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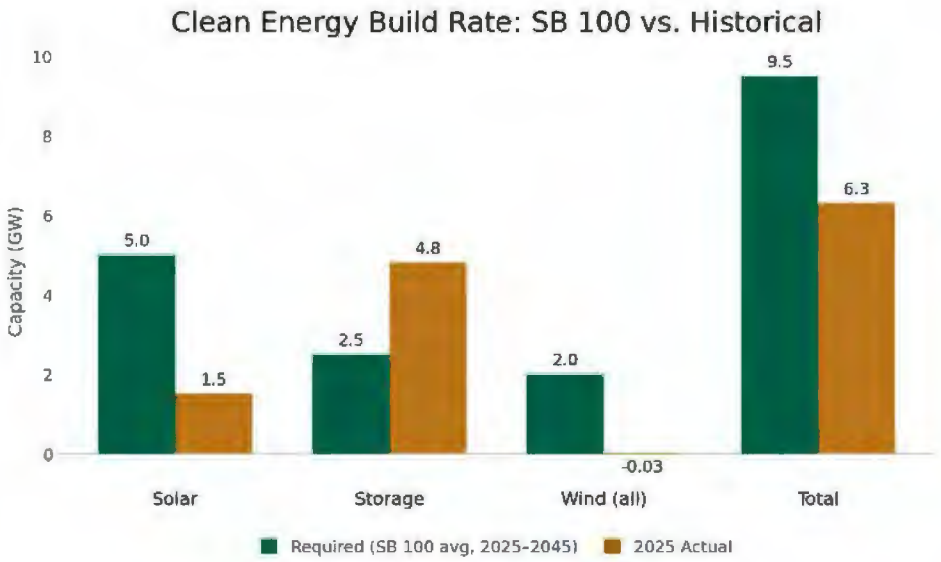
COALITION FOR COMMUNITY SOLAR ACCESS

Front-of-the-Meter (FTM) DER Load Modifiers

James McGarry, Western Regional Director
CEC DERs in California's Energy Future Workshop
July 15, 2026 | Docket No. 22-OII-01

FTM DERs Support Clean Energy Growth Needed to Achieve SB 100



- **~160 GW**: New clean energy capacity by 2045 needed to meet state goals at least cost while maintaining reliability
- **5 GW/year**: Amount of annual new utility-scale solar needed over the next 20 years
- **1.5 GW**: The amount of new utility-scale solar built in 2025

We need to close a large clean energy build gap: FTM DERs can help!

Locational and Ratepayer Benefits

"FTM DERs" refer here to dispatchable distribution-connected storage, typically in the 1-5 MW range, located on the utility side of the meter, which may be paired with renewable generation.

Benefit	How FTM DERs Deliver It
Transmission Relief	Strategically siting projects in Local Capacity Areas (LCAs) reduces upstream congestion and defers costly upgrades otherwise needed to import power into constrained load pockets
Distribution Relief	By serving distribution load during local coincident peaks, projects alleviate stress on upstream transformers, circuits, and breakers, deferring or avoiding the need for new distribution infrastructure — the fastest-growing driver of rate increases. Distribution upgrades needed to interconnect a FTM DER are paid by the developer, not ratepayers — generating significant system value
Local + System RA Value	LCA-sited FTM DERs can lower LSEs' local and system RA requirements, avoiding the local RA premium, in addition to providing system capacity
Air Quality Benefits	Because they sit near load and dispatch during evening peaks, FTM DERs displace gas-fired peakers typically relied on for local reliability
Direct Bill Savings	Deployed via community solar-plus-storage, FTM DERs deliver direct bill credits to low-income customers (est. $250/year) while giving home builders a flexible and cost-effective way to satisfy their Title 24 requirements

Analysis Shows Widespread Potential and Value

- Kevala — feeder-level load sufficiency analysis (results summer 2026)
  - Analysis identifies distribution feeders and substations in CAISO with sufficient load to fully or largely support the dispatch of 3–5 MW FTM DERs during summer net peak hours
  - **9–15 GW*** of load modification potential at the feeder level — up to 37% of combined IOU summer net peak demand
  - Kevala is currently calculating load modification potential when load is aggregated up to the substation level

