

What is the Residential Value of Resiliency?

The Answer May Lie in the Shadows

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AGENDA

- **Background and Motivation**
- **Surveys**
 - 2019 Self Generation Incentive Program Market Assessment and Cost Effectiveness Report
 - 2022 Self Generation Incentive Program Market Assessment Report
- **Methodology**
 - Using the participant cost test to estimate the value of resiliency
 - Using willingness to pay values to estimate the value of resiliency
- **Results**

CALIFORNIA CLIMATE CHANGE



PUBLIC SAFETY POWER SHUTOFF (PSPS)

- » Power lines are de-energized during periods at high risk for wildfire
 - Hot, dry, windy days
- » PSPS events can last a few minutes to multiple days
 - Average event is over 1 day in length
 - Long events can be over a week
 - The number of people impacted by an event can be 1 or 1,000,000

RESILIENCE THROUGH BATTERY STORAGE

- **Battery storage** can be used with PV generation to help customers maintain power during PSPS events
- As of 2022, there were approximately 85,000 residential battery storage units in California.
 - 40% of the batteries had received an incentive from the Self-Generation Incentive Program
- **SGIP Equity Resiliency Budget** was established in 2019.
 - Live in a High Fire Threat District or have experienced at least two PSPS events
 - Additional low income or medical needs requirements.
- 63% of 2020-2024 SGIP budget was set aside for the Equity Resiliency Budget
 - Equity Resiliency Budget was fully subscribed by 2021.

