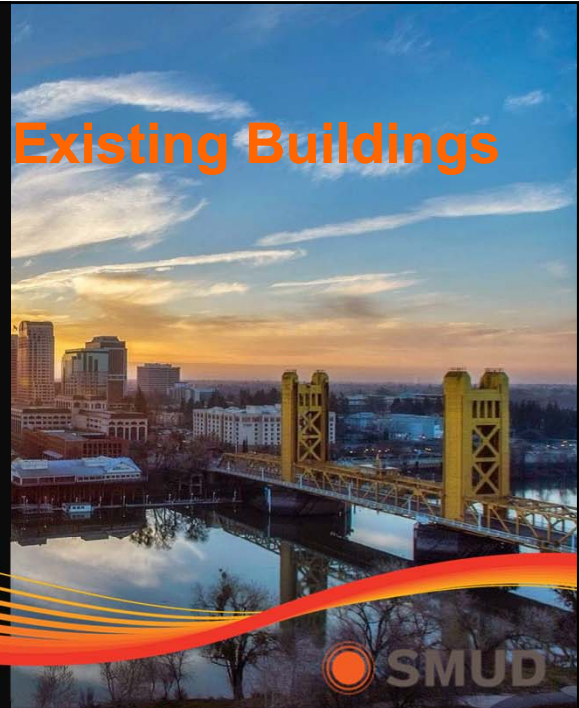


SMUD – Decarbonizing Existing Buildings

October 10, 2019



Sacramento Municipal Utility District (SMUD)

Electric utility

Community-owned not-for-profit

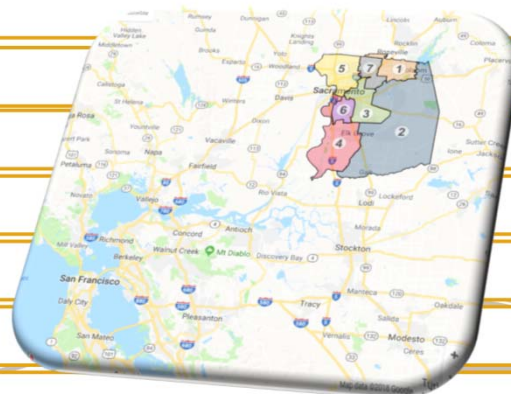
Established 1946

Population 1.5 million

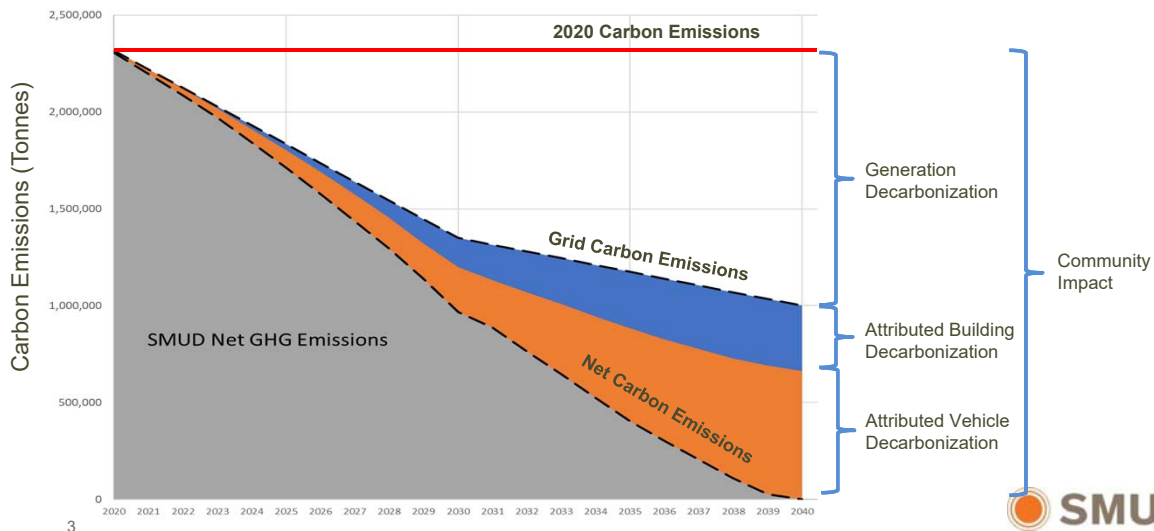
2,219 employees

50% carbon free electricity

626,460 accounts



SMUD's Net Zero Carbon Plan



Path to Electrification Programs

1) Calculate the carbon equivalence between electricity and gas

- Use to claim electrical savings from electrification

2) Calculate the value of electrification to the utility

- Hint, it is much more than net revenue times new load
- With this, set incentives

