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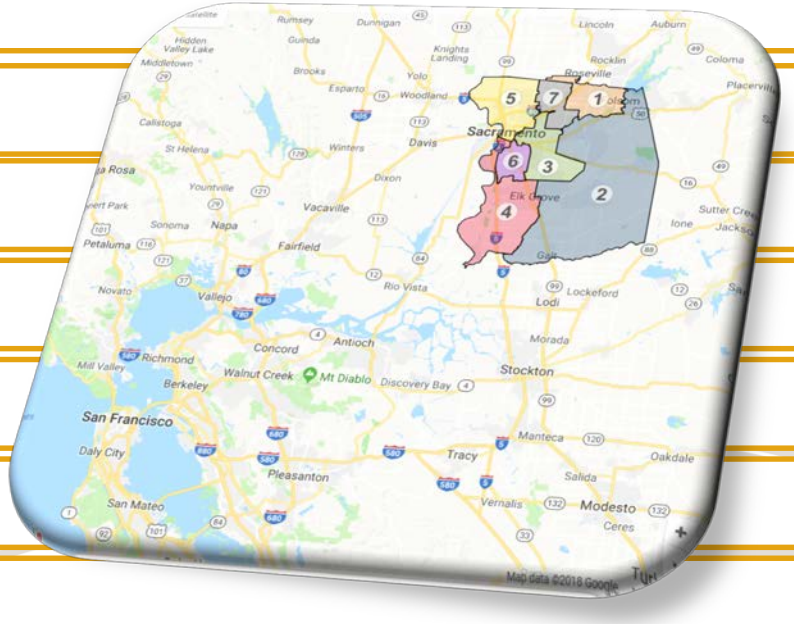
SMUD – Using Carbon as an EE Metric

August 27, 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



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SMUD's 2018 Net Zero Carbon IRP

- IRP focus: **Maximize local benefit**
- IRP's 2 key strategies:

Electrification
(Buildings & Vehicles)

Carbon Free Energy Sources

$1.7 Billion investment plan for electrification over the next 21 years

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Overview – Carbon as a Common Metric

SMUD's Carbon Optimization Tool

Calculates marginal carbon savings and cost effectiveness in order to optimize programs within budget and market adoption constraints

Enables SMUD to shift away from a first year kWh savings metric to a carbon reduction metric common to both energy and electrification

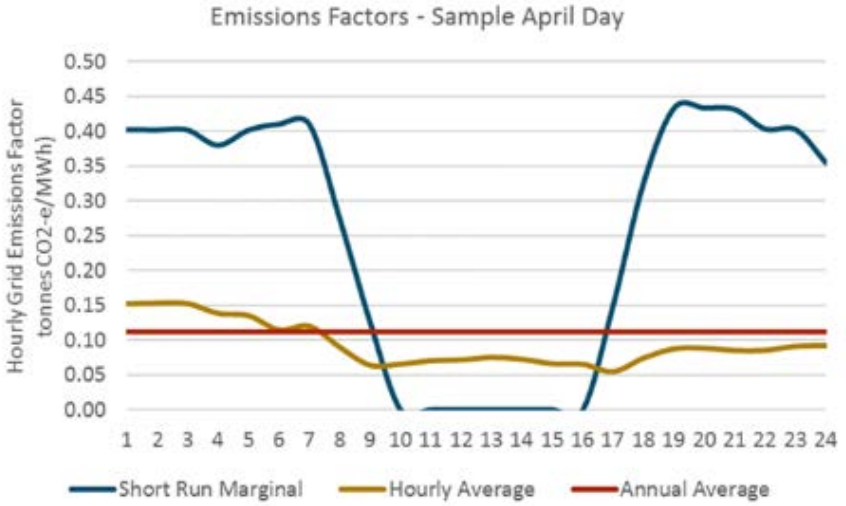
Uses the hourly marginal carbon emissions from the grid and the hourly load/ savings profiles of individual efficiency and electrification measures as well as the carbon reduction from fossil fuels eliminated by the customer

Overview - Supply Side

Traditional ENERGY EFFICIENCY (tEE)

- Annual average emission intensity targets for SMUD's grid, viewed as a constraint

- Maintaining Annual Average
  - tEE at 8pm lowers emission and lowers costs to maintain annual average
  - tEE at noon raises average kWh emission and increases costs to maintain annual average