- Aurora — system-level cost impact study (April 2025)
  - **$6.5 billion in system cost savings** over 20 years from deploying 5.4 GW of load-modifying FTM DERs in transmission-constrained Local Capacity Areas
  - Savings driven by reduced RA procurement, deferred transmission upgrades, and lower wholesale prices from displaced gas peaker generation

CCSA

* Kevala results based on preliminary analysis to be finalized this summer

The Challenge

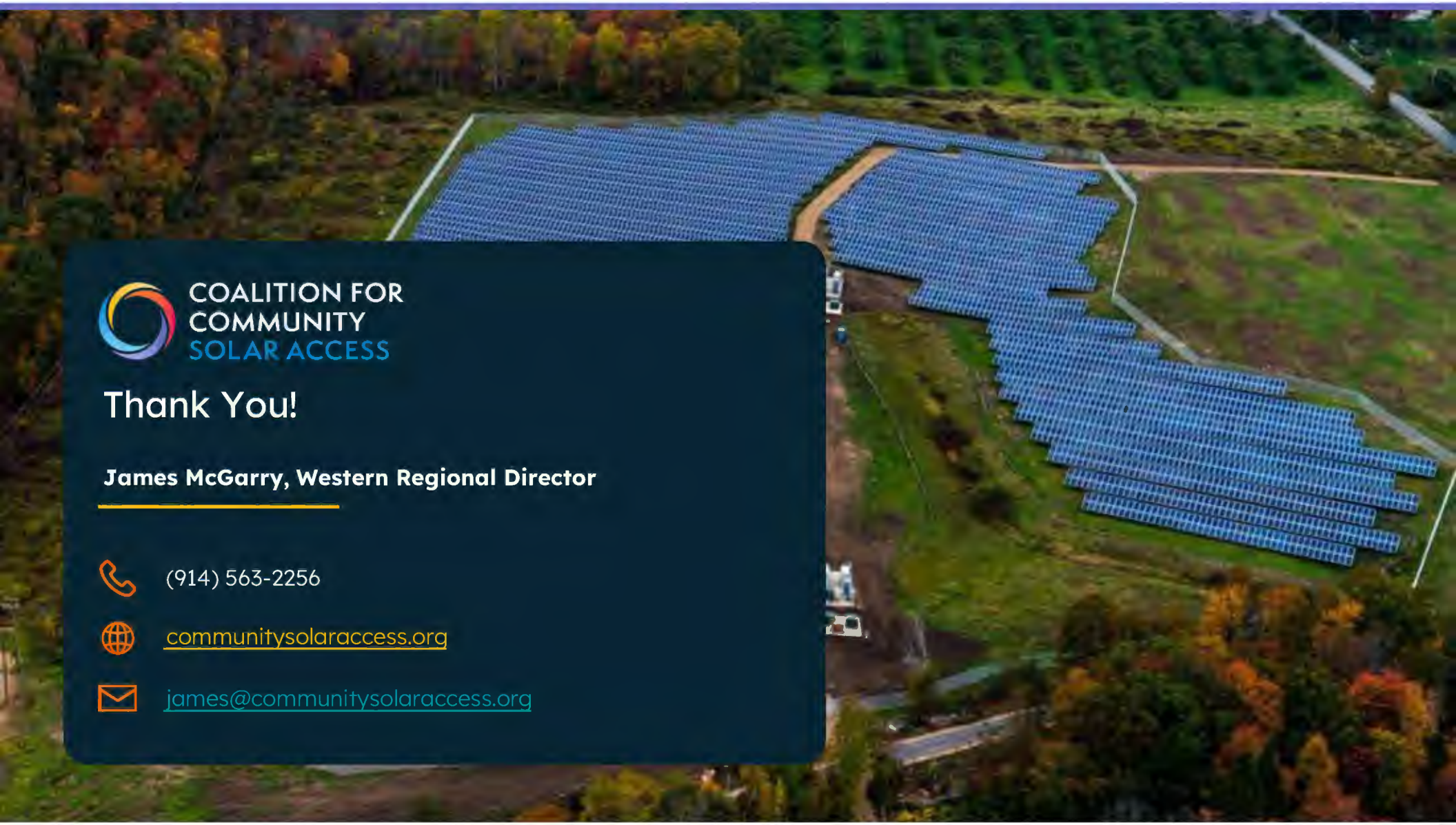
- Existing state planning and procurement frameworks do not provide a pathway for realizing the reliability and grid-level benefits of FTM DERs
  - CAISO's TPD deliverability process is not a viable pathway for distribution-scale resources
  - A load modifier pathway does not currently exist
- FTM and BTM DER exports modify load identically — serving local distribution demand and reducing what the bulk system must supply — yet only BTM exports are counted as load modifiers today

