Rio Bravo Fresno Biomass

SVCE Board Meeting
April 12, 2023

Request and Justification

Recommend Board delegate authority to CEO to execute a short-term power purchase agreement with Rio Bravo Fresno Biomass energy, with the following parameters:

- Capacity: 25 megawatts
- Est. Annual Generation: 175,000 MWhs
- Price: fixed dollar per megawatt hour
- Term: 2.75 years, May 1, 2023 through December 31, 2025
- Not-to-exceed dollar amount: $60,000,000

Rio Bravo Fresno Biomass is needed to meet Renewable Portfolio Standard and Resource Adequacy requirements for calendar years 2023, 2024 and 2025

Rio Bravo Fresno is not an enabled counterparty with SVCE and therefore the Board-approval or delegation of authority to the CEO is necessary

Rio Bravo Fresno Biomass

Capacity: 25 megawatts
Est. Annual Generation: 175,000 MWhs
Term: 2.75 years, May 1, 2023 through December 31, 2025

Renewable Portfolio Standard (RPS) PCC1: 4 to 5% per year

Resource Adequacy Capacity: 25 MW, 24-hour RA which will be effective in meeting RA reform in 2025

Background
Rio Bravo Fresno Biomass is located in California's agricultural region in the community of Malaga. RBF was built in 1988

Fuel Source
Agricultural pruning's and urban wood

Technology Used
The circulating fluidized bed (CFB) boiler technology used allows for a more complete and efficient burn of the biomass, thus air pollutants are dramatically reduced.

Emissions Factor: .04 MTCO2e/MWh (equates to about 1lb of Emissions on SVCE's Power Content Label)

Request and Next Steps

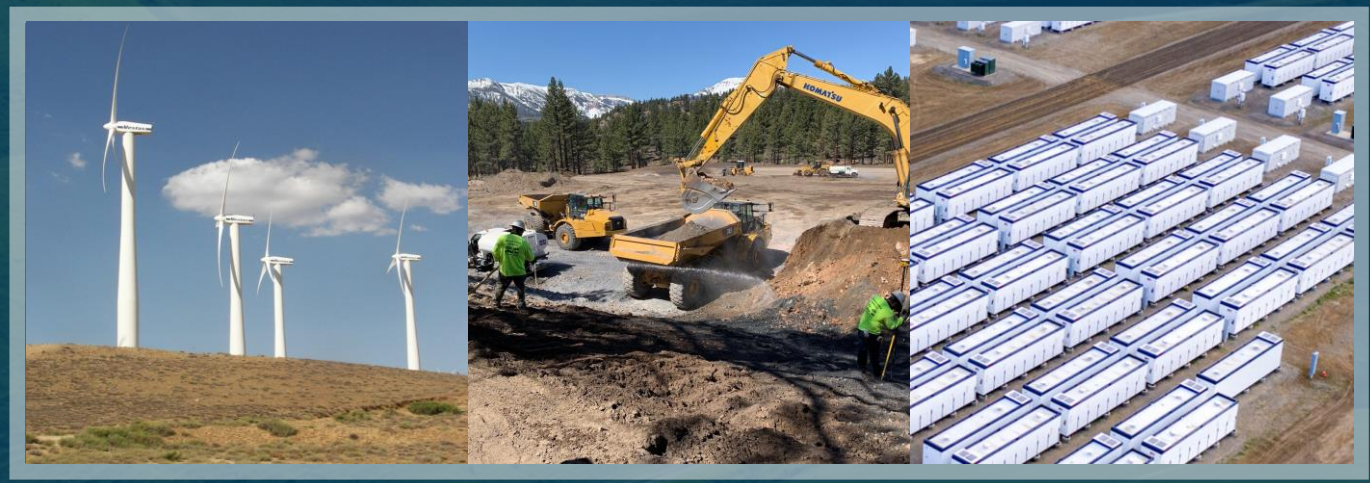
Recommend Board delegate authority to CEO to execute a short-term power purchase agreement (PPA) with Rio Bravo Fresno Biomass energy, with the following parameters:

- Capacity: 25 megawatts
- Est. Annual Generation: 175,000 MWhs
- Price: fixed dollar per megawatt hour
- Term: 2.75 years, May 1, 2023, through December 31, 2025
- Not-to-exceed dollar amount: $60,000,000

Middle River Power – Hanford Hybrid Natural Gas Power Plant with New Battery Energy Storage System

SVCE Board Meeting

April 12, 2023



Request

1. Consider a Power Purchase Agreement with Middle River Power for the Hanford Hybrid Natural Gas Power Plant to meet Resource Adequacy and Mid-term Reliability Procurement Order Requirements;

2. Approve an exception to Board-approved Energy Risk Management Policy to manage cost associated with the Hanford PPA; and

3. Direct staff to develop a proposal to establish a fund and guidelines to mitigate emissions associated with the Hanford PPA

Background and Overview

1. California's Clean Goals, Reliability Challenges and Requirements
2. SVCE's Energy and Capacity Portfolio, Procurement and Progress Efforts
3. Middle River Power's Hanford Hybrid Natural Gas Power Plant with Battery Energy Storage System
4. Recommendation

California's Power Fleet in Transition

To achieve aggressive greenhouse gas reduction goals, California must transition from a fossil-based fleet to a clean source of electricity generation.

SB100: 100% Clean electricity by 2045

Past

Fossil: Primarily Natural Gas, Coal

Clean: Hydro and Nuclear

Present

Fossil: Natural Gas

Clean: Hydroelectric, Nuclear

Renewable: Solar, Wind, Geothermal and limited Storage

(-) Coal (mostly retired)

Future

Fossil: Less Natural gas

Clean: Hydro, Demand Response, & New Technologies.

Renewable: Solar, Wind, Geothermal, Off-shore Wind, Storage

(-) No nuclear

3x the amount of Solar and Wind and 8x of Storage over current rates of development are needed

What is Reliability?

California energy agencies are charged with ensuring that there is sufficient energy and capacity available on the power grid to meet demands at all times

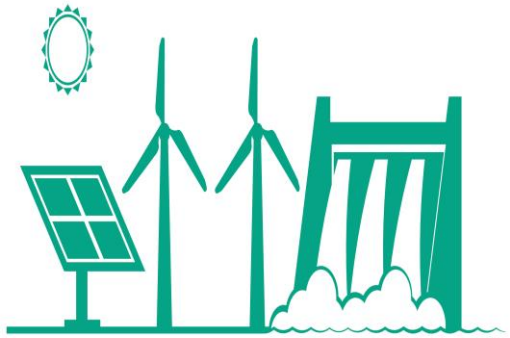
- **Capacity** (MW) - maximum output of electricity

+

- **Energy** (MWh) - electricity generated over time

=

- **Reliability** – Power Plant performance during certain periods of time

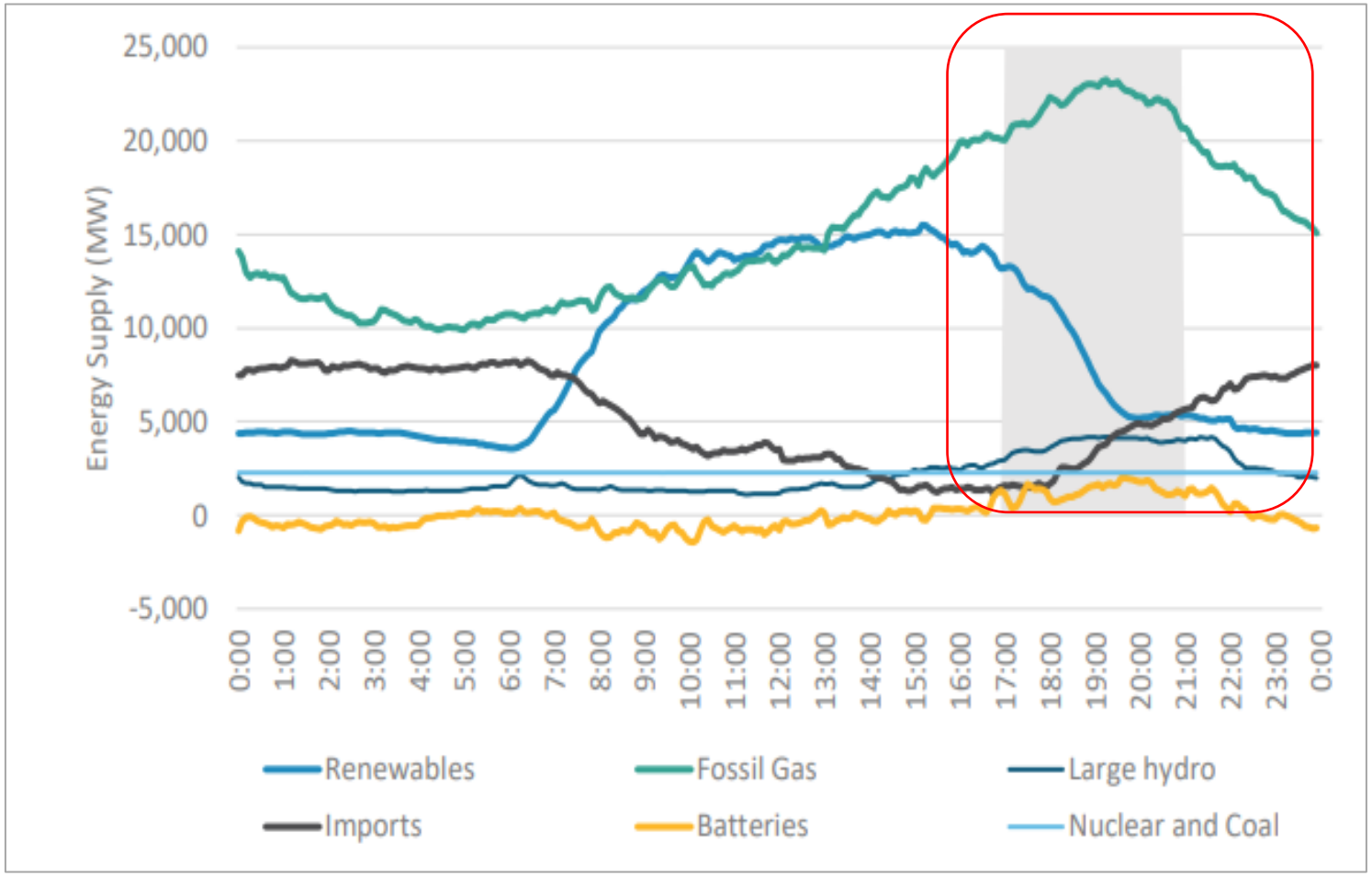


September 6, 2022 – Gas Keeps Lights on in California

Climate change, droughts, changes in load and resources have put a focus on how we will meet Reliability