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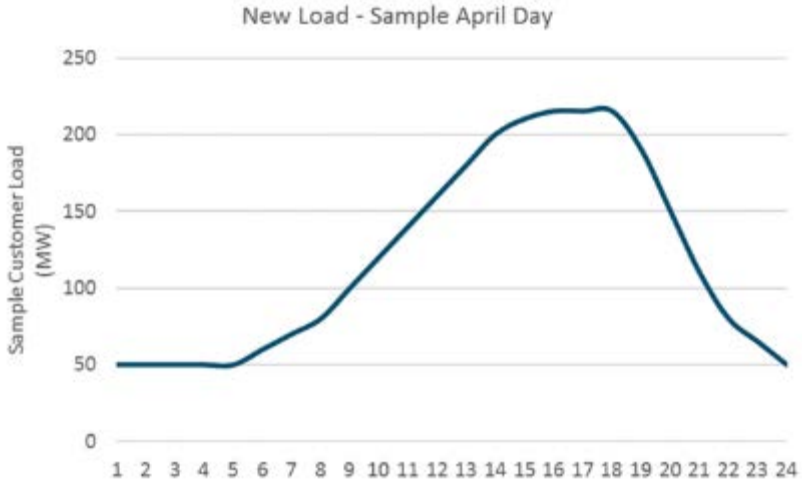
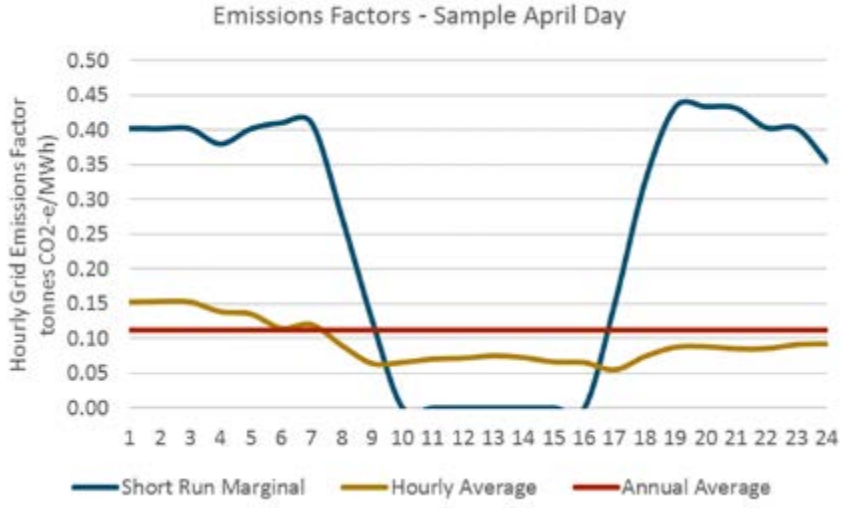
Overview - Supply Side

- Most tEE or EB measures operate in hours both above and below the annual average emissions intensity

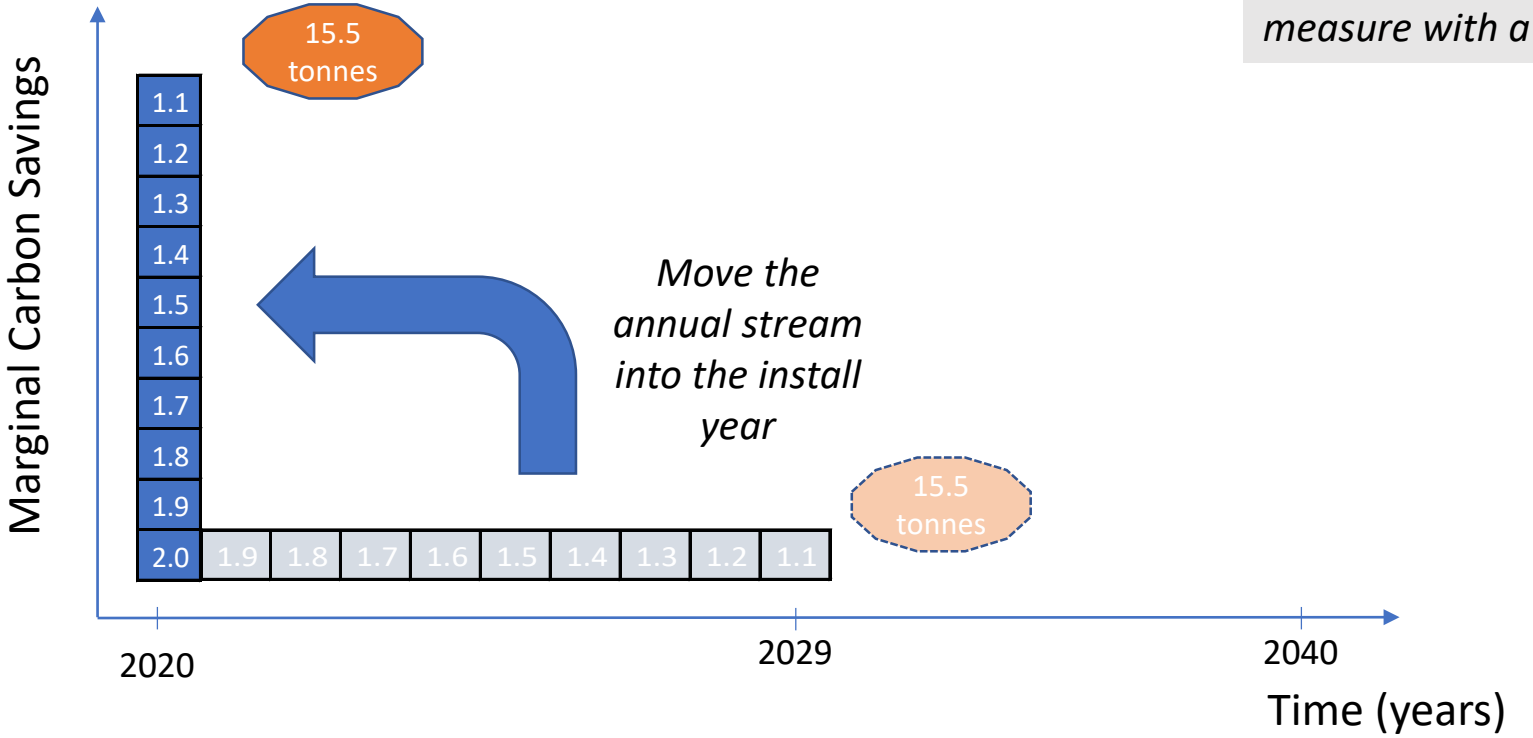
- Marginal Carbon ≡ the summation of short run hourly effects throughout the year and each year of the measure's life