Properly sited and operated FTM DERs can serve distribution-connected net peak load without injecting power through the transmission system, providing the same load-serving benefits as other load modifiers

Potential Guardrails

- Unlike BTM DERs, FTM systems do not have to account for customer usage preferences, so their operation can be contractually bound to grid needs
- FTM DERs can commit to enhanced operational and programmatic requirements as a pre-condition for load modifier status
- Load modifier status could be conditioned on meeting the following eligibility criteria, enforceable through program, tariff, or PPA terms:
  - Guaranteed dispatch/charging windows set based on grid needs
  - Flexibility for contractual dispatch/charging windows to shift over time as peak hours evolve
  - Telemetry to provide CAISO and utilities real-time operational visibility
  - Performance-based payments tied to metered output during defined windows
  - Clawbacks and penalties for underperformance
  - Real-time controller rights enabling utility dispatch during high-load or emergency conditions
  - Exclusivity between load modifier and RA market participation to prevent double counting of reliability value

The Joint Agencies should establish a load modifier pathway for FTM DERs with a set of reasonable guardrails to ensure that projects perform as modeled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Appendix

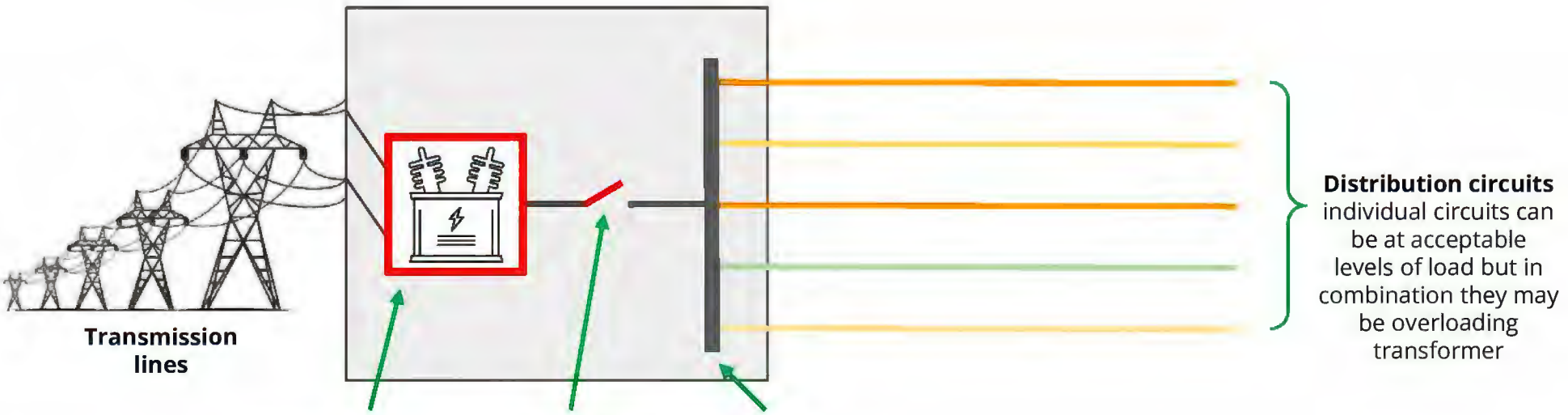
The New York Approach

Element	New York's approach
FTM DERs count as load modifiers	Distribution-connected solar and storage — including FTM projects — are netted out of NYISO's Gold Book peak demand forecast, directly reducing statewide capacity requirements
Load modifiers are compensated for a full value stack	The Value of Distributed Energy Resources (VDER) Program pays load-modifying FTM DERs for energy (zonal day-ahead price), capacity (NYISO auction price, reflecting peak reduction), avoided distribution costs (Demand Reduction Value, paid on performance during a pre-set ~300-hour summer evening window), locational relief at utility-selected congested substations (LSRV), and environmental value (~$31/MWh)
It is working at scale	**~3.4 GW of distributed solar operating under the VDER tariff, ~3 GW more in mature development, and several GW of distributed storage in the pipeline** (NYSERDA, June 2025)

