

Solar-Plus-Storage Innovation in Rural America

And a Project Modeling Tool That Supports It

Jill K. Cliburn

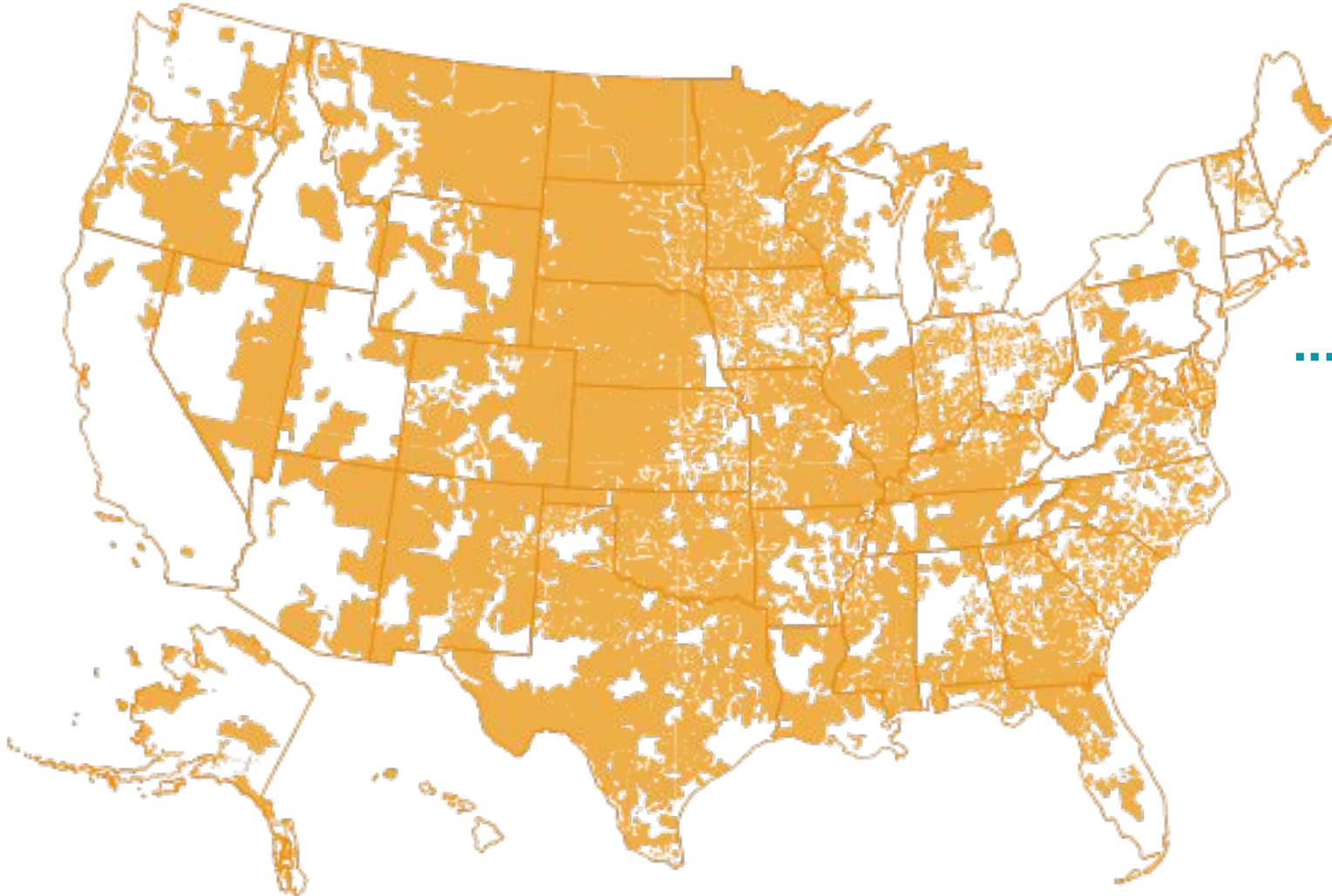
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American Solar Energy Society