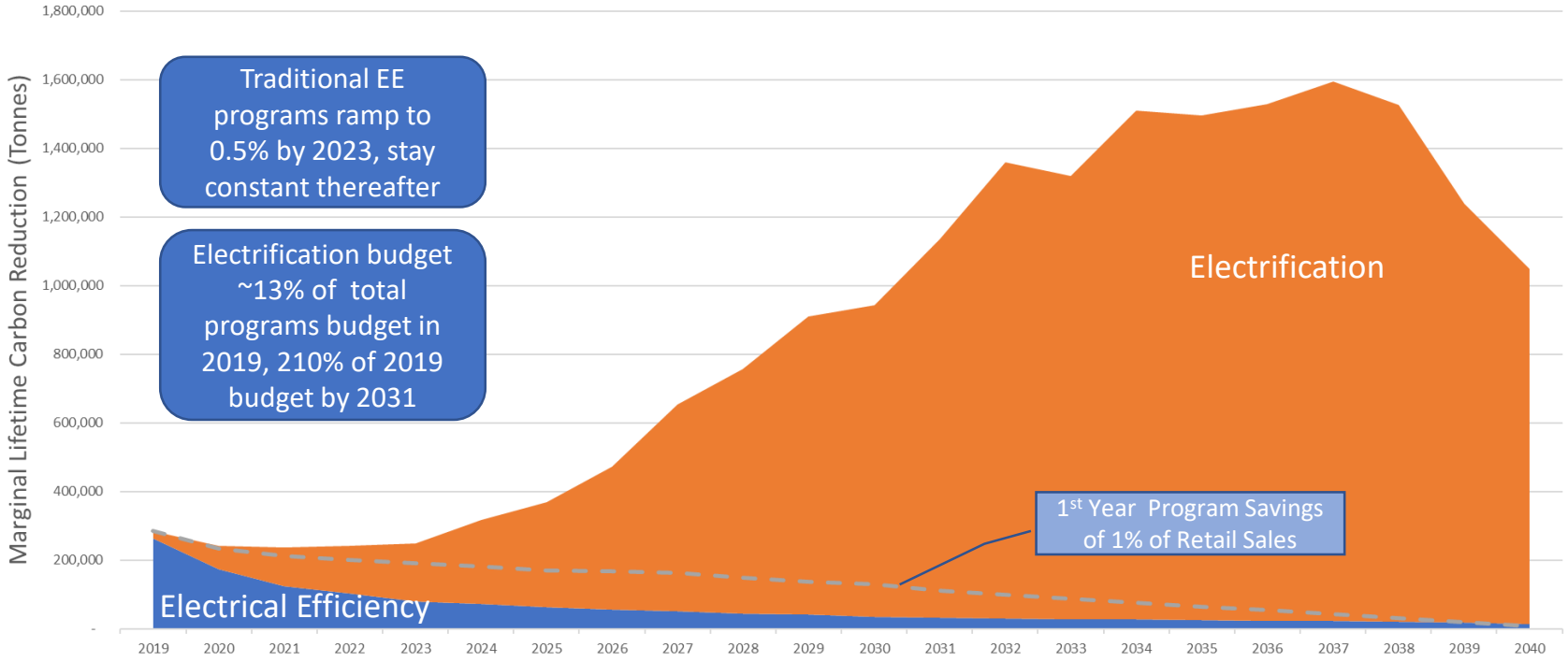
Programmatic Carbon (as a planning metric)