- New York treats FTM solar and storage as load modifiers in their load forecast and compensate projects accordingly for their value stack of benefits
- ISO-NE and PJM treat FTM distributed solar as load modifiers for their transmission planning and RA forecasts, with active policy discussions underway in those RTOs about extending the same treatment to distributed storage

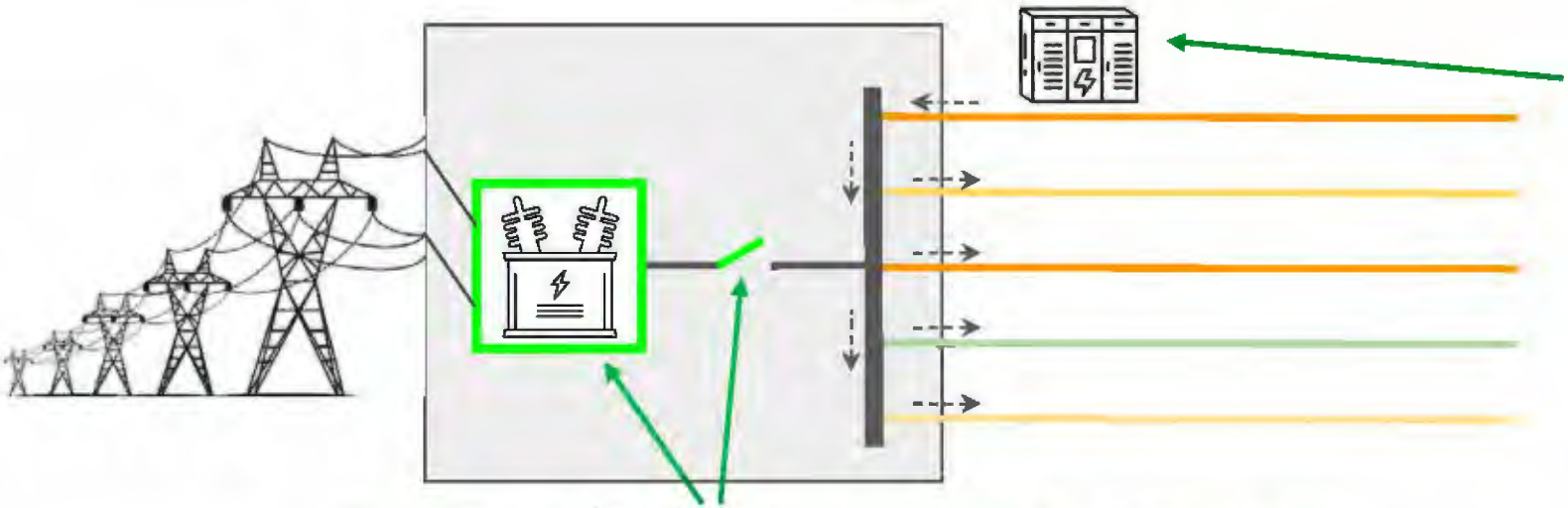
NYSERDA presented the VDER framework to the CEC's Load Flexibility workshop, June 25, 2025 (Docket 25-IEPR-05, TN 264435)

Zooming in: Distribution Substation Power Flow



Source: New Leaf Energy

Zooming in: Distribution Substation Power Flow



Adding storage on one of the circuits can help serve load on all of the circuits on the same bus without going through the transformer, thus alleviating the constraint on the transformer by reducing the amount of load it's serving.

Storage can help relieve upstream constraints, in this case the transformer and circuit breaker. Importantly, storage can relieve a transformer constraint if it is located **anywhere on any of the circuits** that are served by the overloaded transformer. In addition, storage developers' desire to build larger projects is *aligned* with the policy goal of avoiding an upgrade: the bigger the storage project, the more headroom the transformer will have.