Cliburn and Associates, LLC

Electric Cooperatives Serve America's Heartland



830 local electric co-ops
>60 wholesale G&Ts
...serving >90% of America's
poorest counties

Co-ops have tripled
solar capacity since 2010
Yet this is a fraction
of market potential

SPECs: Solar-Plus for Electric Co-ops: High-Value Project Planning, Procurement and Operations

Solar-Plus for Electric Co-ops (SPECs) was launched in 2020 to help optimize the planning, procurement and operations of battery storage and solar-plus-storage for electric cooperatives. SPECs was one of eight projects selected by the U.S. Department of Energy's National Renewable Energy Laboratory (NREL) for the second round of the **Solar Energy Innovation Network (SEIN)**. Cliburn and Associates is joined by partners on this project, including Cobb Electric Membership Corp., Kit Carson Electric Cooperative, United Power, and **North Carolina Clean Energy Technology Center**, plus leaders from the co-op sector and the storage industry nationwide.



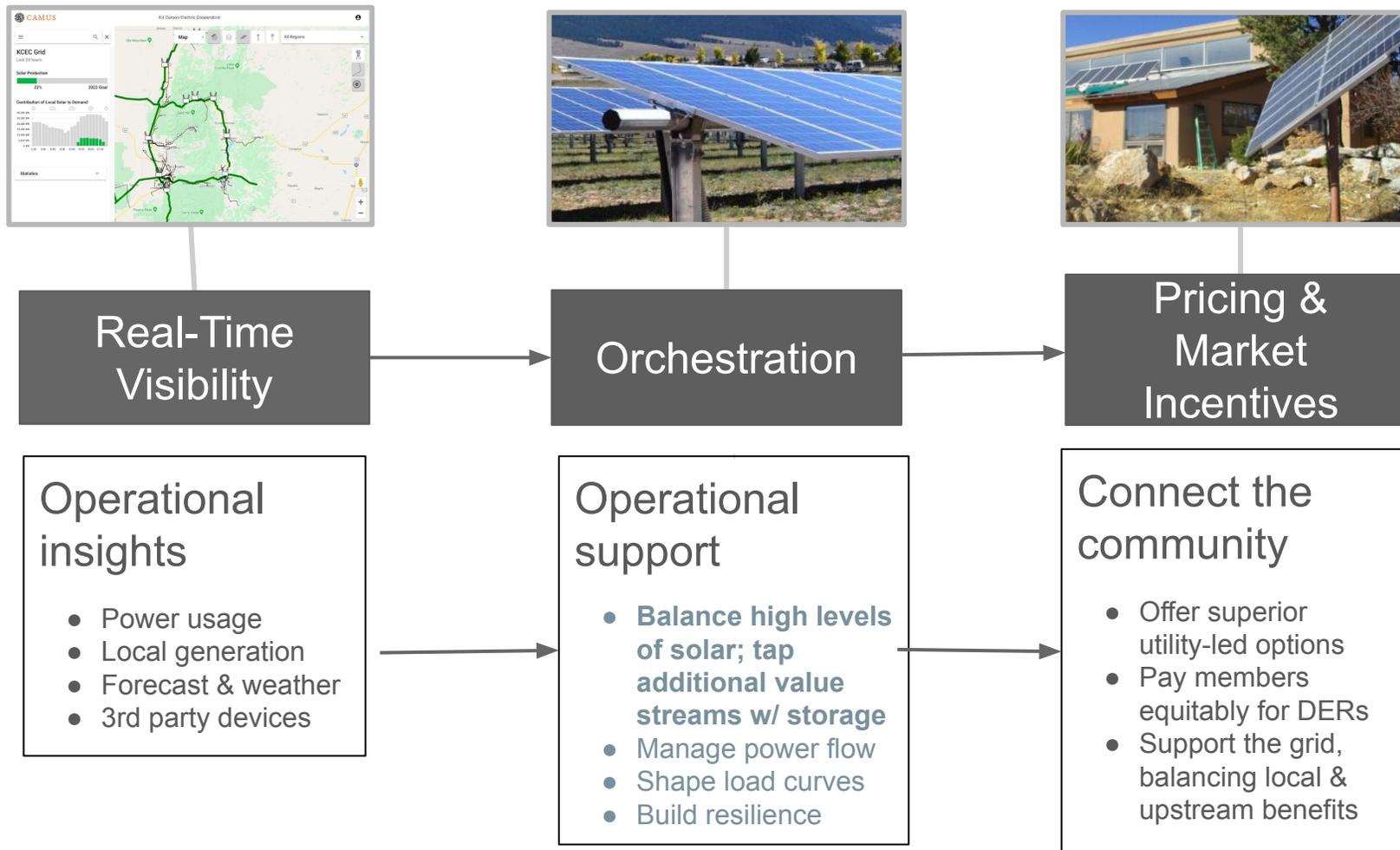
**SPECs: Solar-Plus
for Electric Co-ops**