- Load peaked in evening hours when Renewables ramped down
- Demand Response helped avoid rolling blackouts

Natural gas generation played a critical role in meeting peak demand

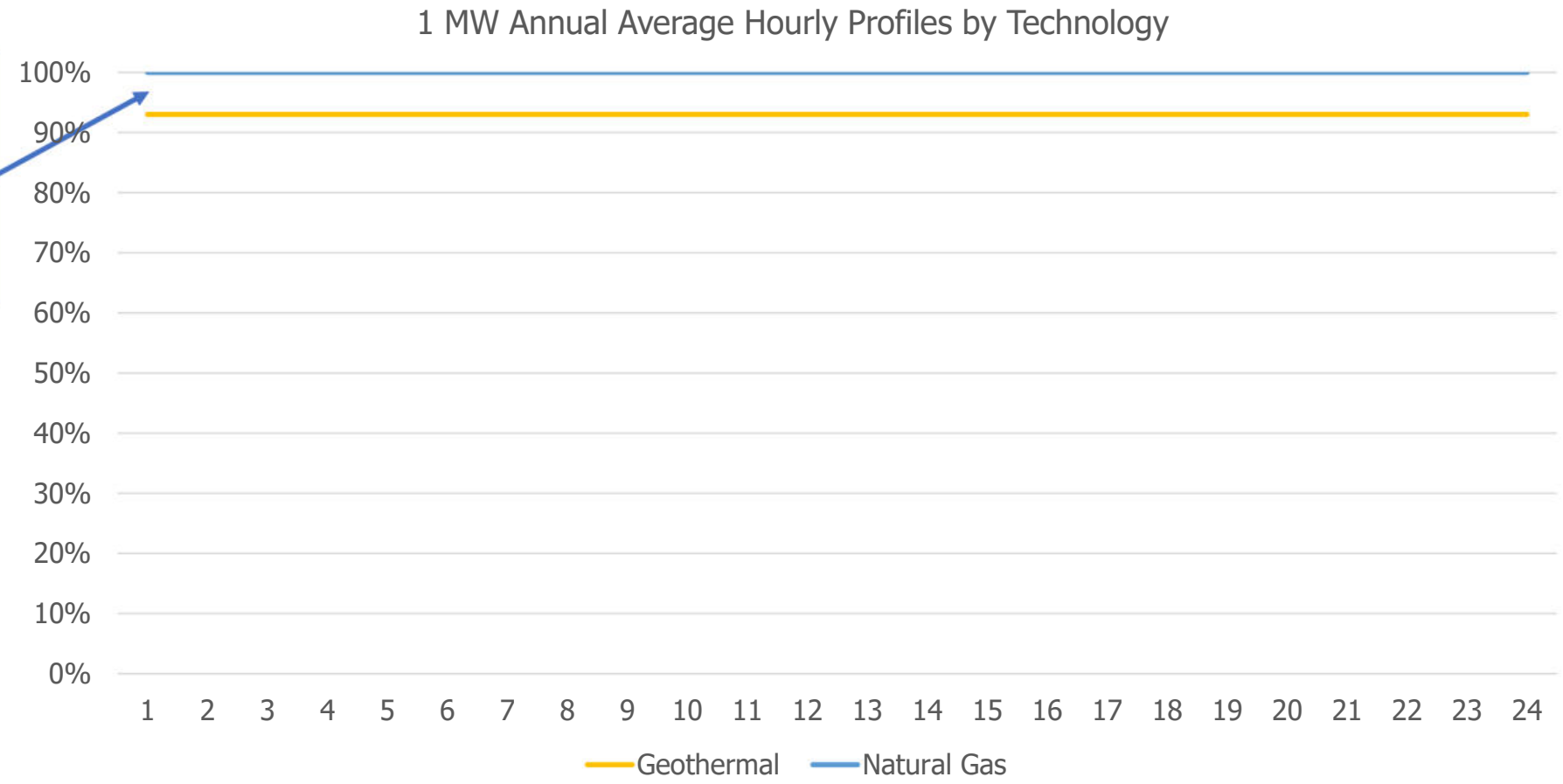


Source: 2022 Scoping Plan for Achieving Carbon Neutrality

Clean Energy Generation Varies

Baseload and Quick Start Resources such as Natural Gas and Geothermal provide 24/7 reliability

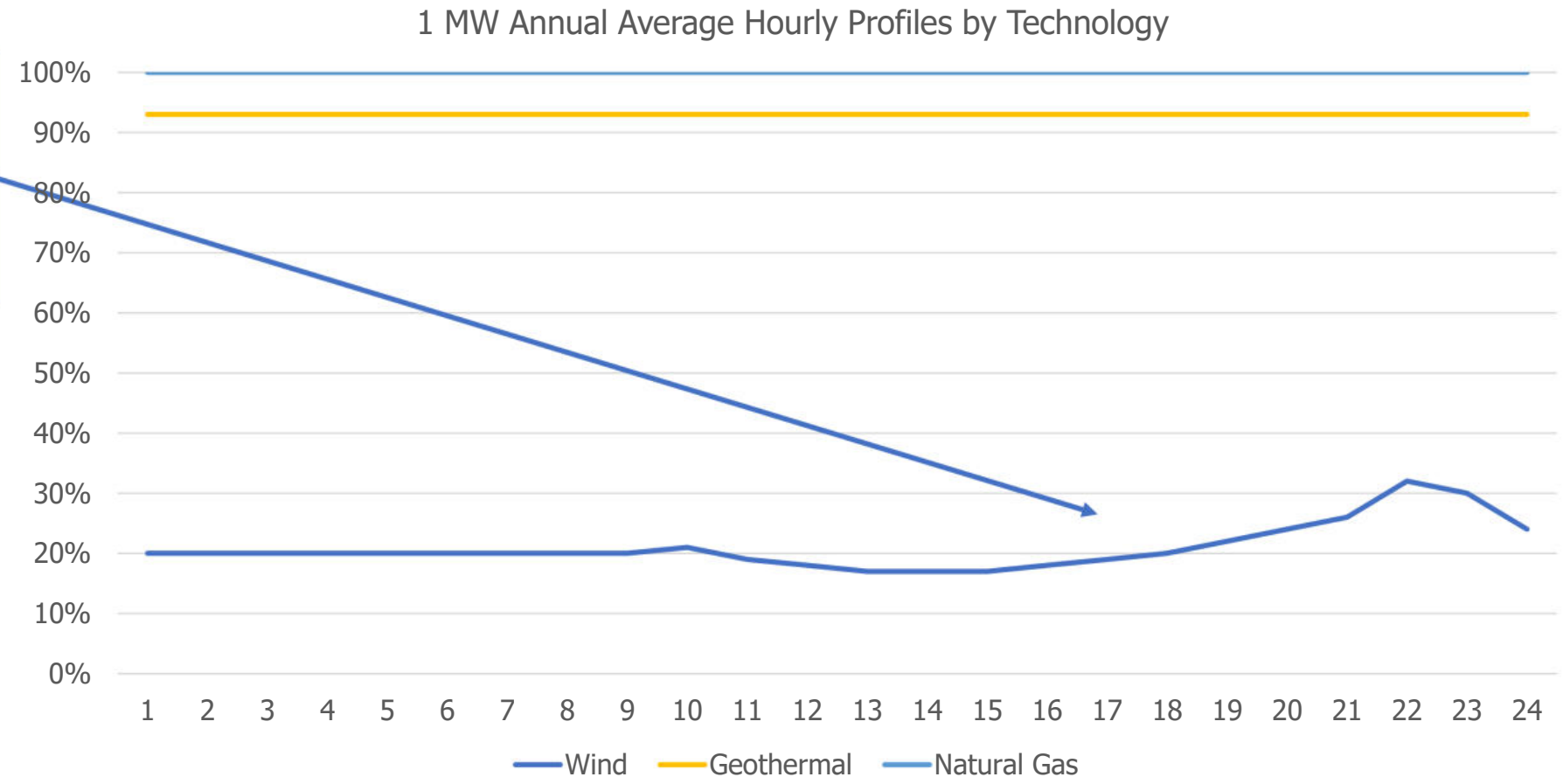
Natural Gas and Geothermal provide consistent and dependable generation



Clean Energy Generation Varies

Wind Resources can provide 24 Hour Reliability but at much lower capacity factors

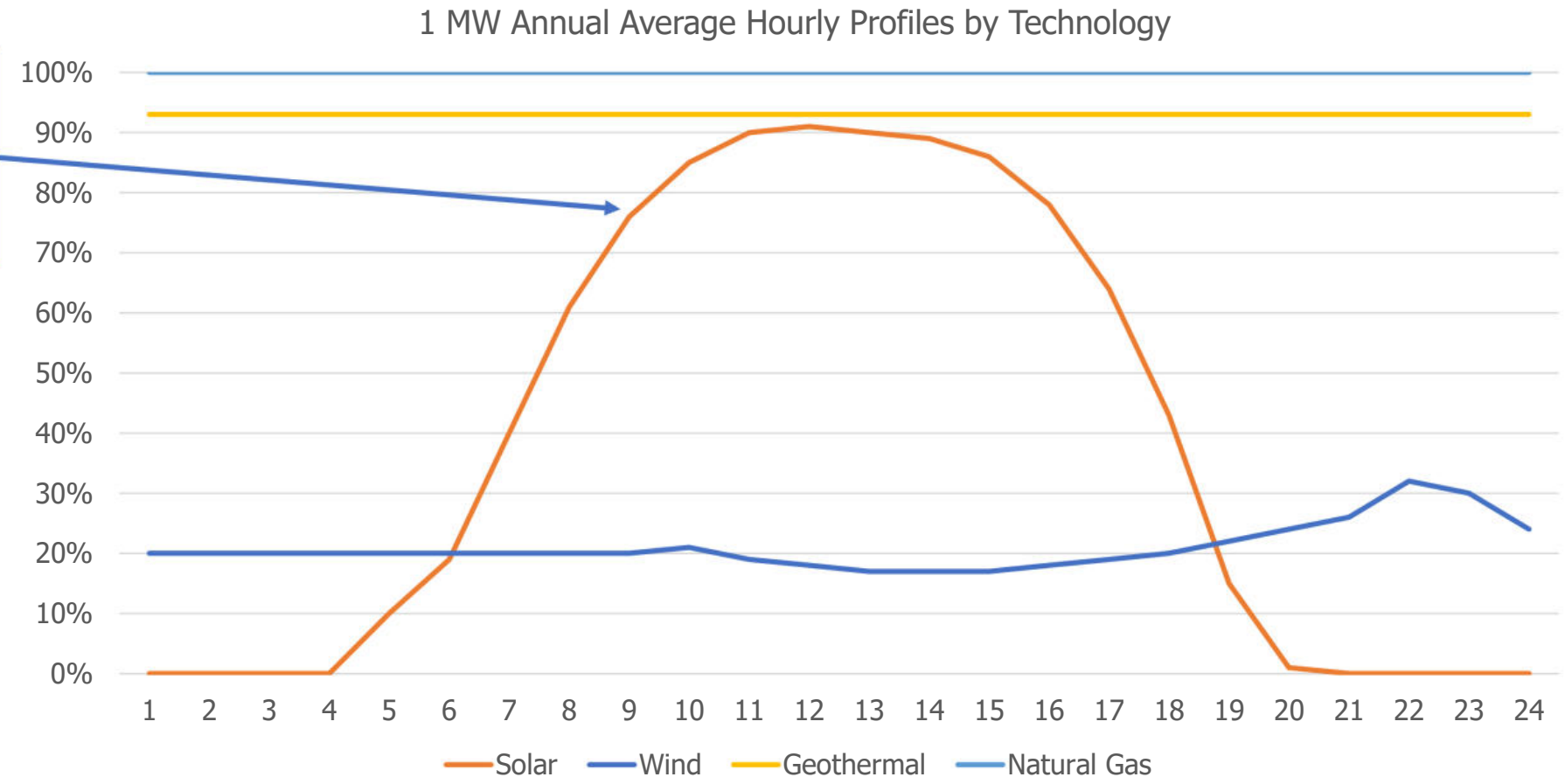
Wind Resources variability is represented by a lower capacity factor throughout the day