Source: New Leaf Energy

AURORA
ENERGY RESEARCH

The value of Community Solar and Storage in CAISO

Executive summary

April 2025

Link to Aurora Study

Source: Aurora Energy Research, *The Value of Community Solar and Storage in CAISO*, April 2025

Community Solar and Storage can produce savings to covers its costs, while also delivering benefits to all Californians

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Bills

Community Solar and Storage can reduce Californian power system costs by 0.6%, a **$6.5bn savings** over 20 years

- Electricity prices: **-$4.2bn reduction**
- Resource Adequacy: **-$4.6bn reduction**
- Transmission & Distribution: **-$0.91bn reduction**
- Capital costs: **+$3.2bn increase**

Reliability

Community Solar and Storage means California communities are **more self sufficient in electricity generation**

- Less reliant on transmission infrastructure to deliver power by **2%**
- Less reliant on out-of-state electricity net imports by **13%**
- Enables the electricity grid to run reliably with lower investment in transmission and distribution infrastructure

Environment

Community Solar and Storage **reduces California electricity sector emissions**

- Emissions reduction by **1.8%** within state
- Less reliant on gas generation to firm the system by **2.5%**

1) For this study, the California electricity system refers to the territory covered by the California Independent System Operator (CAISO).

Key findings

Source: Aurora Energy Research, *The Value of Community Solar and Storage in CAISO*, April 2025

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- Community Solar and Storage allows participants to subscribe to local solar and battery farms and receive credits on their electricity bills
- This study quantifies the impact of adding Community Solar and Storage on California ratepayers
- The analysis employs established electricity modeling techniques, including Capacity Expansion Modeling, Production Cost Modeling, and Power Flow Security-Constrained Economic Dispatch (SCED), to compare market outcomes from adding community projects
- This study finds that adding 5.4GW of Community Solar and Storage in California can have the following impacts:
  - Community Solar and Storage can produce **total electricity system cost savings** for **Californians**
  - The estimated **$6.5bn savings to ratepayers** over 20 years are enabled by:
    - **Lower electricity prices** – By locating close to electricity customers, community projects can bypass transmission constraints, displacing gas generation, which can reduce electricity prices by $4.2bn
    - **Lower spending on Resource Adequacy (RA)** – By including storage, community projects can supply electricity during the evening net peak, reducing capacity required for RA and associated costs of $4.6bn
    - **Lower spending on electricity transmission and distribution** - Community projects situated locally to customers can reduce transmission utilization by 2%, reducing line upgrade spending by $0.91bn
    - The **cost savings exceed the incremental capital costs** of +$3.2bn of community-scale projects, as compared to utility-scale projects[2]
  - The cost savings identified are additive. Cost savings can be allocated to subscribers of Community Solar and Storage projects in a way that allows **non-subscribers are no worse off**
  - In addition to cost savings, community projects allow the California electricity system to be **less reliant on out-of-state electricity net imports** by 13%, **less reliant on gas** generation by 2.5% and **lower CO_2 emissions** by 1.8%

    Community projects enable for the reliable and cost-effective operation of the grid even when transmission investment is reduced or delayed
- **Conclusion: The findings from this study suggests Community Solar and Storage can produce savings to cover its costs, while also delivering reliability and emissions benefits to all Californians**

1) For this study, the California electricity system refers to the territory covered by the California Independent System Operator (CAISO). 2) This analysis assumes Community Solar and Storage projects are 1.32 times more expensive than utility-scale projects – an assumption based on CPUC IRP inputs, where distributed solar is modeled using NREL cost estimates for 200 kW systems. This assumption may be conservative if anticipating lower costs for community projects (e.g. improved economics from economies of scale).

Source: Aurora Energy Research, *The Value of Community Solar and Storage in CAISO*, April 2025

This study adds 5.4GW of Community Solar and Storage throughout the California ISO territory

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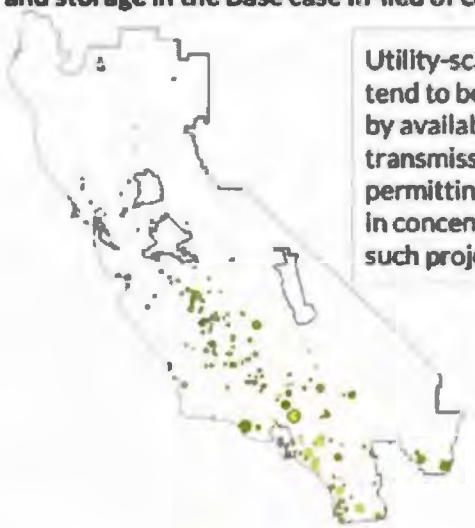
Community Solar and Storage projects added by 2033

Community-scale projects can be evenly spread out, including rural and urban areas, allowing many projects to be close to customers