Example: 1 Traditional EE measure with a 10 year life



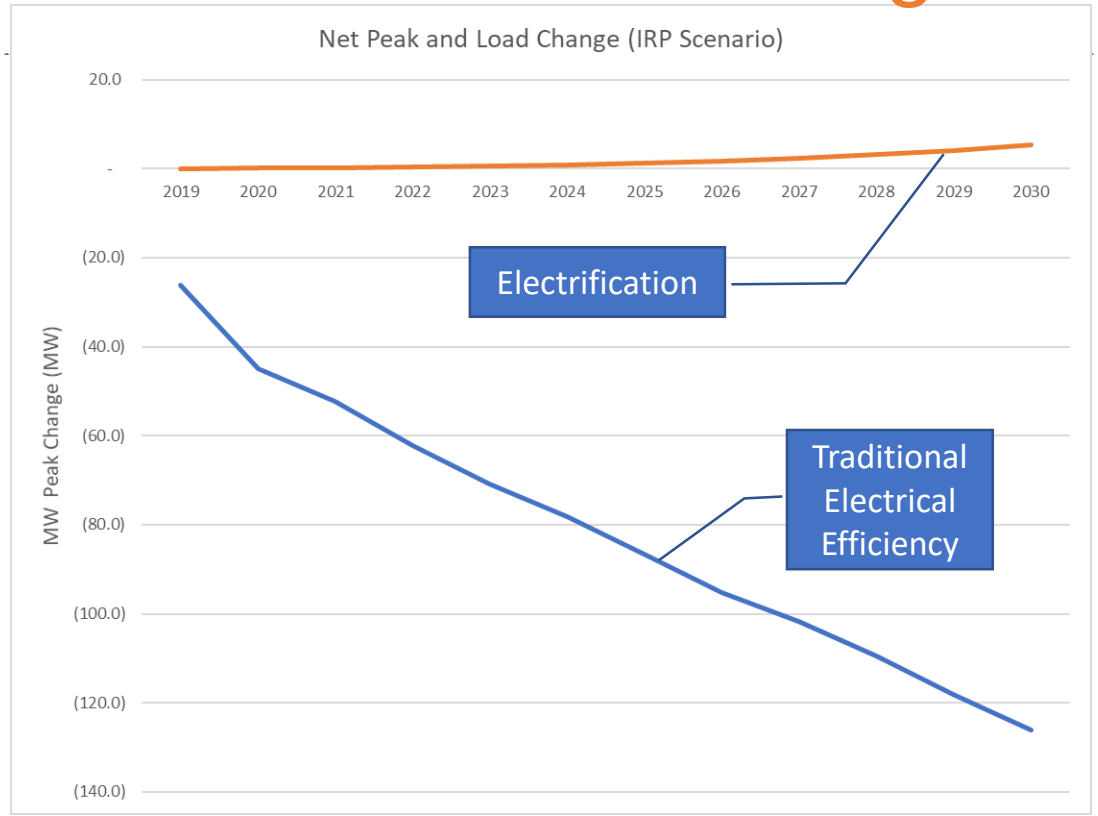
Carbon reduction on the grid and from the customer

Programmatic Carbon Reduction



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

Peak and Load Factor Changes



Grid Utilization Increases 6%

Load factor improves and peak decreases


Thank you
Scott Blunk
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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]
HPWH Midstream Incentive	November 2018	**$1,000**	n/a	n/a	✓	n/a	x
Multifamily Existing	December 2018	**$2,500**	n/a	$1,000	$1,000	$500	x
HPWH Direct Install Program	3nd Quarter 2019	**$3,000**	n/a	n/a	✓	n/a	x
HP-HVAC Equipment Efficiency	4th Quarter 2019	**$4,500**	$1,500	$2,500	n/a	n/a	$500[3]

Resources

- https://www.smud.org/-/media/Documents/Corporate/About-Us/Energy-Research-and-Development/2019-Low-Rise-Reach-Code-Analysis_SMUD_Draft.ashx
- https://www.smud.org/-/media/Documents/Corporate/About-Us/Energy-Research-and-Development/E3-Residential-Building-Electrification-in-California-April-2019.ashx

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