Energy Justice & Energy Storage

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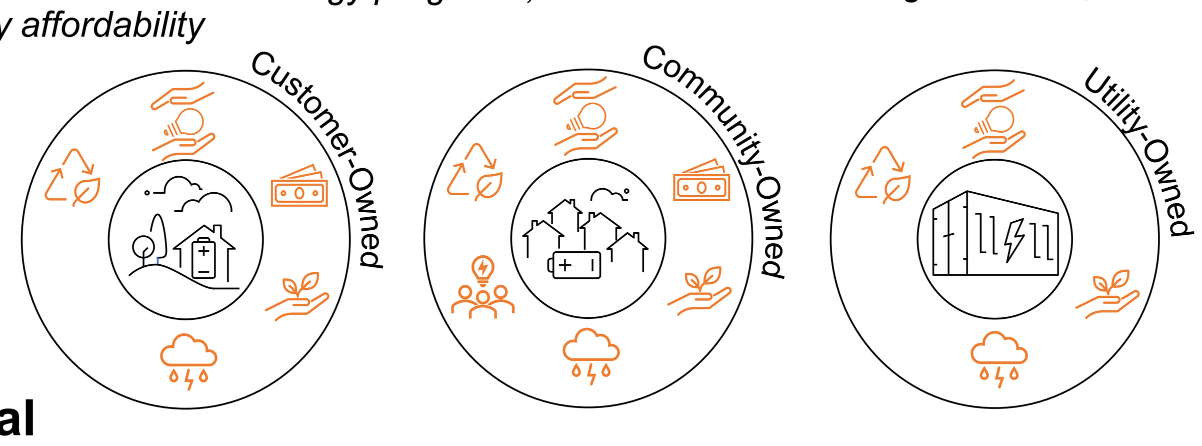
Overview

Energy storage is uniquely suited to serve the power system as a grid asset and energy system stakeholders as an equity asset, supporting the fair and just distribution of energy and non-energy benefits. This poster provides an overview of research efforts analyzing the energy equity benefits of energy storage.

Assessing the Energy Equity Benefits of Energy Storage Solutions[1,3,4]

Distributive
Allocation of benefits and burdens
Maximizing enrollment in clean energy programs, enabling energy affordability

Recognition
Identifying practices of cultural domination
Maximizing resilience, minimizing vulnerabilities



Procedural
Fairness of decision-making process
Enabling participation and evaluation

Restorative
Response to those impacted by burdens of past projects
Wealth-building and long-term equitable planning

- **Access** – increased self-consumption of renewables, resource availability
- **Affordability** – reduced energy burden, shut-off notices for non-payment
- **Decarbonization** – generator rate spike aversion, CO_2 emissions reduction
- **Environmental Impact** – improved local air quality, PM 2.5 reduction
- **Resilience** – avoided energy outages, enhanced reliability
- **Social Impact** – wealth creation, energy independence, community ownership

Pathways and Insights from Community Solar: A Guide to Community Energy Storage Success[1]

Objective: explore the success of CS, whose explosive growth over the last decade provides insights and a potential path forward for the nascent CES.

