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Flexible All-Electric



Scott Blunk
June 20, 2018

Powering forward. Together.



Benefits of Building Electrification

- Reduce Customer's Energy Bills
- Carbon Savings
- Accelerate Fixed Cost Recovery at SMUD
- Create Local Jobs
- Improve Regional Air Quality
- More opportunity to Shape, Shed, and Shift Load



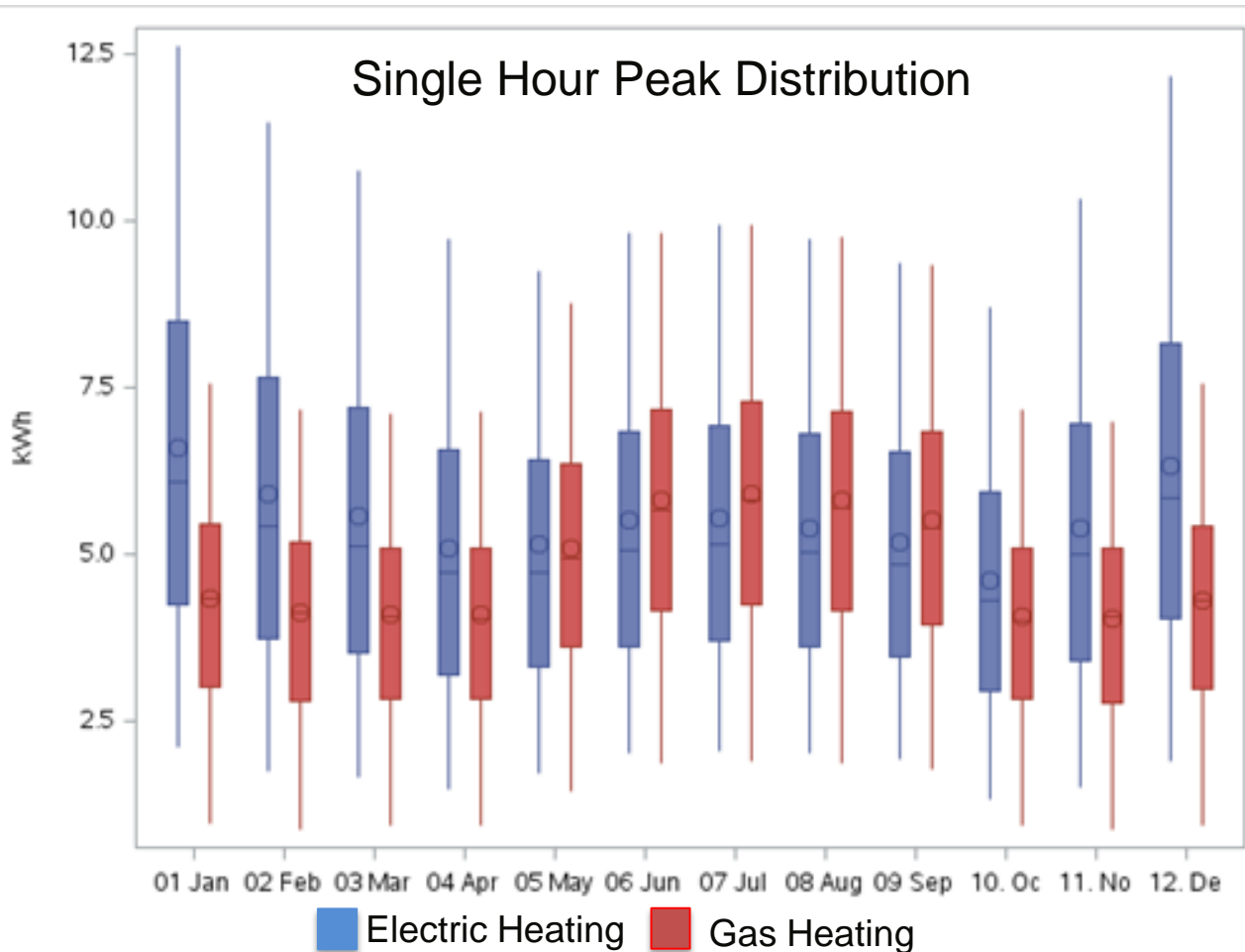
Electrification Program Offerings

	Launch	Total Possible Incentive	Base Incentive	HPSH	HPWH	Induction	Bonus
Single Family New Construction	March 2018	\$5,000	\$3,000	✓	✓	\$1,000	\$1,000 ¹
Multifamily New Construction	March 2018	\$1,500	\$750	✓	✓	\$500	\$250 ²
Single Family Existing	May 2018	\$10,250	n/a	\$4,500	\$3,000	\$250	\$2,500 ³
HPWH Equipment Efficiency	June 2018	\$3,000	\$3,000	n/a	✓	n/a	x
Multifamily Existing	July 2018	\$2,250	n/a	\$1,000	\$1,000	\$250	x
HPWH Midstream Incentive	3rd Quarter 2018	\$1,000	n/a	n/a	✓	n/a	x
HPWH Direct Install Program	1st Quarter 2019	\$3,000	n/a	n/a	✓	n/a	x

Footnotes:

1. Completion in 2018
2. Completion in 2018 or 2019
3. Triggered by changing 3 of the following 4 (HPWH, HPSH, Induction, Panel Upgrade to 200Amps)

Electric vs. Gas Heated Homes



- Represents actual customer data
- Existing electrically heated homes are mostly from the 1970s
- Flexible electric practices/technology will reduce both heating and cooling peaks

Savings Comparison

Residential New Construction All-Electric Home Comparison

	Electric & Gas Home	All-Electric Home
Electricity Consumption	4,530 kWh/yr	7,670 kWh/yr
Natural Gas Consumption	370 Therm/yr	0 Therm/yr
GHG Emissions (source)	6,700 lb CO ₂ /yr	4,100 lb CO ₂ /yr
Total 2016 kTDV ¹	80 kTDV/yr	71 kTDV/yr
Total 2016 Energy Bill	\$1,020/yr	\$890/yr

* Uses SMUD's TOU rates which begin in 2019

Building Costs	Cost Per Home
HVAC Equipment Upgrade	\$25
HPWH Equipment Upgrade	-\$4
Cooking Equipment Upgrade	\$1,056