Clean Energy Generation Varies

Solar Energy provides a consistent shape, but only during the middle of the day

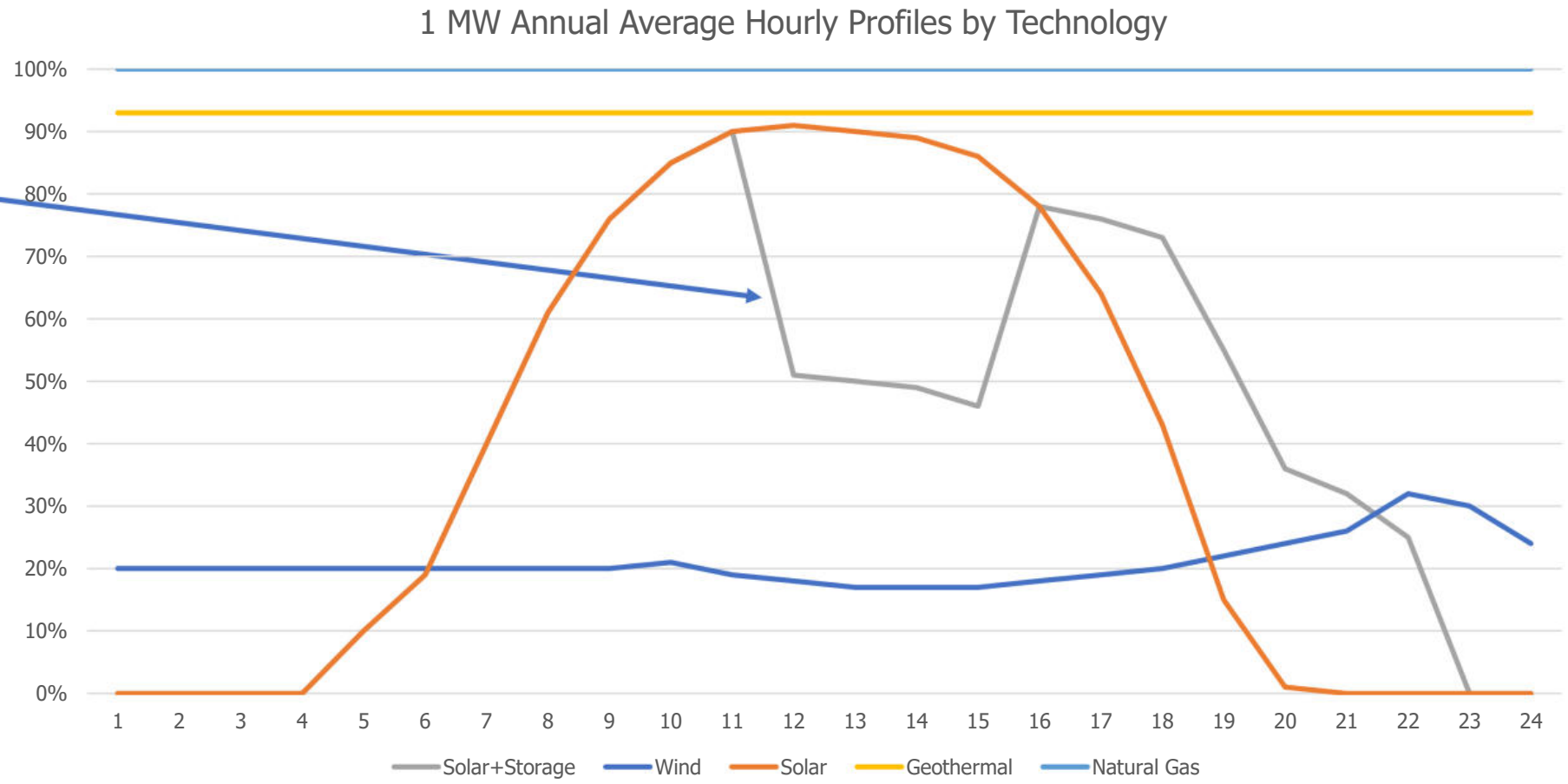
Solar provides consistent generation but is confined to when the sun is shining



Clean Energy Generation Varies

Storage can shift solar energy and other forms of zero-emissions resources to hours where it is needed

Batteries will charge from solar power and shift to hours where it is needed for reliability



Power Supply Products & Strategy

SVCE must procure electricity products to meet mandates and Board directives

	Energy	Capacity
Goal or Requirement	100% Clean RPS Reliability Procurement Mandates	Resource Adequacy Reliability Procurement Mandates
What We Buy	Hydro, Solar, Solar plus Storage, Geothermal and Wind	Natural Gas, Solar, Geothermal, Wind, Storage
How We Buy It	Long-term Power Purchase Agreements (PPA) and Short-term Resources	PPAs (bundled energy & capacity) Short-term RA capacity only, products

Resource Adequacy (RA) Program Overview

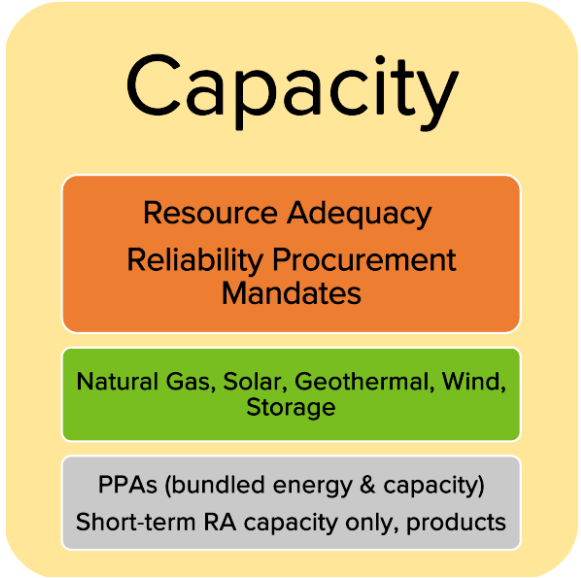
California must ensure there is sufficient Capacity to meet Demand under strained conditions

California Public Utilities Commission (CPUC) oversees RA Program

1. Determine Load Serving Entities (LSEs) obligation
2. Determine technology effectiveness

SVCE's RA Capacity Requirement is ~850 MWs

- SVCE expects to be deficient in CY 2023
  1. Changes to obligation
  2. Changes to technology effectiveness
  3. Scarcity in market
  4. PPA project delays



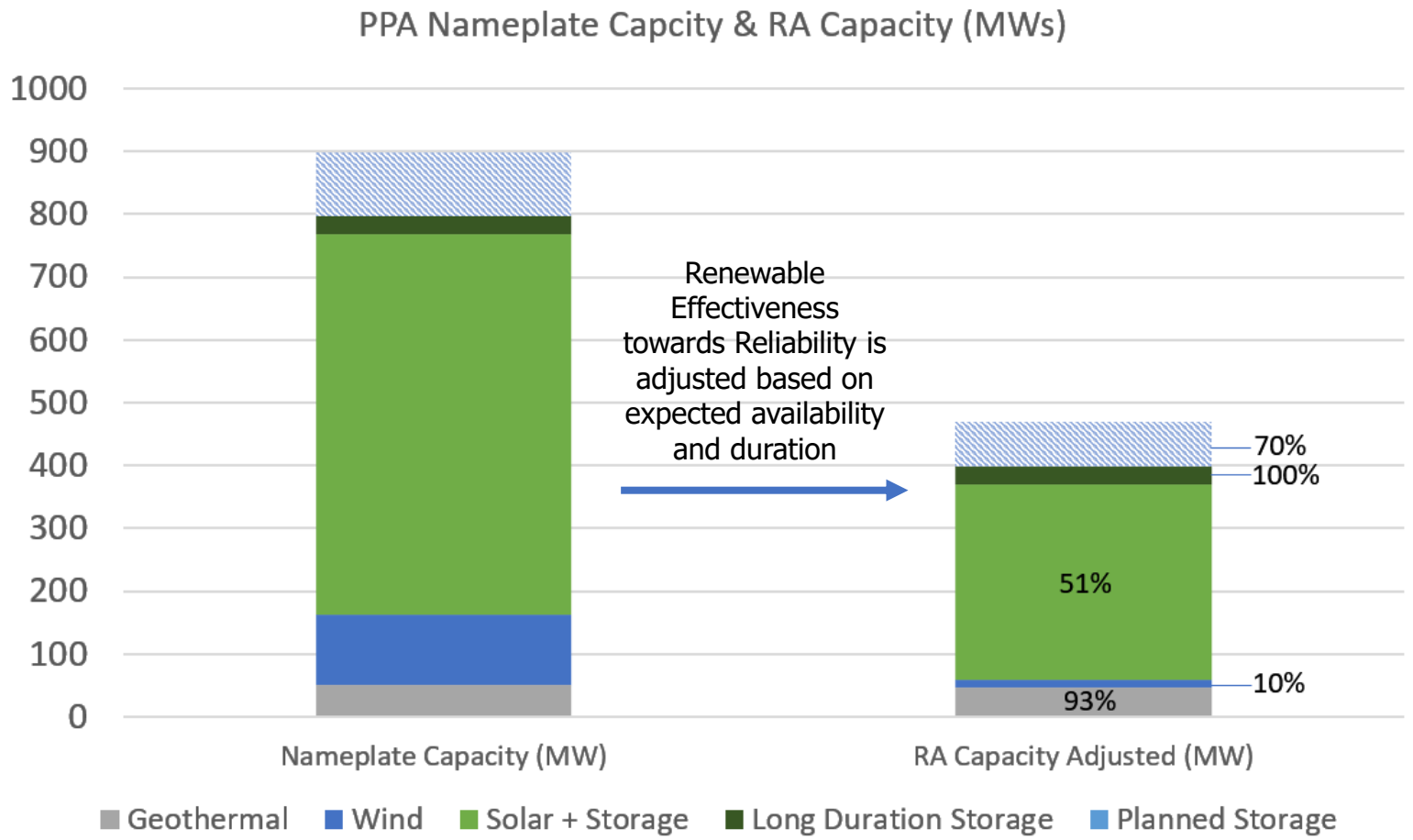
SVCE's PPAs and their RA Capacity

SVCE does not have a Clean Capacity goal, but has over 900 MWs of Clean Capacity that qualifies for about 408 MWs of RA Capacity

