

**DOCKETED**

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# 2019 Residential Appliance Saturation Study (RASS)

Le-Huy Nguyen, Energy Commission Specialist II

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# Background

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- Authorized by the Warren Alquist Act
- Collects information on residential end uses
- Historically, the collected data has been used to provide the inputs for the Demand Office's Residential End Use Model
- Previous CEC RASS: 2003 and 2009



# Project Objectives and Scope

- Statewide CEC and utility-specific forecasting
- Representative sample frames for utility service territories and forecast zones
- Collect information on appliances, equipment and general consumption patterns
- Produce electric and gas end-use saturations at statewide and utility levels for households with electric service



**Pacific Gas and  
Electric Company**



**SOUTHERN CALIFORNIA  
EDISON**  
An EDISON INTERNATIONAL Company



A Sempra Energy utility



A Sempra Energy utility



**Los Angeles  
Department of  
Water & Power**





## Project Objectives and Scope (cont)

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- Conduct conditional demand analysis to develop unit energy consumption estimates (UECs) for 28 electric and 9 natural gas residential end-uses
- Develop whole house electric load shape estimates and gas daily use



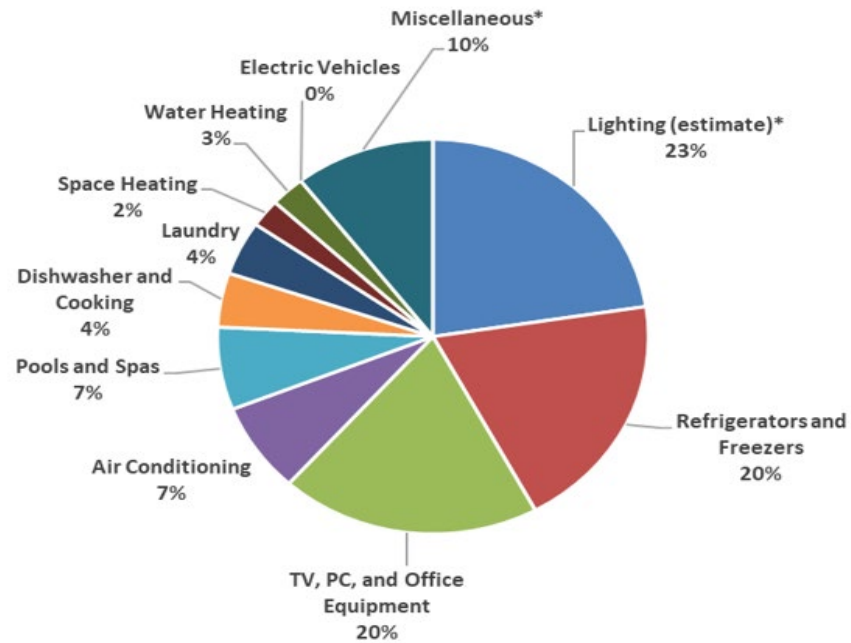
# RASS Surveys Completed

Utility	Population	% Population	Recruitment	Returned Surveys	Response Rate
LADWP	1,362,745	11%	44,653	2,817	6%
PGE	4,667,367	38%	182,364	16,146	9%
SCE	4,385,187	36%	156,313	13,434	9%
SDGE	1,239,170	10%	62,446	5,222	8%
SMUD	524,964	4%	26,570	2,366	9%
<b>Total</b>	<b>12,179,433</b>	<b>100%</b>	<b>472,346</b>	<b>39,985</b>	<b>8%</b>