A Participant in the Solar Energy
Innovation Network of the U.S. DOE
National Renewable Energy Laboratory

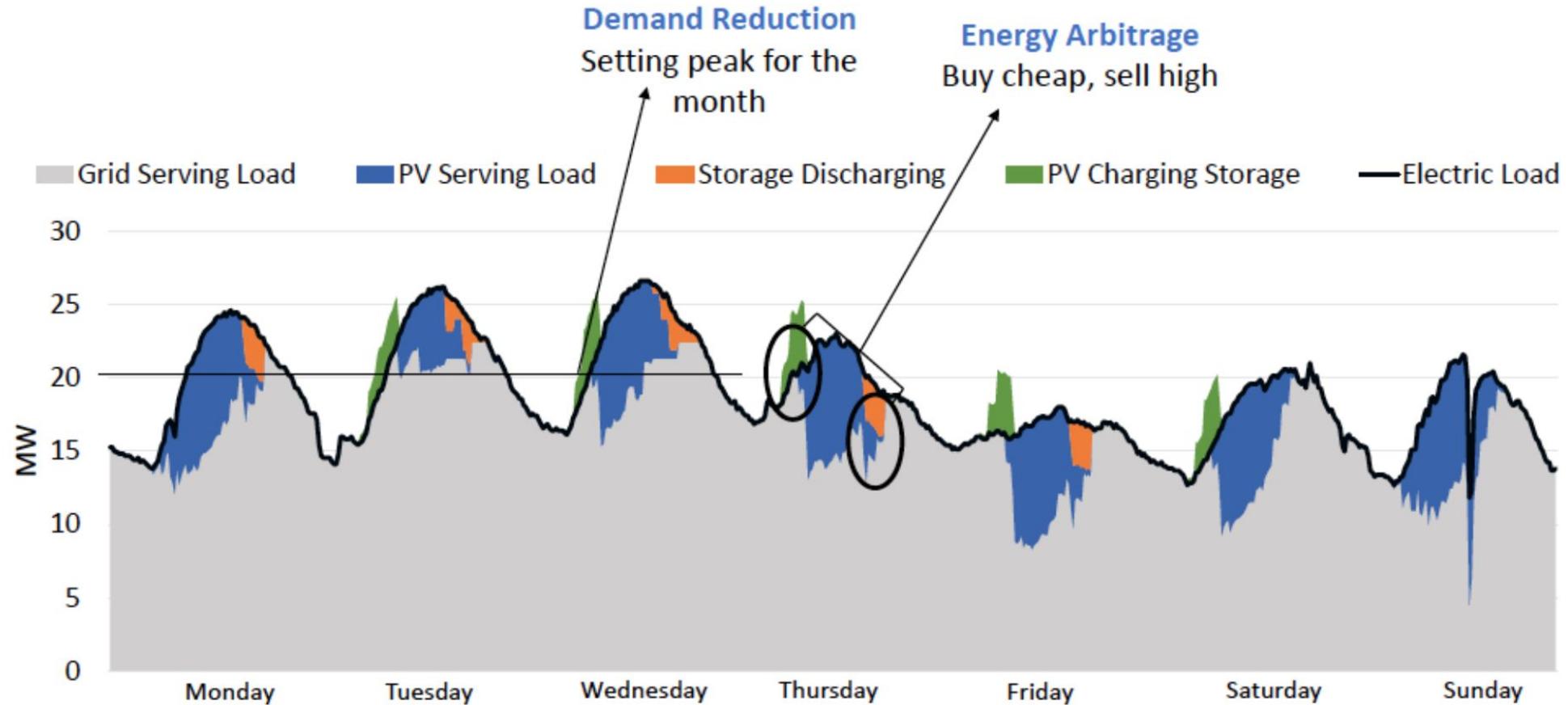
If rural America is truly going all-in for renewables, what integration challenges will local electric co-ops face?