Clean Only Capacity - 2000 to 2500 MW of Additional Solar + Storage Nameplate Capacity needed to meet requirements

Typical lead time to build new renewable resources is 3-5 years

CPUC's RA Program will continue to erode counting capacity for intermittent resources



SVCE's Energy & Capacity Portfolio

100% of Energy needs are met by Clean resources

65% RPS from LT PPAs by 2025, 12% of RA Requirements

Storage capacity will meet 30% of RA Requirement but no energy

Overall 42% Clean Capacity

RA and reliability met primarily through natural gas

Estimated for 2025	Annual Energy (GWhs)	Energy Source as a Percent of Total Retail Sales	Capacity Source as a Percent of Total RA Requirement
Biomass	175	4.4%	2%
Geothermal	507	12.8%	7%
Solar	1,292	32.8%	1%
Wind	584	14.8%	2%
Large Hydroelectric	1,375	35.2%	0%
Battery Storage	0	0%	30%
Natural Gas	0	0%	58%
Total	3,933	100%	100%

Clean Capacity Challenges

SVCE needs near term solutions to meet reliability requirements

Technology Strategy	Challenges
New storage, stand-alone and/or paired with solar and wind	• Long-lead time to build (three to five years); • Large development risk associated with supply chain, labor and interconnection • Sub-optimal portfolio if too much storage is added
Out-of-state wind & off-shore wind	• Lead time • Development risk • Transmission to bring wind into California is expensive
Existing and/or new geothermal, biomass or other clean baseload renewable capacity	• Scarce resource • Lead time • Development risk • Most likely to be built outside of CAISO requiring transmission.
Distributed Energy Resources and Demand Response including Virtual Power Plants	• Potential amount of capacity is limited • Rules for counting towards RA are in-flux • Long lead time

SVCE's Reliability Challenge & Strategy

Status Quo:

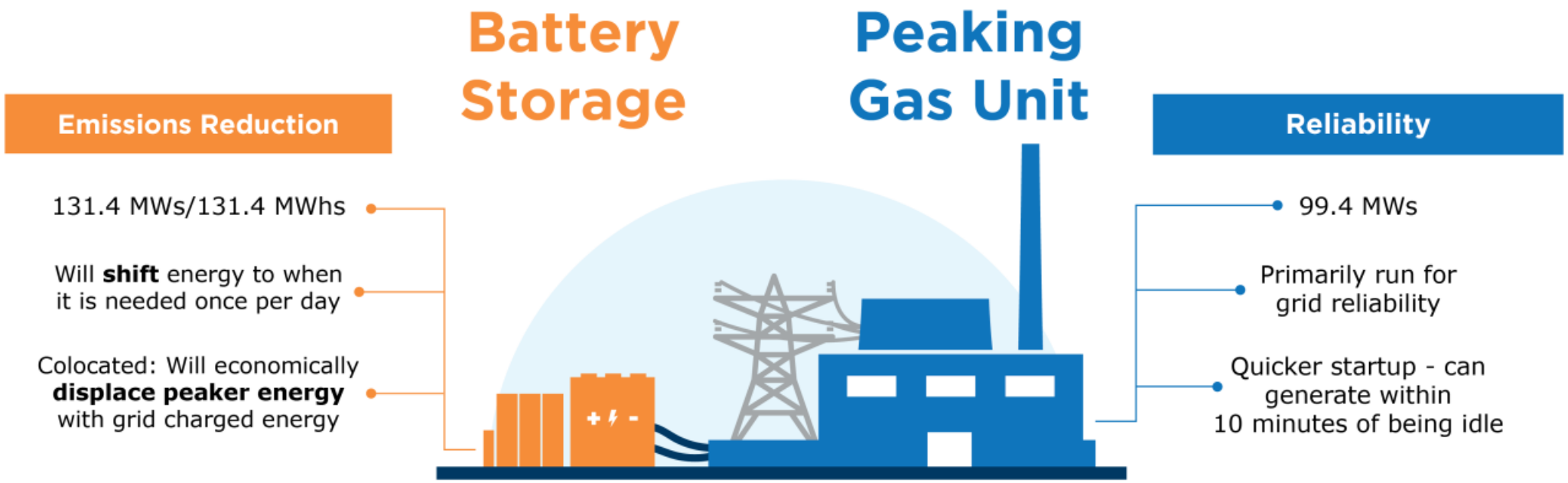
- 900 MWs of renewable projects under long-term contract to meet clean energy
- Renewable and storage capacity effectiveness is expected to decrease over time
- Natural gas power plants will continue to be needed for reliability over the next ten to 20 years
- RA market is tightening and cost are increasing
- SVCE relies on ***short-term***, natural gas RA-only capacity contracts
- Regulatory uncertainty around future procurement orders and/or central procurement of clean capacity

Adapt:

- Layer in ***longer-term*** gas RA purchases to reduce sensitivities to price, supply, and compliance risk
- Continue to plan for a clean energy transition

Hanford Hybrid Natural Gas Power Plant with Battery Energy Storage System –Alternative

Middle River Power's (MRP) Hanford Natural Gas Peaker Power Plant ("Hanford") with grid-charging BESS



Over time, the BESS will compete for transmission capacity at the site and the Natural Gas Power Plant ("Peaking Gas Unit") will operate less and less, thus reducing emissions at the Hanford project location

Hanford Project Attributes & Benefits

Seller: Middle River Power

Project:

1. **Existing** 99.4 MW Peaking Natural Gas Power Plant w/ Energy Toll and RA Capacity
2. **New BESS** 131.4 MW one-hour Lithium-ion

Price:

- RA Capacity fixed cost per month
- Energy Toll fixed cost per month plus Variable Operation and Maintenance adder
- Expected cost: $280,000,000

Expected Commercial Operation Date: April 2024

Term: 12 Years

Location: Fresno, CA

Resource Adequacy Capacity – 115.4 MW

- 99.4 MW from Existing Peaker Plant
- 16 MW from 131.4 MW of new BESS

Mid-term Reliability Procurement – 16 MW

- From the new BESS

Energy Toll

- Dispatchable energy from existing Peaker plant to be used during constrained market conditions for reliability and under limited operating constraints

Hanford Portfolio Impacts & Benefits

Resource Adequacy Capacity from BESS – 2%

Resource Adequacy Capacity from gas peaker – 16%

Total Resource Adequacy – 18%

Energy generated for grid stability Estimated ~ 0.2% of load.

Estimated 2025	Annual Energy (GWhs)	Energy Source as a Percent of Total Retail Sales	Capacity Source as a Percent of Total RA Requirement
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Wind	584	14.8%	2%
Large Hydroelectric	1,375	35%	0%
Battery Storage	0	0%	32%
Natural Gas	0	0%	40%
Hanford – Natural Gas	Est. 8	.2%	16%
Total	3,933	100%	100%

Hanford Portfolio Impacts & Benefits

Resource Adequacy Capacity from BESS – 2%

Resource Adequacy Capacity from gas peaker – 16%

Total Resource Adequacy – 18%

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Total	3,933	100%	100%

Environmental Impacts

- **Expected Annual Energy:** 8,000 MWh or 0.2% of SVCE's load
- **Emissions:** 0.6612 MT CO2e/MWh x 8000 MWhs = 5,289.6 MT CO2e per year
- Other types of emissions are generated at the site

- BESS will compete with gas power plant
- GHG emissions are expected to decrease over time
- Minimal reportable emissions on Power Content Label
- Consider establishing a fund to mitigate impacts
- Fund details to be discussed with Board and other stakeholders

SVCE's Reliability Solution

Alternative strategies needed to mitigate supply and price risk and meet reliability obligations

Hanford PPA

- Primarily Resource Adequacy Capacity
- New BESS meets Mid-term Reliability Procurement Order
- Emissions are low and decrease over time
- Little development risk
- Competitively priced and adds portfolio value
- Term aligns with California's transition to a Clean grid

Additional Efforts

- Increase Long-term RA Purchases and decrease reliance on short-term contracts
- Consider additional hybridized gas resources for reliability
- Pursue additional Clean Capacity resources including geothermal, biomass, wind, solar & storage
- Build up portfolio of Demand Response, Distributed Energy Resources and Virtual Power Plants

Portfolio Goals

SVCE has an aggressive Clean Energy Goal: 100% Clean Energy on an annual basis. Capacity procured to meet reliability and Resource Adequacy requirements.

Past

Clean Annually

50% RPS: short-term PCC1

50% Carbon-free: Large Hydro and Nuclear Allocations

Capacity

~95 to 100% Natural Gas Capacity Only Short-term contracts

~2036

Clean Annually

50 to 75% RPS: long-term PPAs

Balance from Large Hydro

Capacity

25 to 50% from Clean Resources

50% from Natural Gas Some Long-Term and/or Short-Term

~2045

Matched 24x7 Clean

50 to 75% RPS: long-term PPAs

Balance from Large Hydro

Capacity

75% from Clean Resources

25% from Short-Term Natural Gas

2022-23 Strategic Focus Area: 24x7 CLEAN ENERGY: Explore 24x7 clean energy delivery at scale, to improve on the current 100% clean energy goal

Request from Board

Approve Resolution 2023-06:

1. Delegates authority to CEO to finalize and execute a Power Purchase Agreement with Middle River Power for the Hanford Hybrid Natural Gas Power Plant with Battery Energy Storage System, with the following parameters:
   - RA capacity from existing Hanford Natural Gas Power Plant of 99.4 MW
   - Additional RA capacity from a new BESS of 16 MW, counting towards the MTR Procurement Order
   - Dispatchable energy from peaker plant subject to operating constraints and to meet demand under certain market and grid conditions
   - Term: April 1, 2024 date and delivery through April 30, 2036.
   - Not-to-exceed dollar amount: $280,000,000

2. Approves an exception to the Energy Risk Management Policy to enable gas transactions needed to manage Hanford PPA

3. Directs staff to develop a policy and/or guidelines to set aside funds to be used for programs and/or projects to mitigate emissions associated with energy produced by the Hanford project resulting from the Hanford PPA

Electrification Discount Design

SVCE Board of Directors Meeting
April 12th, 2023

SILICON VALLEY CLEAN ENERGY

Today we're asking you to approve a design update to the E-ELEC discount

Update to "TOU Super" design

- -30% Off-Peak rates: cost savings
- +10% Peak rates: cost increase
- 0% adjustment to Partial-Peak

TOU-based design rewards customers the more they shift their usage to help the grid – **beneficial electrification**

1. Background

E-ELEC Residential Rate Background

The Board recently approved $9.5M to fund a multi-year discount to the E-ELEC rate

- PG&E's new E-ELEC ("Electric Home") rate open to residential customers with **heat pump, HPWH, EV, and/or ESS**
- Currently **unavailable to NEM** customers
- **Flat 10% discount** currently in place for SVCE's rate pilot
- Note: for **equitable access to electrification**, the Board also set aside $9.5M for the **multifamily direct-install program**

There is opportunity to better align the discount with SVCE's decarbonization mission

Electrification discount established to **support electrification** by **improving on-bill economics** of switch from gas to electric appliances.