Community projects[1] Utility-scale solar Utility-scale storage

Utility-scale solar and storage in the Base case in-lieu of community projects



Utility-scale projects tend to be constrained by available transmission and permitting, resulting in concentrations of such projects

Community Solar and Storage case

- 5.4GW of community projects are distributed throughout CAISO territory[2]
- As small and diverse projects, community projects can locate throughout the Central Valley and near urban areas including LA, San Diego, and San Francisco
- Community-scale projects can cost more than the utility-scale versions. The addition of 5.4GW of such projects results in an estimated incremental capital cost of $3.2bn when compared to the utility-scale equivalents

Base case, without community projects

- In the absence of community projects, a commensurate amount of utility-scale solar and storage projects are added[3]
- Utility-scale solar is expected to concentrate in the Central Valley, and utility-scale storage around Southern California
- Few utility scale projects are expected around the Bay Area and Sacramento due to less favorable project economics and transmission constraints

1) Circle size on map represents project size. Smaller projects connected to the same substation are aggregated and shown as a single circle. 2) Allocation of such projects subject to constraints: proportional to net downstream load, within Local Reliability Area (LRA) regions, 80/20 rural-urban split, minimum project size of 3MW. 3) Project entry modeled based on economic optimization subject to available transmission

Sources: Aurora Energy Research

Source: Aurora Energy Research, *The Value of Community Solar and Storage in CAISO*, April 2025

In being close to customers, community projects can bypass transmission constraints and displace gas generation

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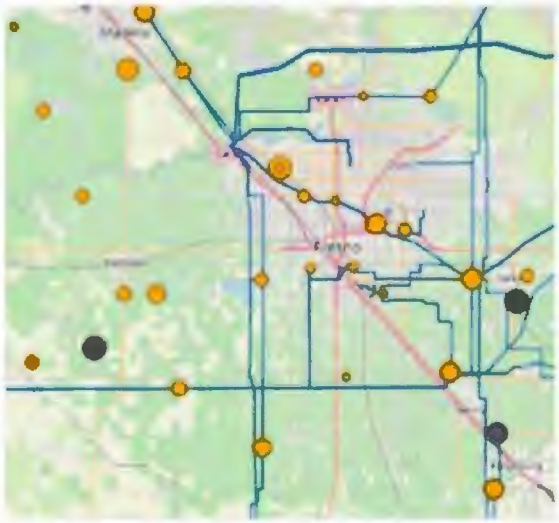
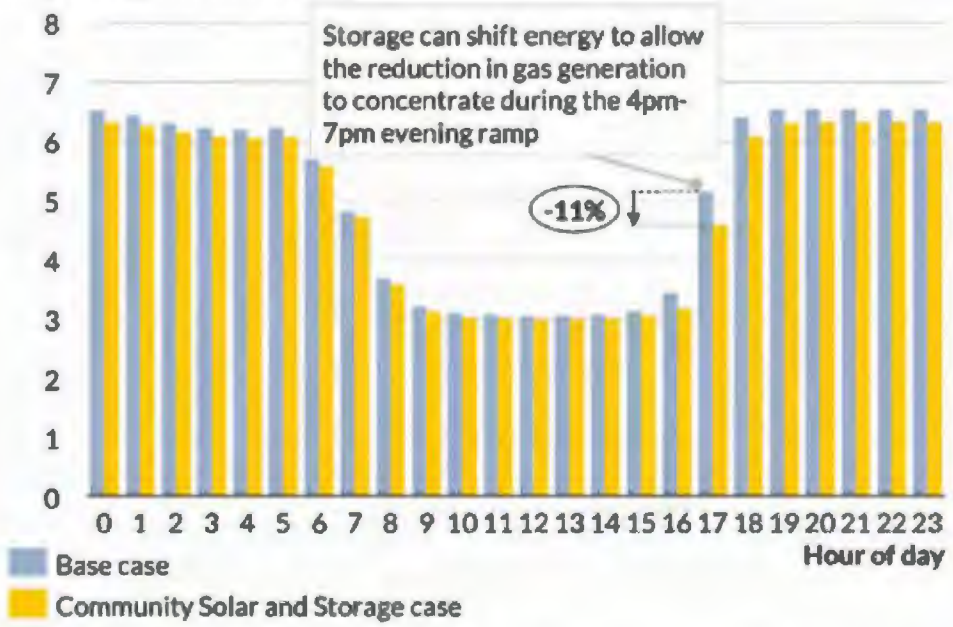
Potential Community Solar and Storage projects in Fresno by 2033