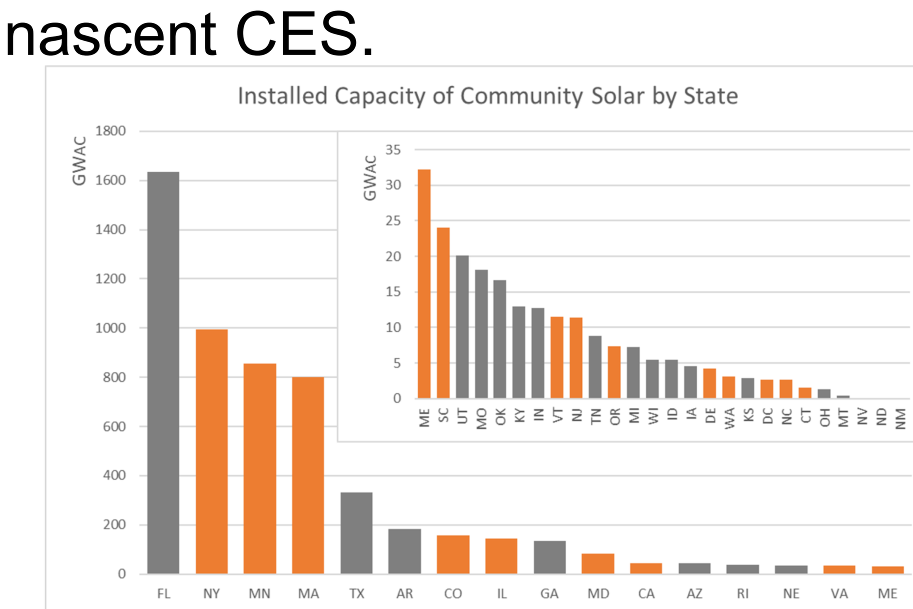


Fig 1. Installed CS capacity by state. States with Community Solar Policy (ORANGE); states without CS policy (GRAY).

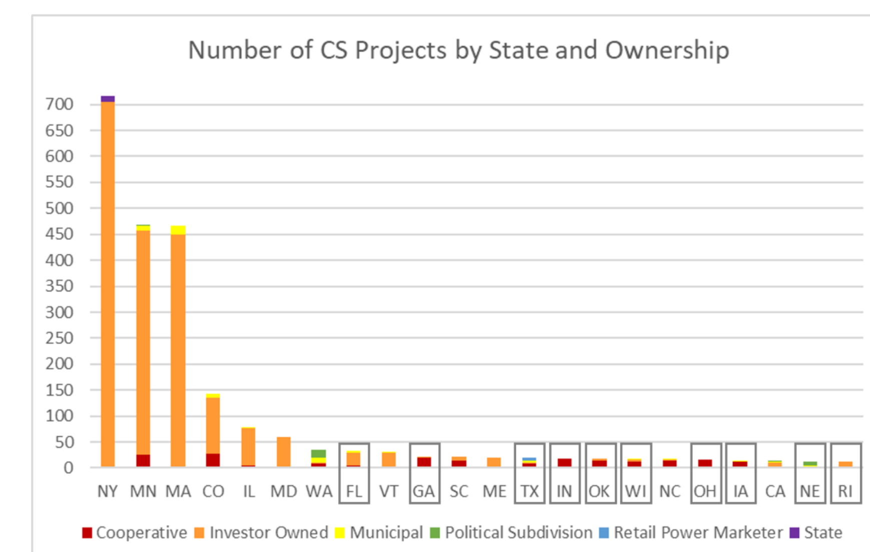
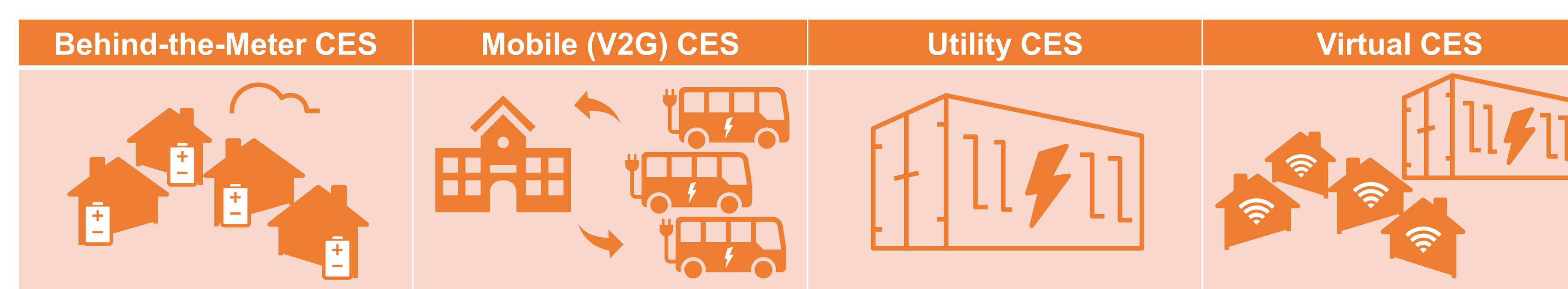


Fig 2. Number of CS projects deployed by state and ownership. States without CS policy are boxed.