However…

We can go further to promote **beneficial electrification**:

- Lower bills
- Reduce grid stress
- Align usage with solar and wind generation

E-ELEC Discount Timeline

12/14/2022: BOD approves E-ELEC discount

1/1/2023: 10% flat discount applied to SVCE's E-ELEC rate

2/13: 1st Staff Design Review Meeting

3/13: 2nd Staff Design Review Meeting

3/24: Executive Committee discussion

4/12: Present to Board of Directors for approval

2. Discount Design

We evaluated 4 different discount approaches based around TOU periods

1. **Flat 10%** – discount applied equally across all TOU periods
2. **TOU Standard** – discount applied only to Off-Peak period
3. **TOU Plus** – increased Peak rate, deeper discount for Off-Peak
4. **TOU Super** – even more increased Peak, even deeper Off-Peak discount

TOU = Time-of-Use

Beneficial Electrification is supported by the cost difference between Peak and Off-Peak periods

SVCE's E-ELEC Generation Discount Rates per TOU Period

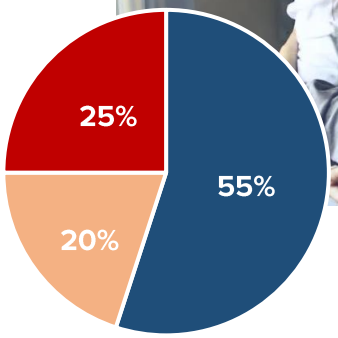
		Flat 10%	TOU Std	TOU Plus	TOU Super
Winter	Off-Peak	**-10%**	**-20%**	**-25%**	**-30%**
	Partial-Peak	**-10%**	0%	0%	0%
	Peak	**-10%**	0%	**+5%**	**+10%**
Summer	Off-Peak	**-10%**	**-20%**	**-25%**	**-30%**
	Partial-Peak	**-10%**	0%	0%	0%
	Peak	**-10%**	0%	**+5%**	**+10%**

Note: Discount options were designed to be revenue neutral to SVCE for the average customer.

We evaluated three different customer profiles to gauge the impact of discounts

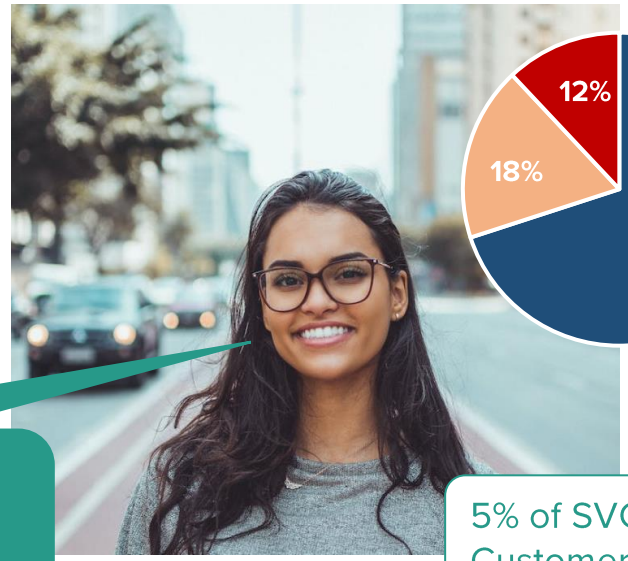
Average Customer

Sure, I care about my energy bills, but I'm busy.



90% of SVCE Customers

Savvy Customer

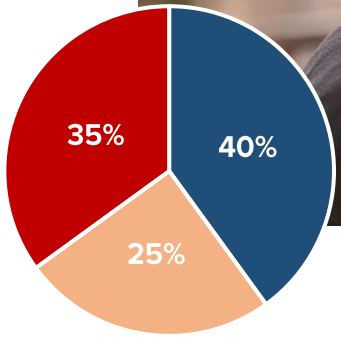


I've got all my appliances programmed to minimize my carbon footprint, it's awesome!

5% of SVCE Customers

Heavy Peaker

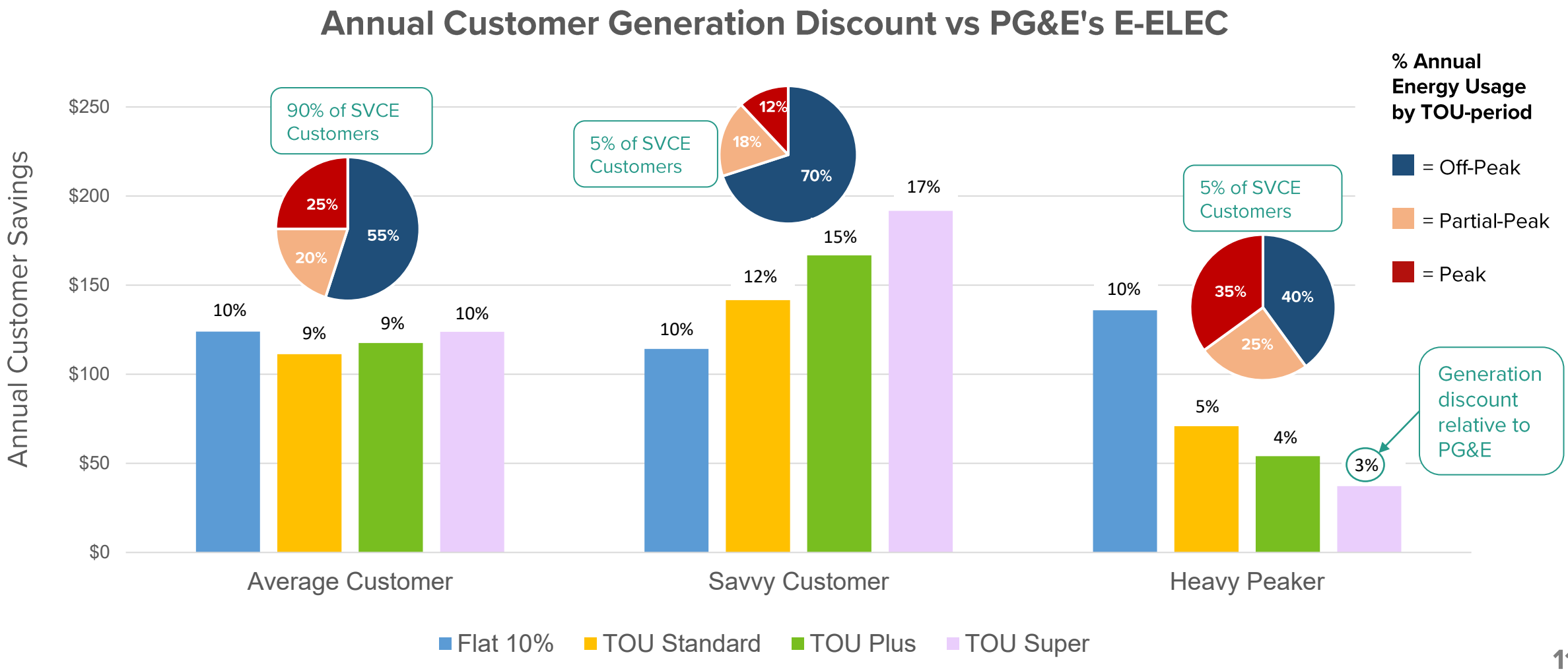
Since when is it a crime to love late-afternoon air conditioning?



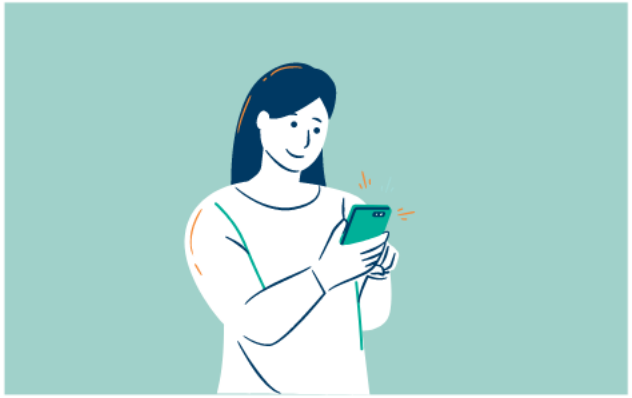
5% of SVCE Customers

= Off-Peak = Partial-Peak = Peak

The average customer could ~2x their discount through behavioral changes on TOU Super



Customer Journey – Electrifying the typical Single-Family Home



MEET AVERAGE CUSTOMER

Average Customer pays ~$270/month for gas & electricity.

RETROFITS TO HPWH

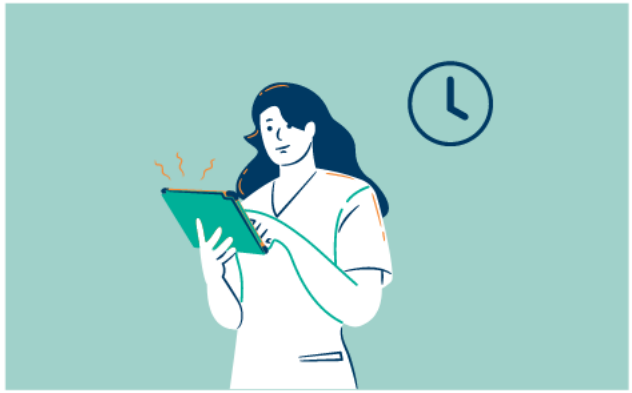
Average Customer saves an average $6/month after retrofitting their heat pump water heater (HPWH).