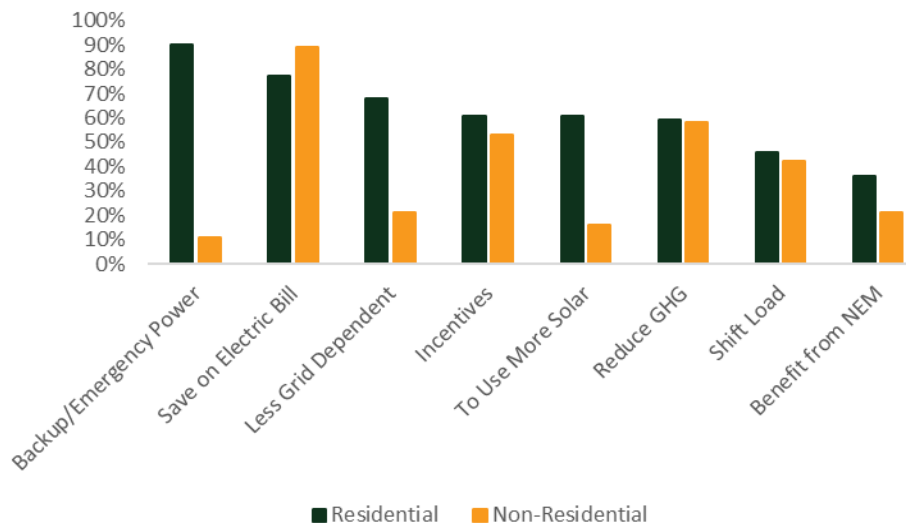
Market Assessment Surveys

2019 AND 2021 BATTERY STORAGE SURVEYS

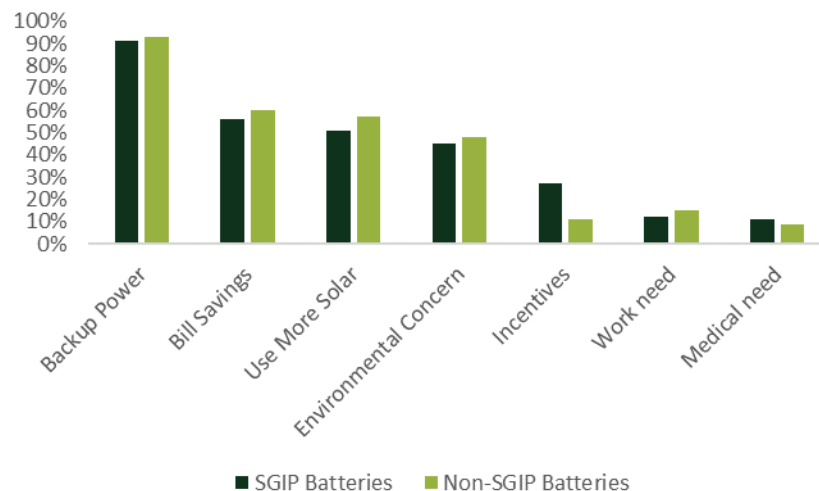
- **2019 SGIP Energy Storage Market Assessment and Cost Effectiveness Study**
 - Research Objectives
 - Drivers and barriers to adoption and *battery storage cost effectiveness*
 - Surveyed SGIP battery storage customer and customers with solar but not storage
- **2021 SGIP Energy Storage Market Assessment Study**
 - Research Objectives
 - Drivers and barriers to adoption and *customer willingness to pay for battery resiliency*
 - Surveyed customers with SGIP battery storage, non-SGIP battery storage, solar non-storage, and customers without solar or storage