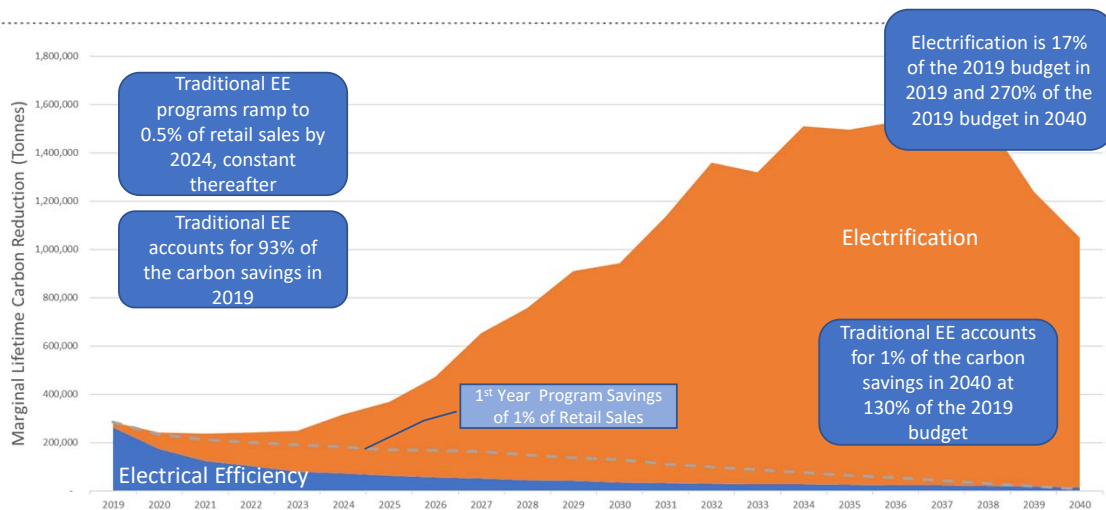
3) Calculate the hourly long term marginal emissions

- Use to change the metric used to manage EE programs

SMUD Electrification Programs

	Launch Date	Total Possible Incentive	Base Incentive	HP-HVAC	HPWH	Induction	Bonus
Single Family New Construction	March 2018	\$7,000	\$4,000	✓	✓	\$1,000	\$2,000
Multifamily New Construction	March 2018	\$1,750	\$1,250	✓	✓	\$500	x
Single Family Existing	May 2018	\$10,500	n/a	\$4,500	\$3,000	\$500	\$2,500 ¹
HPWH Equipment Efficiency	June 2018	\$3,000	\$2,000	n/a	✓	n/a	\$1,000 ²
Multifamily Existing	December 2018	\$2,500	n/a	\$1,000	\$1,000	\$500	x
HPWH Direct Install Program	3 rd Quarter 2019	\$3,000	n/a	n/a	✓	n/a	x
HP-HVAC Equipment Efficiency	3 rd Quarter 2019	\$4,500	\$1,500	\$2,500	n/a	n/a	\$500 ³

Programmatic Building Carbon Reduction

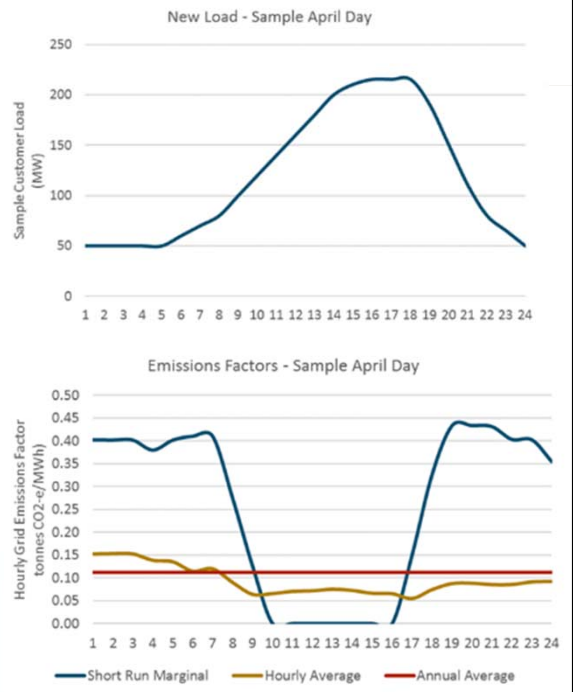


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If you don't measure it you can't manage it