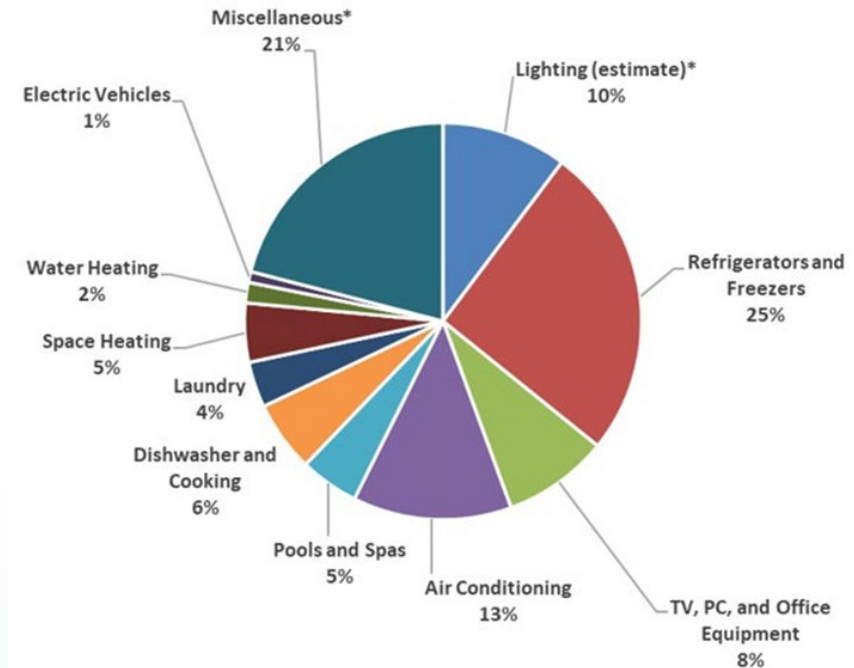


# Statewide Electricity Consumption 2009 vs 2019

2009 RASS : 6,296 kWh per home



2019 RASS: 6,174 kWh per home



Source: 2019 California Residential Appliance Saturation Survey



# Electric UEC and Appliance Saturation by Housing Type

	All		Single Family		Multifamily		Mobile home	
	UEC	Sat.	UEC	Sat.	UEC	Sat.	Home UEC	Sat.
<b>All Household UEC</b>	6,174	39,682 homes	7,553	26,263 homes	4,022	12,583 homes	5,798	836 homes
<b>Primary Conventional Space Heating</b>	953	15%	1,509	10%	622	23%	1,193	6%
<b>Primary Heat Pump Space Heating</b>	768	4%	1,221	3%	493	7%	980	1%
<b>Auxiliary Space Heating</b>	489	7%	825	8%	117	7%	528	6%
<b>Furnace Fan</b>	130	64%	159	76%	55	45%	116	63%
<b>Attic Fan</b>	152	2%	133	3%	182	1%	442	3%
<b>Central Air Conditioning</b>	1,163	59%	1,372	66%	698	48%	1,246	53%
<b>Room Air Conditioning</b>	620	17%	828	14%	354	20%	1,026	29%
<b>Evaporative Cooling</b>	890	10%	1,001	12%	497	7%	1,488	27%
<b>Water Heating</b>	1,792	6%	2,539	4%	1,168	8%	2,107	5%
<b>Solar Water Heating</b>	1,295	0%	1,297	0%	1,258	0%	.	.
<b>Dryer</b>	502	32%	552	35%	396	25%	478	40%
<b>Dishwasher</b>	84	67%	93	74%	69	56%	51	53%
<b>Range/Oven</b>	350	47%	404	43%	285	54%	269	31%

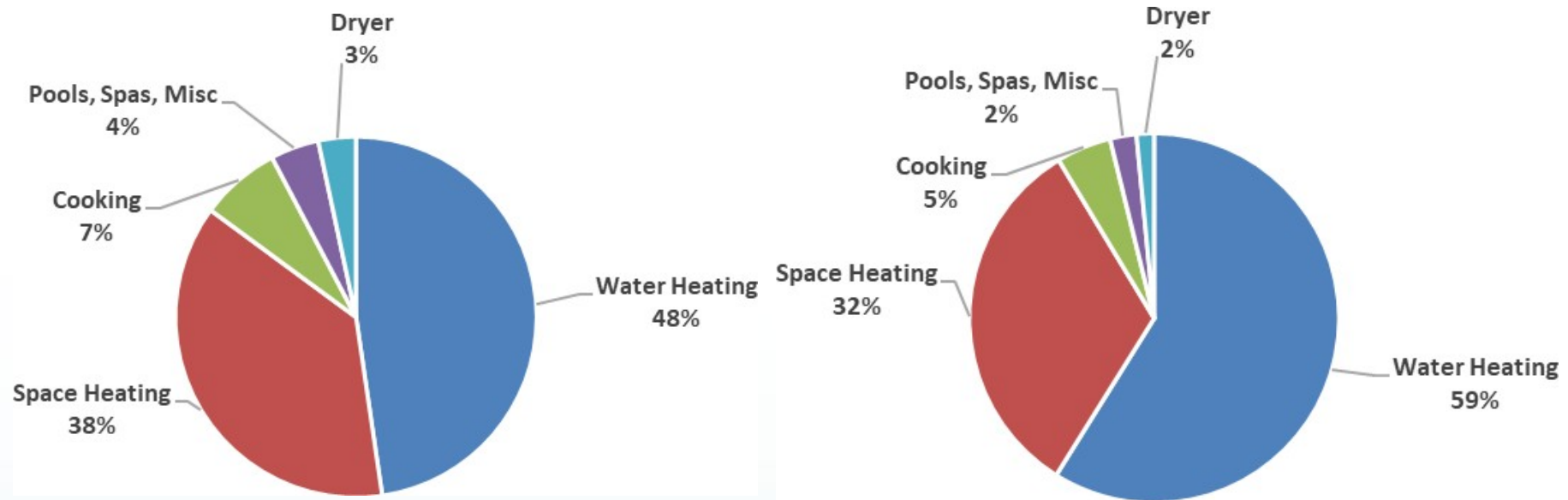
Source: 2019 California Residential Appliance Saturation Survey