Discussion: enabling policy for community energy storage should support distributive justice and local benefits, recognition justice and equitable access, and procedural justice and program transparency.



A Targeted Approach to Energy Burden Reduction Measures: Comparing the Effects of Energy Storage, Rooftop Solar, Weatherization, and Energy Efficiency Upgrades[1,2,4,5]

Objective: establish a prioritization methodology for energy burden reduction measures based on climate region, housing characteristics, and energy behaviors to assist policymakers, utilities, and households alike.

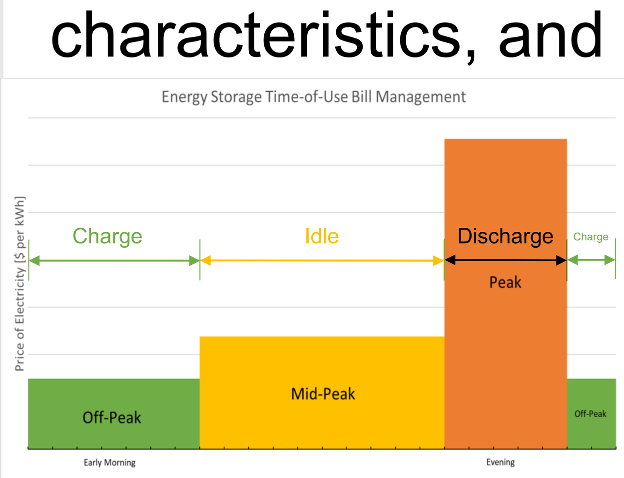


Fig 3. Energy storage dispatch schedule for TOU bill management.

Table 1. Average energy savings [kWh], bill savings [$/mo.], and payback period [years] of simulated energy burden reduction measure by climate region.

	Marine			Cold/Very Cold			Mixed Dry			Mixed Humid			HOT		
	Energy Savings [kWh]	Bill Savings [$/mo.]	Payback Period [years]	Energy Savings [kWh]	Bill Savings [$/mo.]	Payback Period [years]	Energy Savings [kWh]	Bill Savings [$/mo.]	Payback Period [years]	Energy Savings [kWh]	Bill Savings [$/mo.]	Payback Period [years]	Energy Savings [kWh]	Bill Savings [$/mo.]	Payback Period [years]
	-574	65	16.5	-573	65	16	-581	65	16	-580	65	17	-580	64	17
	4628	119	18	5380	123	17	4771	116	19	4797	122	18	5179	122	18
	15724	147	0.7 - ∞	18717	180	0.6 - 46	2932	22	4 - ∞	18710	173	0.6 - 48	6111	56	4 - 9
	665	7	34	781	8	27	912	10	21	875	9	23	995	10	20