WHY CUSTOMERS INSTALL BATTERIES

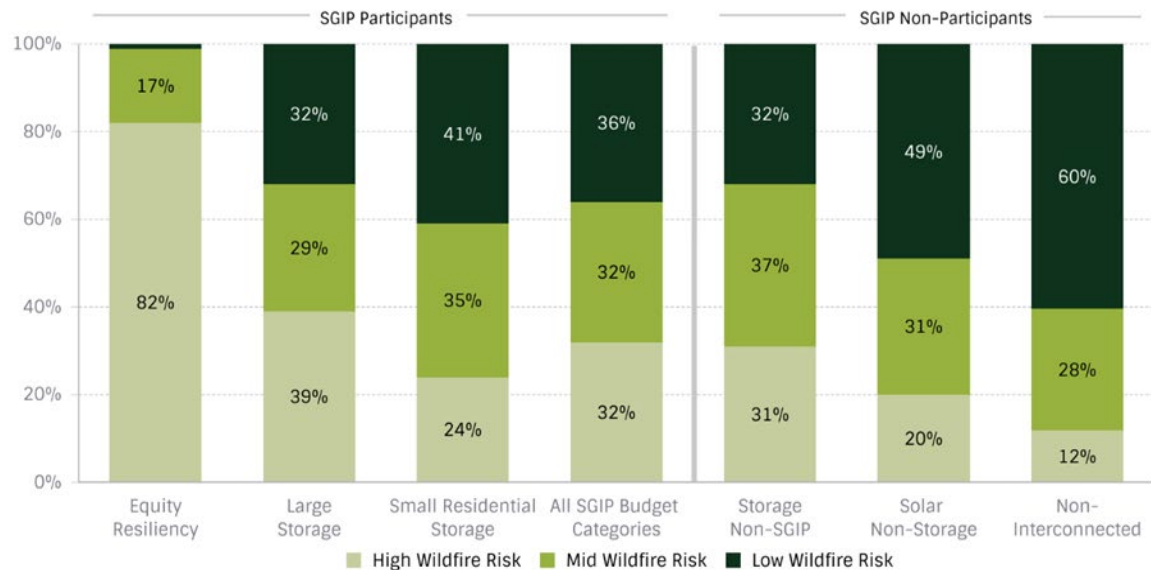
2019 Survey



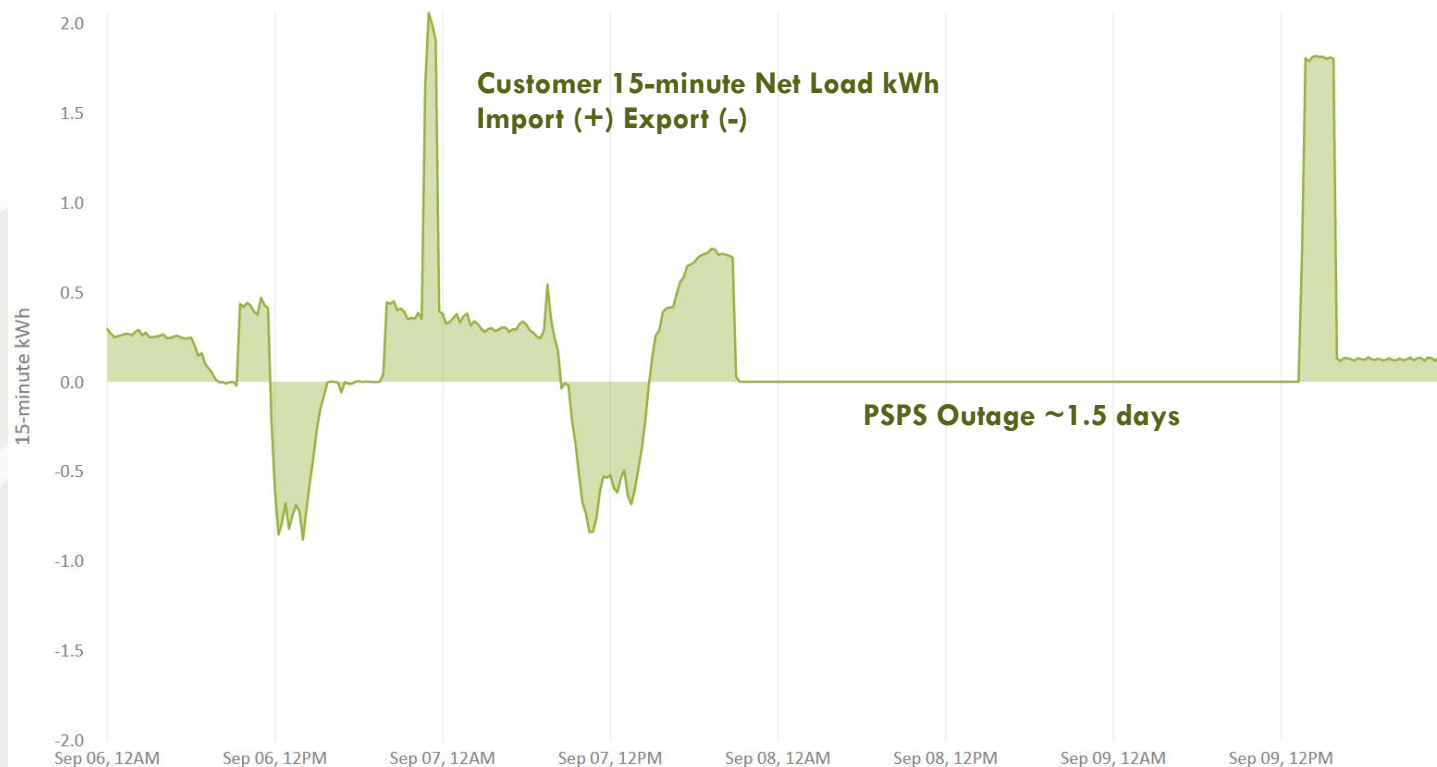