- 3 MW
- 25 MW
- 50 MW[1]
- Community Solar and Storage
- Natural gas
- Transmission or distribution line

CAISO-wide natural gas generation – Community vs Base

Daily average in 2033, GW



- Community projects are smaller and can be spread out throughout California
- With some community-scale projects located close to customers e.g. in urban areas, community solar and storage could reduce the need for gas generation located upstream of congested transmission lines

- Aurora's modeling shows the Community Solar and Storage case with 2.5% lower gas generation and 13% lower out-of-state electricity net imports compared to the Base case
- The lower gas generation results in $4.2bn lower electricity prices and a 1.8% reduction of California within state CO_2 emissions over 2025-2045

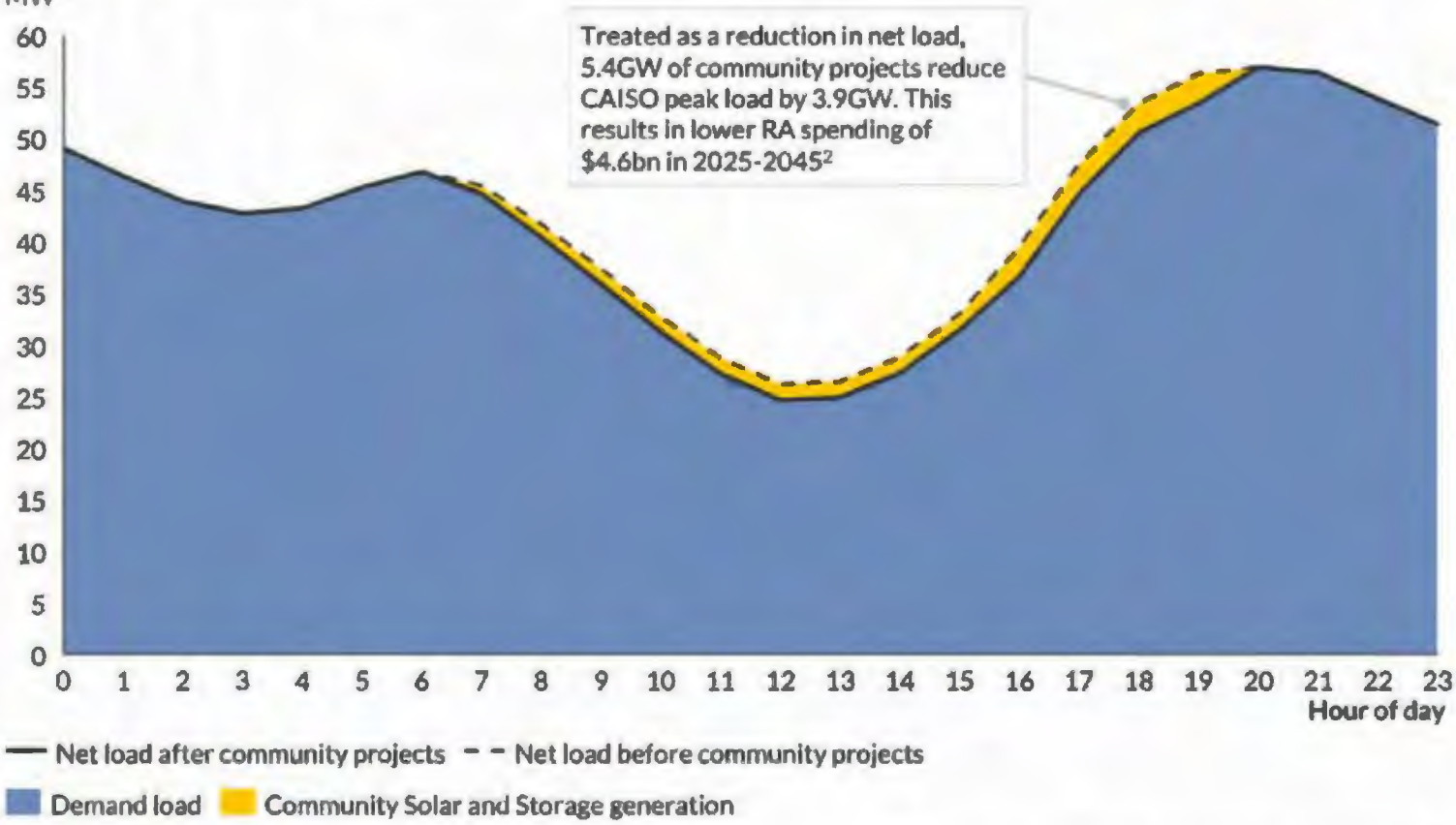
1) Smaller projects connected to the same substation are aggregated and shown as a single circle.