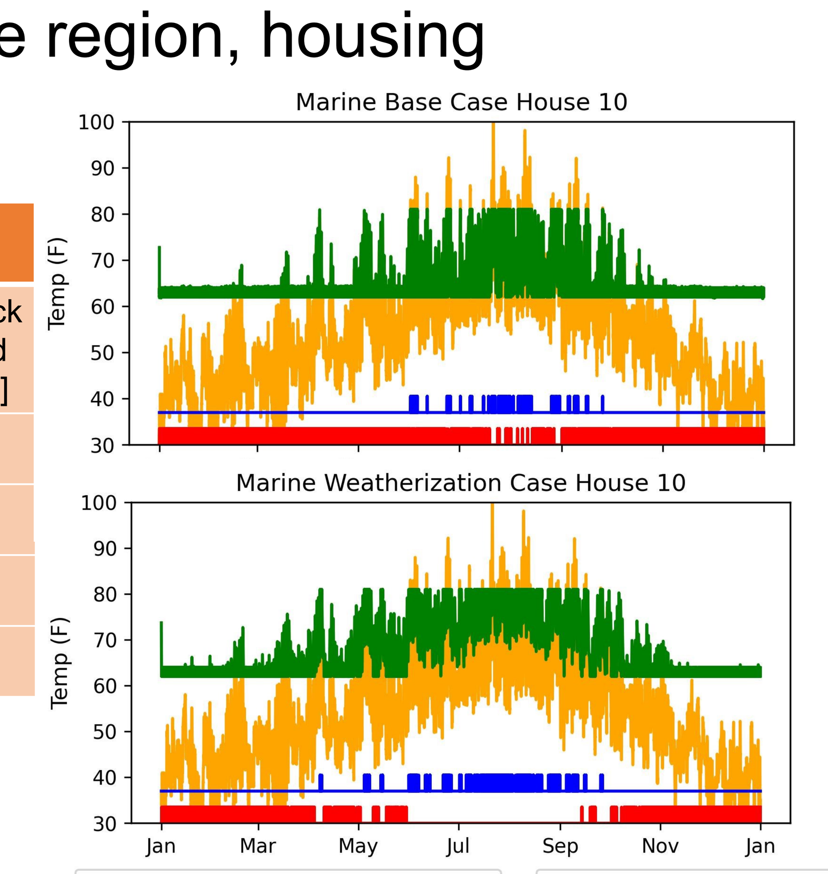


Fig 4. Base Case vs. Weatherized Household Conditions

Discussion: energy storage can provide consistent bill savings and increase in discretionary income; energy storage plus solar can provide additional energy and bill savings with seasonal variability; weatherization can provide great energy and bill savings for households with little thermal insulation; energy efficiency appliance upgrades provide marginal savings, recommend discretion.

A Guide to Residential Energy Storage and Rooftop Solar: State Policies, Incentives, and Compensation Mechanisms[1]

Objective: determine which combination of existing utility rate structure designs, net metering policies, and financial incentives provide favorable project economics for residential energy storage and rooftop solar to serve as a guide for households considering installing residential energy systems across the US.

Preliminary Findings:

System	Net Metering Policies	Utility Purchase [kWh]	Battery Input [kWh]	PV Input [kWh]	Utility Bill [$]	Bill Savings [$]
None	-	7062	-	-	759.28	-
	None	7332	2455	-	405.97	353.31
	BESS	7344	2604	-	299.24	460.04
	None	1868	2764	5498	83.23	676.05
	PV	-1061	2455	8393	-679.20	1438.48
	PV & BESS	-1048	2604	8393	-785.96	1545.24