2021 Survey



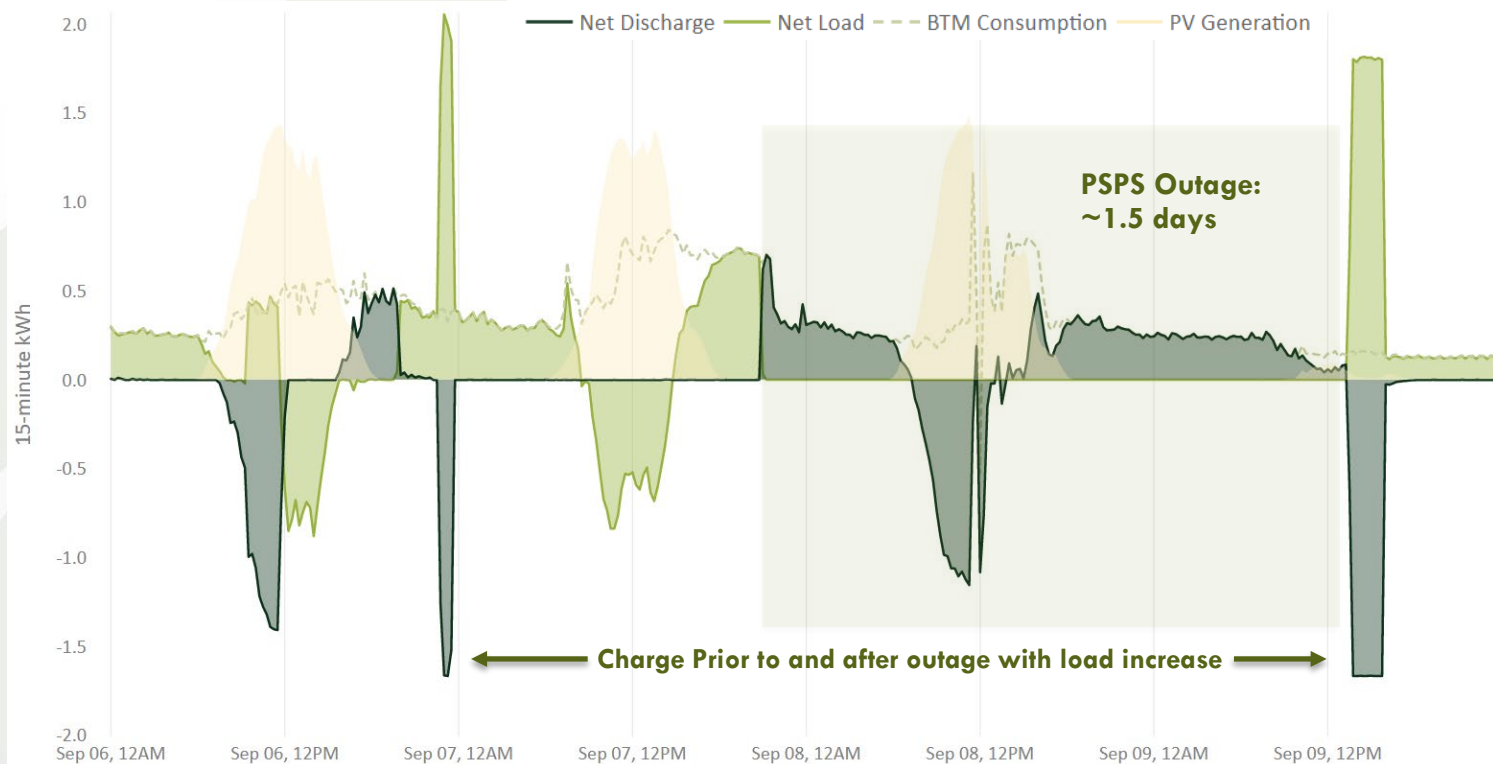
RESIDENTIAL CUSTOMERS IN SELF-DESCRIBED HIGH WILDFIRE RISK AREA