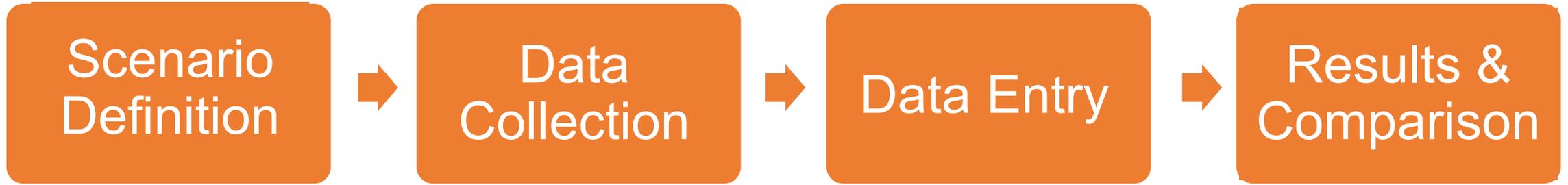
One Vision: Local Solar Complements Big Grid Solutions



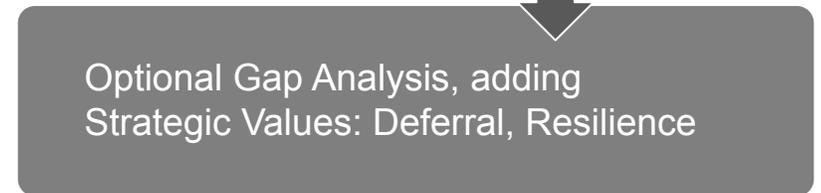
“Value-Stacking” Requires Understanding Battery Storage Capabilities and Trade-Offs