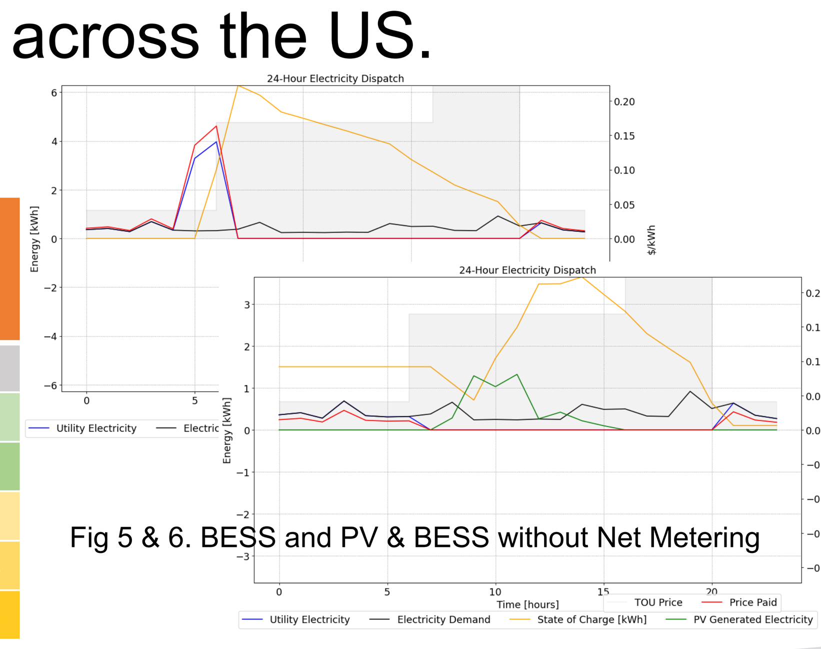


Fig 5 & 6. BESS and PV & BESS without Net Metering

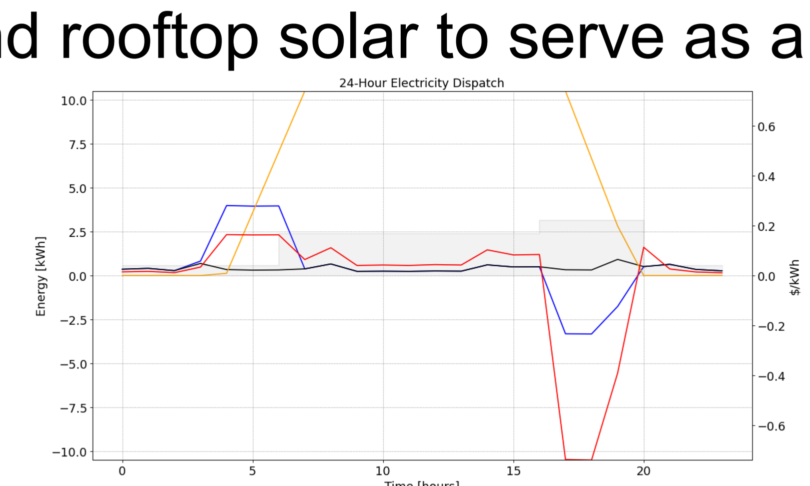


Fig 7. BESS with Battery Net Metering

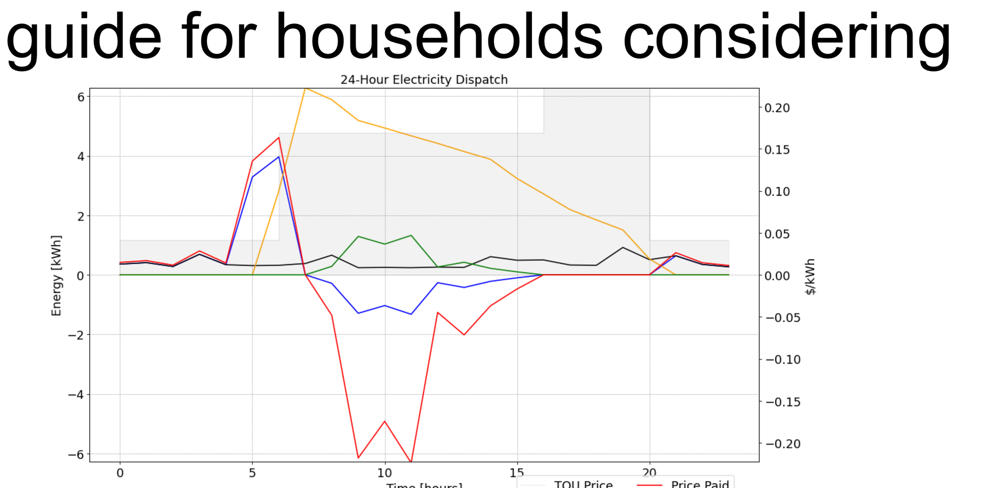


Fig 8. PV & BESS with Solar & Battery Net Metering

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10/9/2023 | PNNL-SA-191014

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