ENROLLS IN E-ELEC RATE

Average Customer saves an extra $15/month ($21/month total savings) after enrolling in E-ELEC rate with SVCE's TOU Discount.

RETROFITS FURNACE TO HEAT PUMP

Average Customer saves an extra $11/month ($32/month total savings) after retrofitting their furnace to heat pump.



SHIFTS ENERGY USAGE OFF-PEAK

Average Customer saves an extra $16/month ($48/month total savings) after shifting their energy usage off-peak.

REDUCE YOUR BILLS, NOT YOUR LIFESTYLE

Be like Average Customer and save $48/month while still enjoying the same level of comfort and convenience at home.

The Executive Committee recommended piloting a "time-guarantee" for enrolled customers

Proposed E-ELEC design update:

Phase 1

- Discount guaranteed through at least Jan 1, 2027
- Limited to first 1,000 enrolled customers
- SVCE to actively market discount and encourage usage shifting

Phase 2

- Staff to reevaluate time-guarantee based on Phase 1 participant data, remaining funding, and other relevant factors

3. Takeaways & Staff Recommendation

Summary of Key Takeaways

- A **flat discount** promotes **non-beneficial behavior** – more Peak energy consumption gives a bigger reward
- A TOU-based design rewards a customer more the more they shift their usage to a beneficial pattern – **low/no risk opportunity**

Staff Recommendation

Adopt Resolution 2023-07 to Update the E-ELEC discount to reflect the “TOU Super” design structure

- -30% Off-Peak rates: cost savings
- +10% Peak rates: cost increase
- 0% adjustment to Partial-Peak

APPENDIX SLIDES

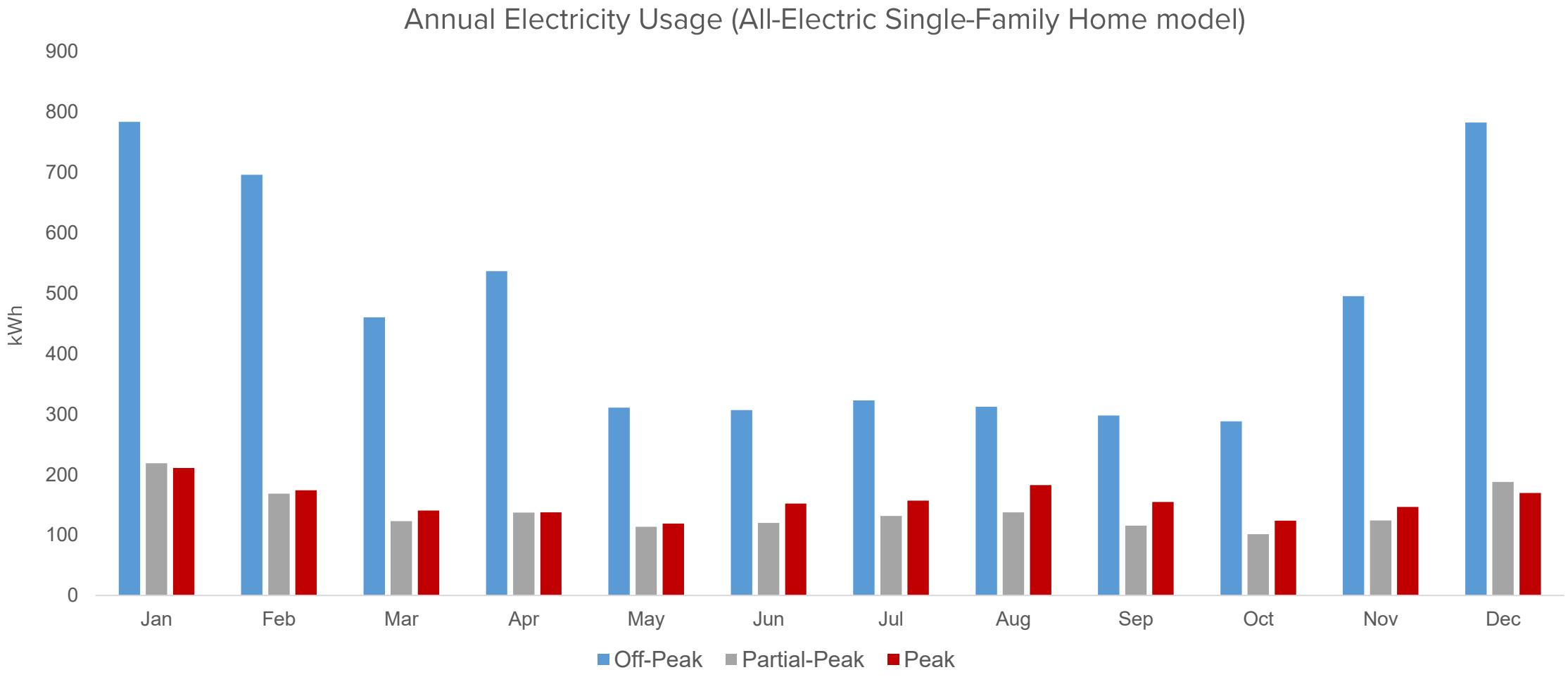
What is E-ELEC?

- E-ELEC (“Electric Home”) is a **non-tiered, opt-in residential** rate schedule
- Intended to **incentivize residential electrification** by lowering volumetric charges on transmission and distribution (T&D) rate components
- Includes a **fixed monthly charge** of $15 to recover PG&E’s fixed costs (meter reading, maintenance, service, O&M, etc.)
- Residential customers are eligible if the customer uses electricity for any of the following:
    - Heat pump space and/or water heating,
    - EV Charging, or
    - Energy storage charging

Current E-ELEC Generation Rates

SVCE Rate Schedule	Time of Use Period	SVCE Generation Rates[1]	SVCE Generation Service[2]	PG&E Generation Service[3]	Discount Level
E-ELEC	**Summer** (Jun-Sep)				
	SUMMER PEAK	$ 0.26126	**$ 0.26526**	$ 0.29473	10%
	SUMMER PART-PEAK	$ 0.17206	**$ 0.17606**	$ 0.19562	10%
	SUMMER OFF-PEAK	$ 0.13147	**$ 0.13547**	$ 0.15052	10%
	Winter (Oct-May)				
	WINTER PEAK	$ 0.11534	**$ 0.11934**	$ 0.13260	10%
	WINTER PART-PEAK	$ 0.09737	**$ 0.10137**	$ 0.11263	10%
	WINTER OFF-PEAK	$ 0.08535	**$ 0.08935**	$ 0.09928	10%

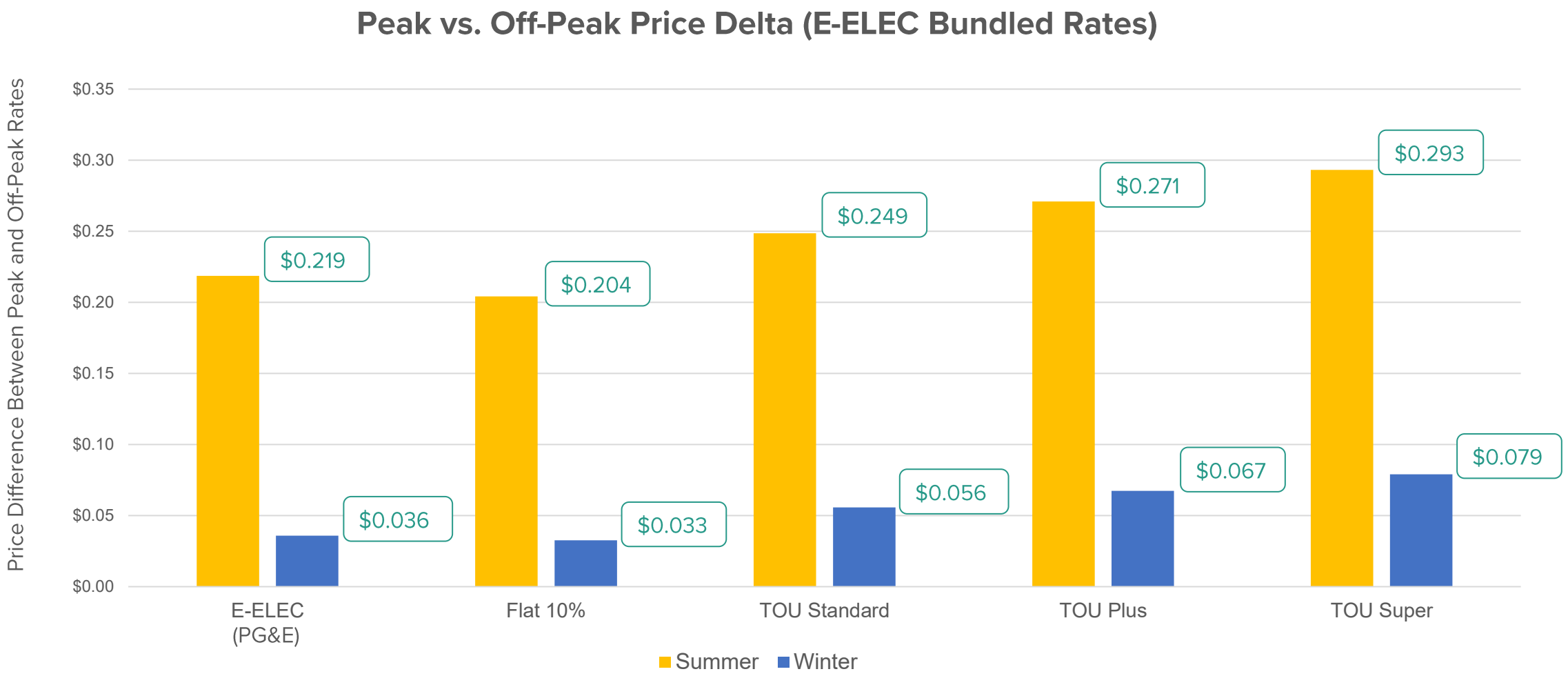
Over 60% of average usage occurs Off-Peak – we want to push this even higher