Temporal Aspects of EE

- Traditional EE and Electrification EE measures operate in hours both above and below the annual average emissions intensity target
- Programmatic Carbon: the summation of hourly marginal carbon savings for every year of the measure's life



Carbon Savings Over Time

Programmatic Carbon is the lifetime long term marginal emission carbon reduction

Measure Installed in 2020	Carbon Reduction (tonnes)		First Year kWh Savings
	Annual Average	Programmatic	
Whole House Fan	1.43	2.85	567
HPWH	11.55	11.00	3,751
Heat Pump HVAC	25.38	22.81	8,212
AC - 16 SEER	1.09	1.74	513

Measure Installed in 2040	Carbon Reduction (tonnes)		First Year kWh Savings
	Annual Average	Programmatic	
Whole House Fan	0.23	0.86	567
HPWH	12.75	12.97	4,129
Heat Pump HVAC	27.93	28.96	9,040
AC - 16 SEER	0.21	0.34	513

Existing Building Program Outcomes

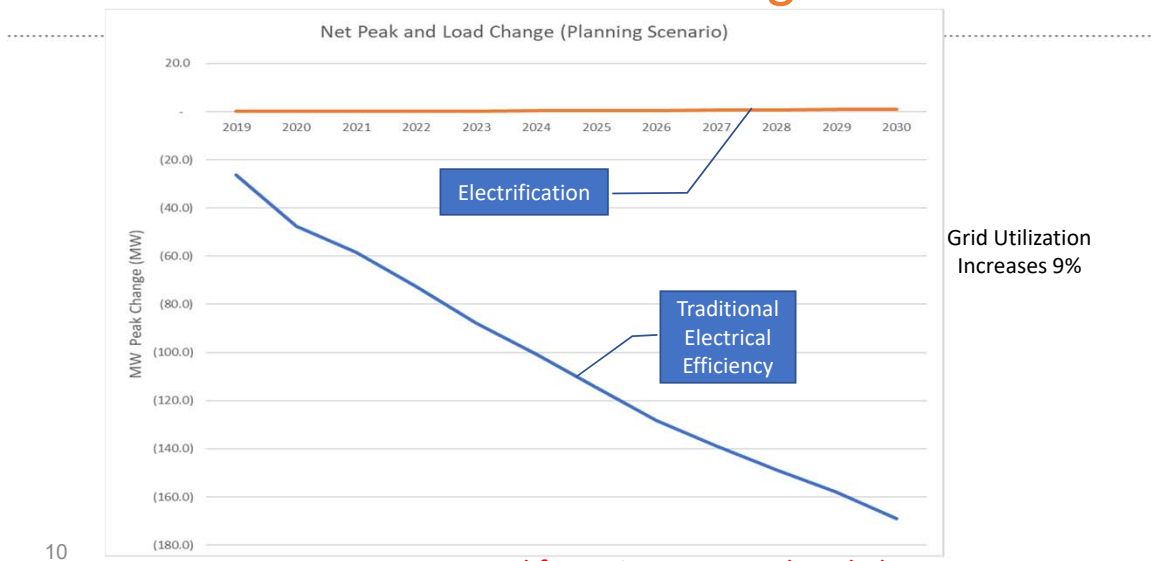
	Incentive	2018	2019 (to date)	2020	2021
HPWH – Total	\$3,000	150	722	1,026	1,462
HPWH - Plumbers		99	624		
HPWH - GCs		51	98		
HP-HVAC - Total	\$4,500	162	394	1,653	2,440
HP-HVAC – C20s		n/a	*		
HP-HVAC - GCs		162	394		
All-Electric Ready	\$2,500	24	35	100	250

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* Program Launched 9/1/2019



Peak and Load Factor Changes



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Thank you

Scott Blunk
scott.blunk@smud.org