SGIP PARTICIPANT EXAMPLE PSPS EVENT



SGIP PARTICIPANT EXAMPLE PSPS EVENT

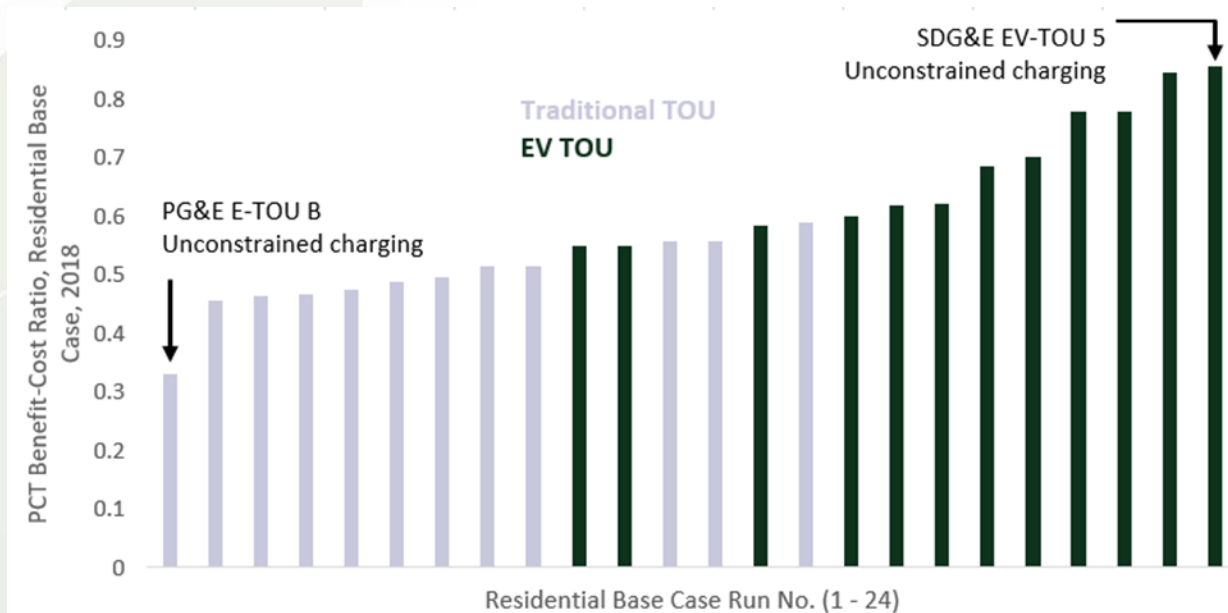


Value of Resiliency

RESILIENCY AND THE 2019 AND 2021 BATTERY STORAGE SURVEYS

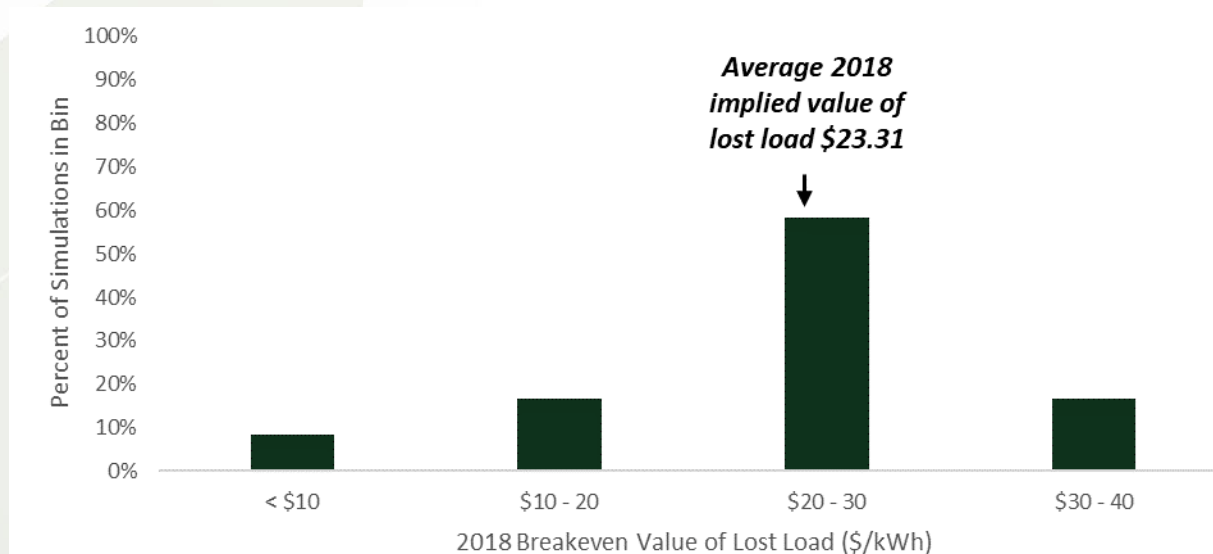
- **2019 SGIP Energy Storage Market Assessment and Cost Effectiveness Study**
 - Use the participant cost test (PCT) results to develop an estimate of the value of resiliency
 - The PCT measures the cost-effectiveness of the battery system to the customer, but it doesn't include a resiliency value and is therefore a lower bound on the PCT.
 - What is the “shadow price” of resiliency needed to increase the PCT so that customer decisions are consistent with a PCT greater than or equal to 1?
- **2021 SGIP Energy Storage Market Assessment Study**
 - Use the willingness to pay (WTP) results to develop an estimate of the value of resiliency
 - The WTP can be transformed, using assumptions about the potential number of outages, to develop an estimate of the value of resiliency.