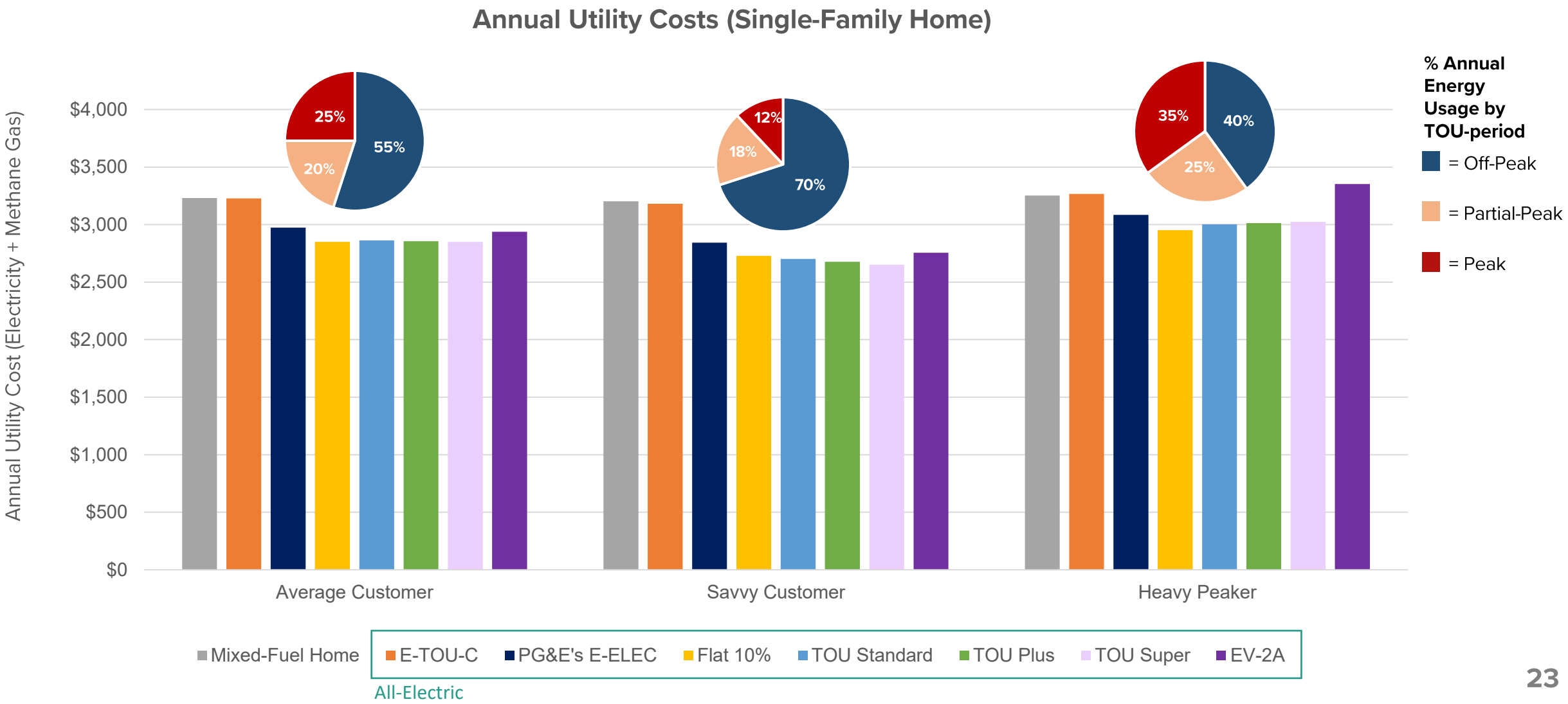
Discount Options – Details

		PG&E Gen	Flat 10%	Discount	TOU Std	Discount	TOU Plus	Discount	TOU Super	Discount
Winter	Off-Peak	$0.09928	$0.08935	**-10%**	$0.07942	**-20%**	$0.07446	**-25%**	$0.06950	**-30%**
	Partial-Peak	$0.11263	$0.10137	**-10%**	$0.11263	0%	$0.11263	0%	$0.11263	0%
	Peak	$0.13260	$0.11934	**-10%**	$0.13260	0%	$0.13923	**+5%**	$0.14586	**+10%**
Summer	Off-Peak	$0.15052	$0.13547	**-10%**	$0.12041	**-20%**	$0.11289	**-25%**	$0.10536	**-30%**
	Partial-Peak	$0.19562	$0.17606	**-10%**	$0.19562	0%	$0.19562	0%	$0.19562	0%
	Peak	$0.29473	$0.26526	**-10%**	$0.29473	0%	$0.30946	**+5%**	$0.32420	**+10%**

Beneficial electrification is supported by the difference between Peak and Off-Peak prices



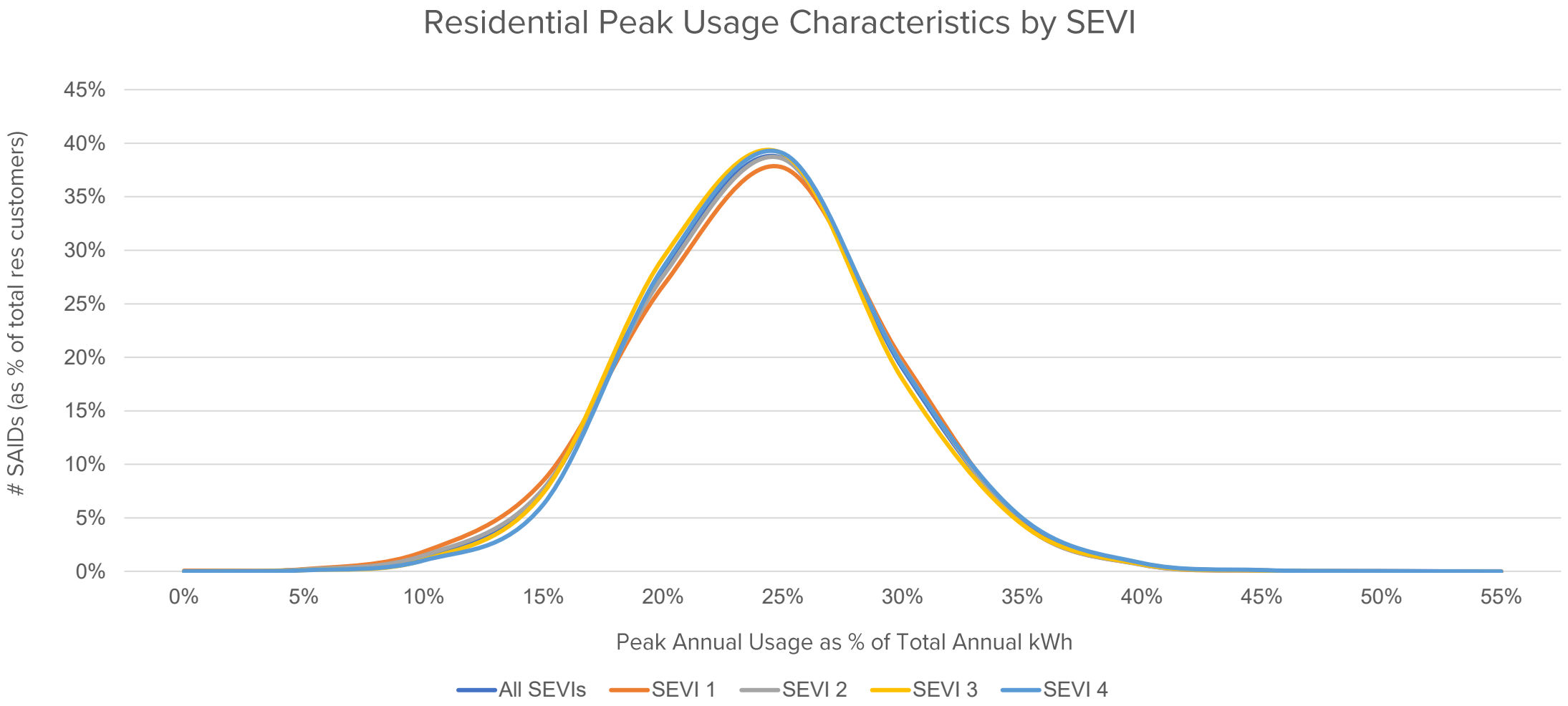
We anticipate the All-Electric single-family home on E-ELEC will save money compared to being Mixed-Fuel



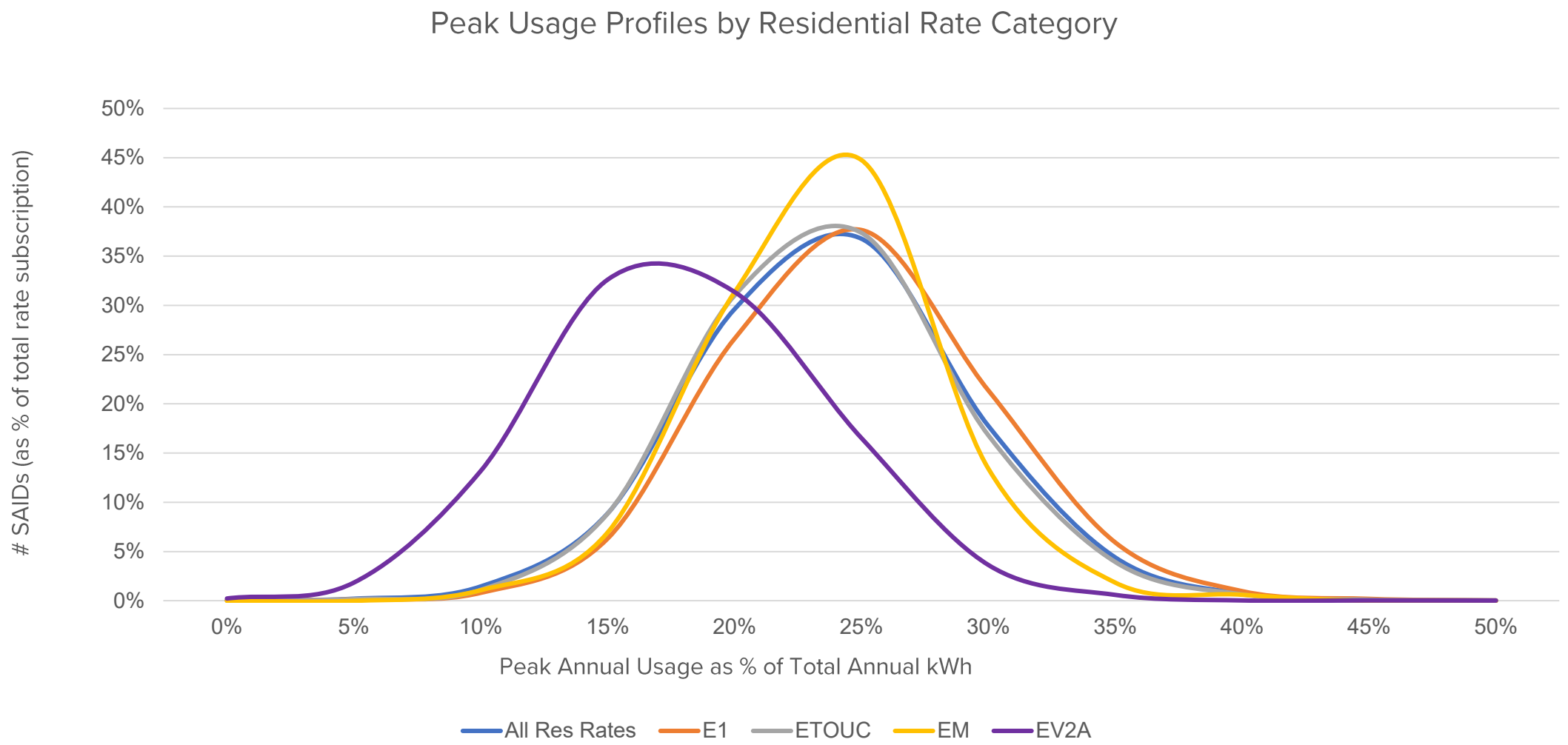
Additional Takeaways from the Rate Analysis

- Peak usage would have to exceed 50% of total annual kWh while Off-Peak was below 30% to lose money on TOU Super (0.004% of res customers)
- All three customer scenarios realize savings on E-ELEC compared to E-TOU-C, regardless of the discount approach
- Based on PG&E's published 2023 methane gas price forecast, the average All-Electric single-family home saves money over Mixed-Fuel by enrolling in E-ELEC (even without a discount)
- Rate participation is voluntary – customers can always select a different rate if their needs change (e.g., TOU-C, EV-2A, etc.)