In-home Electric Infrastructure Upgrade	\$600
In-home Gas Infrastructure	-\$550
Neighborhood Gas Infrastructure	-\$1,000
Net Costs to Builder	\$127

Heat Pump Water Heater (HPWH)



- Same technology as a refrigerator
- ~300% “efficient”, less expensive to operate and fewer emissions than gas tankless
- Flexibility:
 - Ability to recharge at times of low grid utilization, mid-day, which minimizes power draw during times of peak grid demand
 - Inclusion of a mixing valve allows heating of water beyond delivery temperature effectively increasing the capacity of the tank
 - Shift: ~ 1.05 kWh / 450W per unit
 - Float through peak demand

Heat Pump Space Heating (HPSH)

- ~300% “efficient” – absorbs instead of creates heat, less expensive and fewer emissions than gas heating
- Compressor is reversible otherwise same as standard AC
- Flexibility:
 - Ability to pre-heat and pre-cool buildings at times of low grid utilization
 - Reduces use at time of high grid utilization
 - Shift: highly dependent on envelope quality



Envelope



- The better the envelope the more the building can be used as a flexible energy source while keeping occupants comfortable
- This includes:
 - Air sealing: A less leaky envelope does two things: keeps more conditioned air in the building and improves insulation performance
 - Insulation: Improve walls, attics, cool roof
 - Windows: Lower U and SHGC windows
 - Exterior shading devices, overhangs

Batteries

- More electric end uses results in higher utilization of batteries
 - Shoulder seasons electric homes are better able to deplete the batteries daily and are more likely to be able to take full advantage of clean/ cheap power during mid-day
 - Batteries work to shift cleaner energy to induction ranges, HPWH, space heating, electric dryers, EVs

Questions?



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Flexible Electrification