COST EFFECTIVENESS OF BATTERY STORAGE (2019)



RESILIENCY VALUE NEED TO ACHIEVE COST EFFECTIVENESS

ACROSS ALL SIMULATIONS WITH INCENTIVES (2019)



WILLINGNESS TO PAY FOR BATTERY STORAGE RESILIENCY (2021)

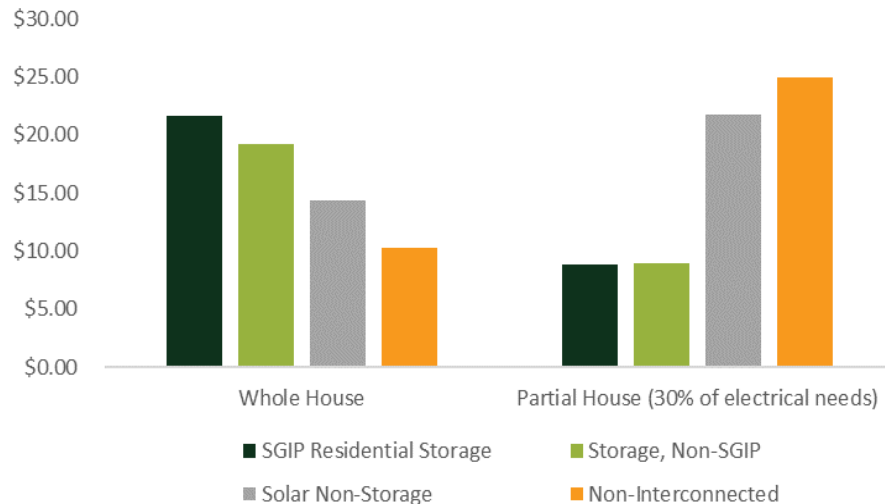
- » Customers who already own storage:
 - Higher WTP for whole house system than non-storage customers
 - Lower WTP for partial house system than non-storage customers
- » Solar Non-Storage customers higher WTP for whole house system than non-DER

Mean WTP for Storage	Whole House	Partial House (30% of electrical needs)
SGIP	\$19,928	\$2,432
Storage, Non-SGIP	\$19,443	\$2,714
Solar Non-Storage	\$11,157	\$5,072
Non-DER	\$6,520	\$4,741

MODEL WILLINGNESS TO PAY AS A \$/KWH

(2021)

- » Customers who already own storage:
 - Place a higher value on whole house resilience and a lower value on being able to back up only a portion of their home.
- » Solar Non-Storage customers higher value of resiliency for whole house system than non-DER.
- » Non-DER value being able to have resilience for critical load



FINDINGS AND NEXT STEPS

- The customer value of resilience calculated using cost-effectiveness shadow pricing and WTP analysis are very similar.
- Illustrates the importance of resilience in customer decisions to purchase battery storage.
- Other customer values of battery storage include TOU arbitrage, demand response, the ability to use more solar and environmental concerns.
- Additional research on the value of resilience and lost load are needed

THANK YOU

 VERDANT