# Statewide Gas Consumption 2009 vs 2019

2009 RASS: 354 therms per home    2019 RASS: 360 therms per home



Source: 2019 California Residential Appliance Saturation Survey



# Natural Gas UEC and Appliance Saturation by Utility

	All		PGE		SDGE		SoCalGas	
	UEC	Saturation of Homes with Gas Data	UEC	Saturation of Homes with Gas Data	UEC	Saturation of Homes with Gas Data	UEC	Saturation of Homes with Gas Data
<b>All Household UEC</b>	377	23,606 homes	416	10,338 homes	287	2,765 homes	363	10,503 homes
<b>Primary Heat</b>	158	77%	207	79%	101	75%	128	76%
<b>Auxiliary Heat</b>	53	2%	77	2%	30	2%	40	3%
<b>Water Heating</b>	258	86%	259	89%	208	88%	267	84%
<b>Solar Water Heat</b>	183	<1%	218	<1%	164	1%	196	<1%
<b>Dryer</b>	13	45%	13	30%	10	57%	13	54%
<b>Range/Oven</b>	24	75%	22	63%	18	77%	26	84%
<b>Pool Heating</b>	164	4%	139	3%	134	4%	180	5%
<b>Spa Heating</b>	37	5%	34	3%	37	8%	39	7%
<b>Miscellaneous</b>	17	10%	17	8%	14	16%	18	11%
	<i>All Homes</i>		<i>PG&amp;E</i>		<i>SDG&amp;E</i>		<i>SoCalGas</i>	
<i>Household Total UEC for All Homes with Gas Service</i>	360		402		280		358	

Source: 2019 California Residential Appliance Saturation Survey



# Natural Gas UEC and Appliance Saturation by Housing Type

	Single Family		Multifamily		Mobile Home	
	UEC	Saturation of Homes with Gas Data	UEC	Saturation of Homes with Gas Data	UEC	Saturation of Homes with Gas Data
<b>All Household UEC</b>	443	17,269 homes	241	5,999 homes	300	338 homes
<b>Primary Heat</b>	191	83%	67	63%	136	73%
<b>Auxiliary Heat</b>	59	2%	43	3%	37	<1%
<b>Water Heating</b>	260	94%	252	69%	257	85%
<b>Solar Water Heat</b>	184	<1%	166	0%	174	<1%
<b>Dryer</b>	12	53%	18	28%	17	35%
<b>Range/Oven</b>	25	77%	23	71%	20	82%
<b>Pool Heating</b>	163	5%	178	1%	181	1%
<b>Spa Heating</b>	38	8%	28	1%	38	<1%
<b>Miscellaneous</b>	17	12%	18	6%	27	5%
	<b>Single Family</b>		<b>Multifamily</b>		<b>Mobile Home</b>	
<b>Household Total UEC for All Homes with Gas Service</b>	434		226		324	

Source: 2019 California Residential Appliance Saturation Survey



## More Information

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- 2019 RASS website:
  - Final Reports
  - RASS Webtool
  - Previous Studies
- <https://www.energy.ca.gov/data-reports/surveys/2019-residential-appliance-saturation-study>



# Questions?

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