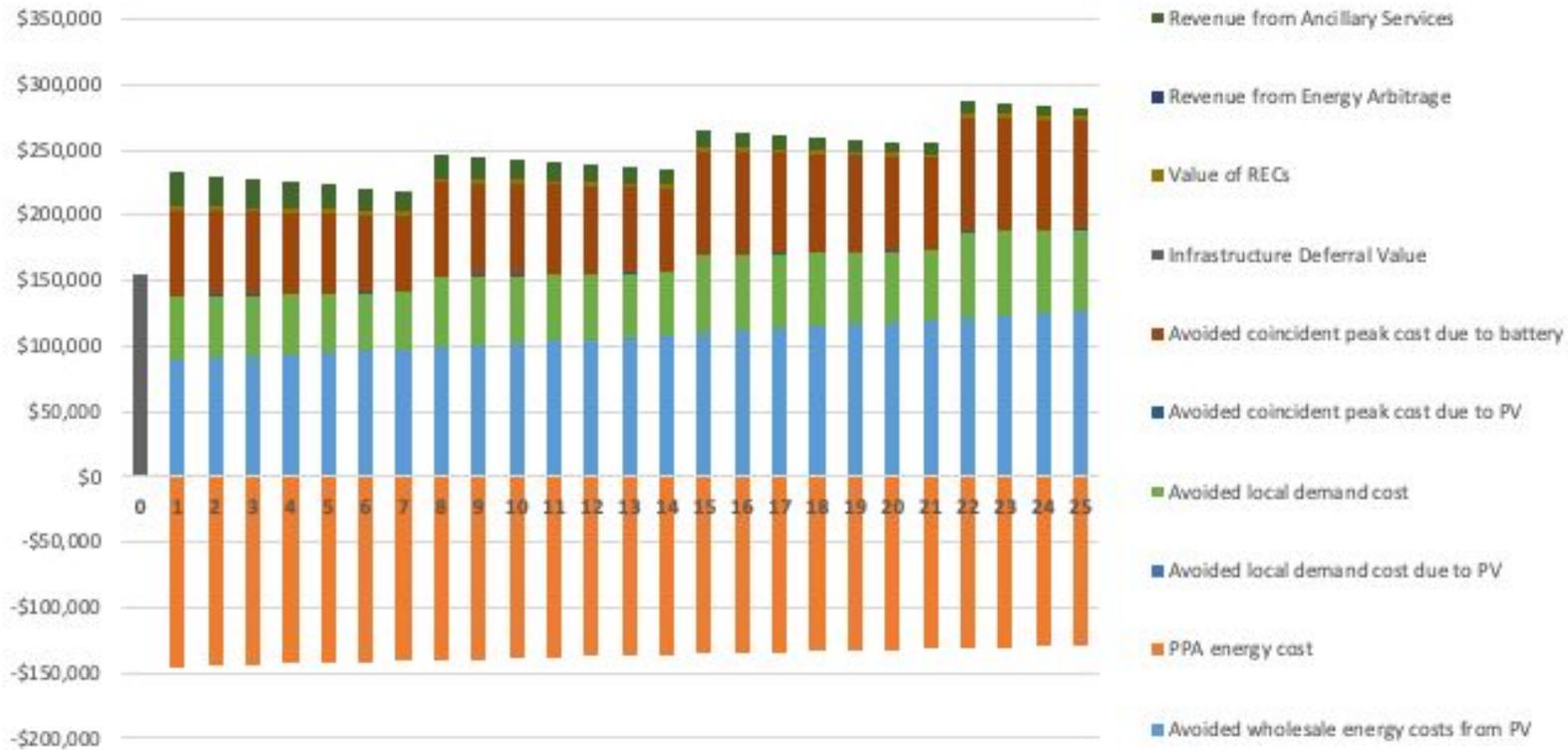
<https://www.dynapower.com/energy-storage-applications/>
(based on NREL)



<i>Value Stack Priority</i>	1	2	3	4	5	6	7	8
1st	Local Demand	Local Demand	Local Demand	Local Demand	CP Demand	CP Demand	CP Demand	CP Demand
2nd	Energy Arbitrage	Ancillary Services	CP Demand	CP Demand	Local Demand	Local Demand	Energy Arbitrage	Ancillary Services
3rd	Ancillary Services	Energy Arbitrage	Energy Arbitrage	Ancillary Services	Energy Arbitrage	Ancillary Services	Ancillary Services	Energy Arbitrage



Utility (Nominal) Value Streams Yrs 0-25



**Sample
Result for
Solar-only
Charging,
Value-Stack #4**

What Can Storage Do Best?