Sources: Aurora Energy Research

Source: Aurora Energy Research, *The Value of Community Solar and Storage in CAISO*, April 2025

In serving downstream electricity demand, Community Solar and Storage could reduce Resource Adequacy requirements

Net demand load at an example substation: Malaga substation – August 5th, 2033



1) Demand load is net of rooftop solar. 2) Analysis assumes cost savings from System Resource Adequacy procurement requirement – this analysis could prove conservative where Community Solar and Storage is able to displace more scarce and typically more costly Local Resource Adequacy procurement requirements.

Sources: Aurora Energy Research

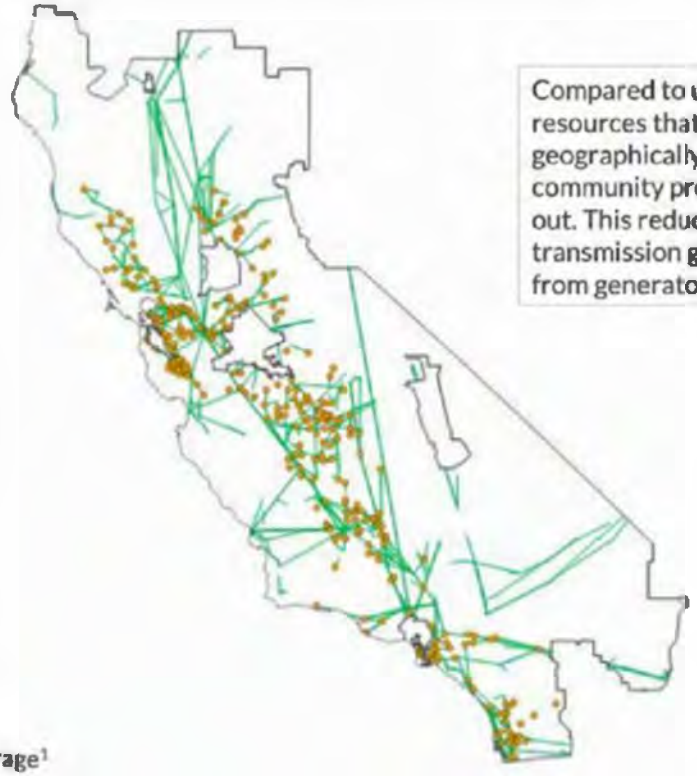
AURORA

- The Resource Adequacy (RA) program requires Load Serving Entities (LSEs) to procure adequate energy resources to meet their expected peak-load plus a planning reserve margin (PRM)
- The Community Solar and Storage projects, when incentivized appropriately, can store solar energy for use during the evening net peak
- By siting the Community Solar and Storage projects where there is downstream demand, these projects could reduce the net load for LSEs, potentially reducing RA spending

Source: Aurora Energy Research, *The Value of Community Solar and Storage in CAISO*, April 2025

Community projects allow electricity customers to be less reliant on transmission lines, reducing transmission utilization and spending

Reduction in transmission utilization in Community Solar and Storage case - 2033



Compared to utility-scale energy resources that tend to be geographically concentrated, community projects are evenly spread out. This reduces the reliance on the transmission grid to move electricity from generators to customers

Community Solar and Storage[1]

Lines with decreased flow, compared to Base case

1) Smaller projects connected to the same substation are aggregated and shown as a single circle.

Sources: Aurora Energy Research

- The resulting less congested grid allows lower requirements for upgrading transmission lines. In the Community Solar and Storage case, the reduction in transmission utilization allows lower spending in line upgrades of $0.91bn in 2025-2045
- Transmission is a major limiting factor for building new renewable energy projects. The addition of Community Solar and Storage allows for greater potential for building renewables at a quicker pace

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