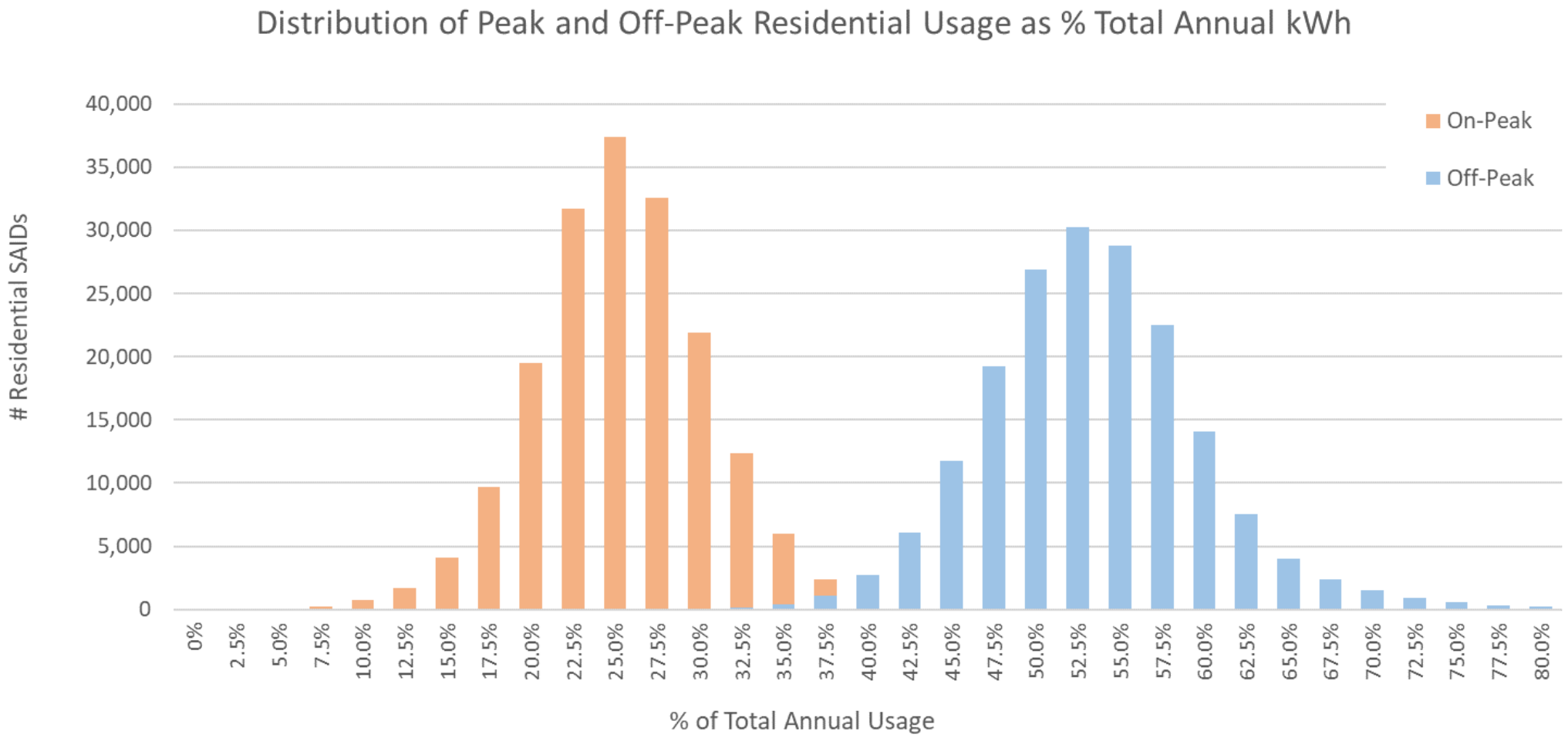
Total Peak usage is consistent across all residential SEVI groups



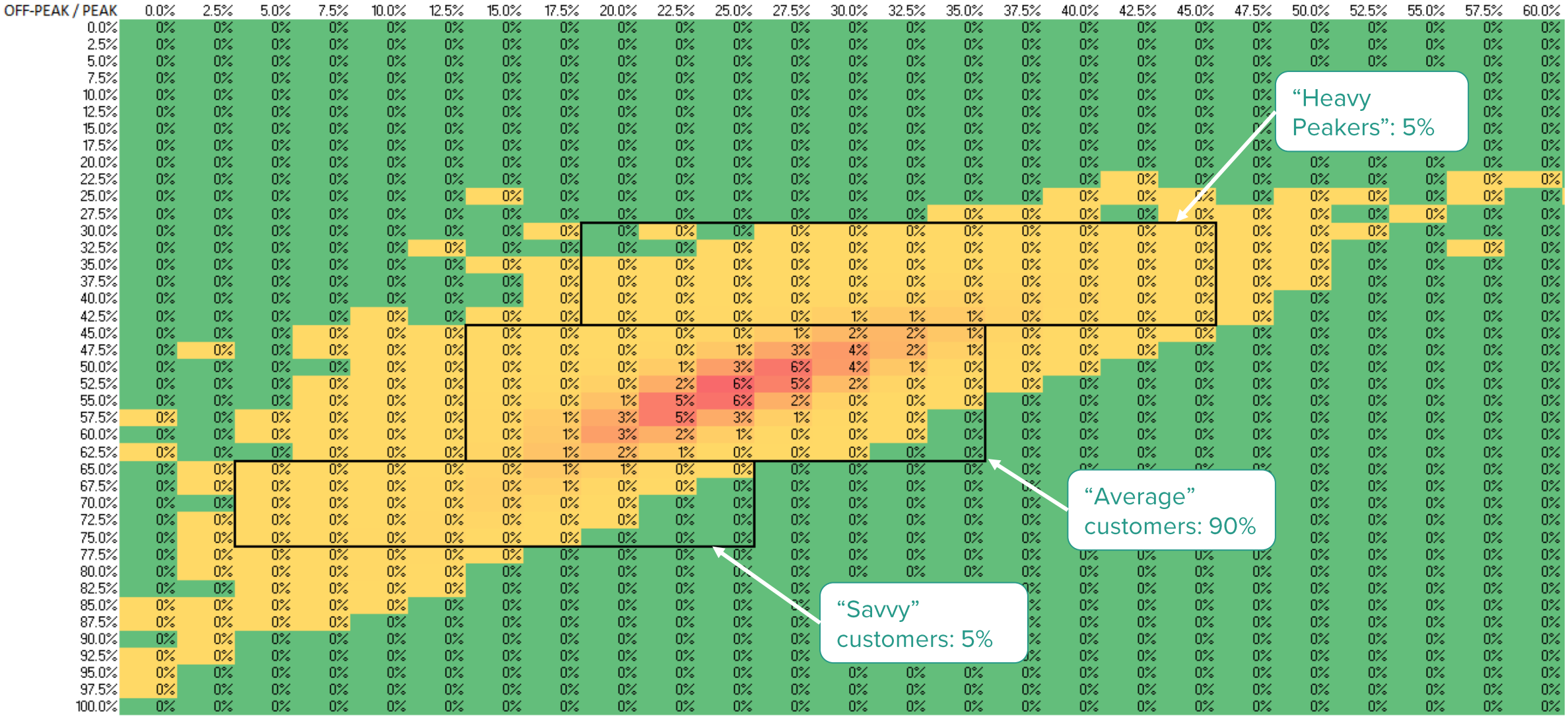
The EV rate paints an idealized picture of what reduced Peak usage could look like



For the average customer, peak usage represents 25% of total annual consumption, and Off-Peak ~53%



Economics of the TOU Plus & Super discounts depend on the balance of Peak vs. Off-Peak energy usage



How do we market the discount to our customers?

- Targeted marketing to customers who already qualify for E-ELEC based on participation in HPWH, FFH, and/or GridShift programs
- General awareness campaign via e-mail/newsletter
- Embed rate optimization into customer programs upon project completion (e.g., as part of a concierge service)
- Experiment with different messaging to groups of participating customers in order to evaluate impact on behavioral changes
- Explore engagement tools – how can we inform customers about TOU and make load shifting easy and accessible?

SCE's "Appliance Energy Use Cost Estimator" for residential customers – a tool to encourage Off-Peak usage

Appliance Energy Use Cost Estimator

See how much you can save by shifting energy use to off-peak hours

Whole House HVAC

Based on less than 1 hour per day

$59.00 per month	Super Off-Peak 8 a.m. - 4 p.m.
$64.00 per month	Off-Peak 9 p.m. - 8 a.m.
$84.00 per month	Mid-Peak 4 p.m. - 9 p.m.

https://www.sce.com/residential/rates/Time-Of-Use-Residential-Rate-Plans/Appliance-Energy-Use-Cost-Estimator

Disclaimer: These cost estimates are based on average monthly usage of each appliance and currently applicable Southern California Edison (SCE) rates and is provided to illustrate potential bill impacts to help you understand how Time-of-Use peak periods impact the price you pay. Appliances with 3+ hours of average daily usage may cross into other peak periods. Additional usage is calculated at the next lowest price and included in the cost in an effort to provide the most accurate estimate of total potential cost impacts. The costs above are estimates and cannot be guaranteed to reflect future potential costs that might be experienced under these rate plans. Actual costs will vary due to changes in usage patterns, weather variability, taxes, and/or pending and future rate changes. Changes to these numerous variables will affect actual costs. These estimates do not include baseline credit amounts, or rate discount programs like CARE, FERA or Summer Discount Plan (SDP). Unfortunately at this time the TOU-D-T rate plan is not factored into our appliance tool.