Roanoke, NC
Community Solar Plus



OPALCO, WA
T&D Deferral & Resilience



Anza, CA Distribution Defferal
& Resilience

Kit Carson Electric Co-op: 100% Daytime Solar

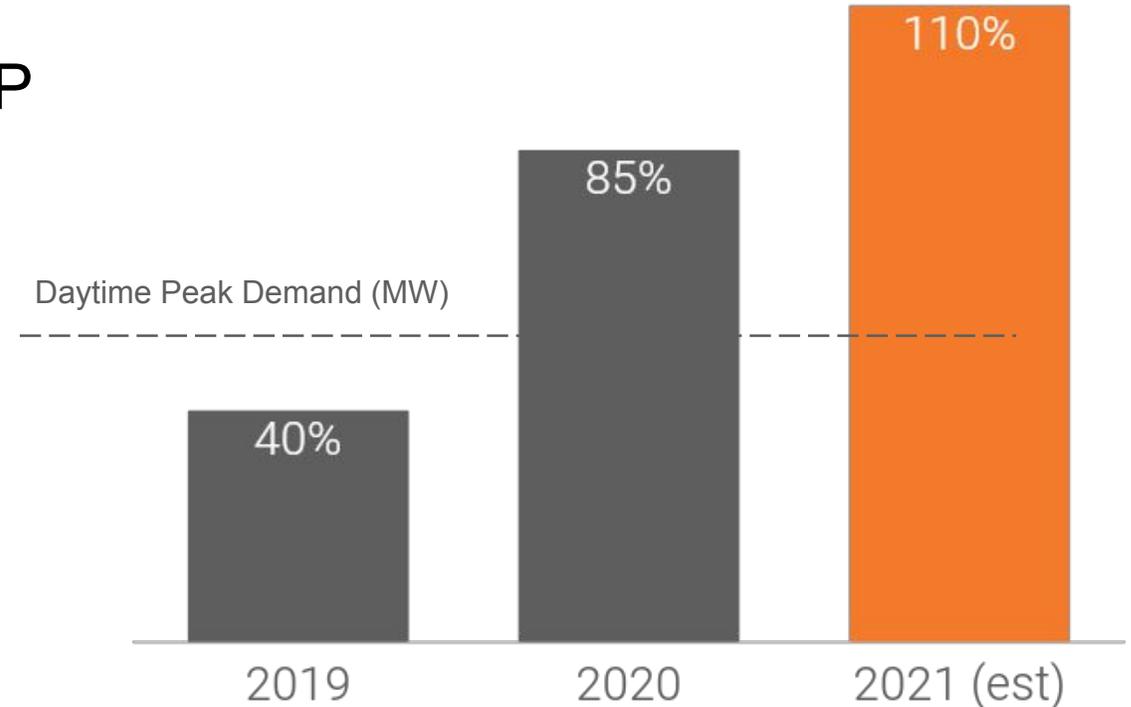
- Lowering energy costs while increasing reliability, resilience & choice
- >40 MW local solar & 2 co-op storage projects (15 MW total) to date
- College-owned microgrid underway
- Additional utility-side sites under consideration
- Broadband enabled information systems and grid visibility project supports participation on the customer-side, including EVs and electrification



A High-Renewables Co-op Finds Multiple Uses for This Model

- ▲ Use Case #7 estimates savings from CP Demand (Transmission), Energy Arbitrage, Ancillary Services
- ▲ Using Gap Analysis function to add in strategic values for distribution deferral and resilience to fire emergencies
- ▲ Future: Dovetailing SPECs' model with grid visibility tools for better system planning, including prioritizing storage and solar-plus projects strategically sited on both sides of the meter; strategic EV charging and electrification

KCEC Distributed Solar Generation as Percentage of Daytime Peak Demand



Solar-plus helps Kit Carson with solar integration, reduces wholesale transmission costs, offers ancillary services, distribution deferral and resilience options.

References and Links

https://kitcarson.com/wp-content/uploads/2021/04/KCEC_Torch-PressRelease_FINAL.pdf

<https://www.solarvalueproject.com/>

The Solar Value Project website hosts all the tools and resources of the Solar-Plus for Electric Co-ops (SPECs) project, including access to the Early-Stage Decision Model, User's Guide, RFP Library, and Webinar covering Solar-Plus Operational Capabilities and Trade-Offs, Procurement Best-Practices and Lessons Learned and Policy Outlook for Local Solar-Plus.

<https://www.nrel.gov/solar/solar-energy-innovation-network-round-2.html>

<https://camus.energy/>

Developer of grid visibility software and related tools that help KCEC with to achieve its grid modernization and integrated distribution system operation goals.

Speaker Bio and Contact Information



From her consultancy in Santa Fe, NM, Jill Cliburn provides program-design, market development, evaluation and process leadership for solar and solar-plus projects, and integrated energy strategies. She is widely known as an innovator in the solar field, and is a Fellow in the American Solar Energy Society.

Jill leads the Solar Value Project www.solarvalueproject.com, a gateway to resources from Solar-Plus for Electric Co-ops (SPECs), an effort that is part of the Solar Energy Innovation Network, administered by the National Renewable Energy Laboratory. She is also a technical advisor to the National Community Solar Partnership (NCSP) program, which is co-funded by the U.S. Department of Energy, Solar Energy Technology Office (SETO). Contact: jkcliburn@cliburnenergy.com