

How Storage Fits...

In an Integrated, High-Renewables Local Grid



Cliburn and Associates, LLC

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.



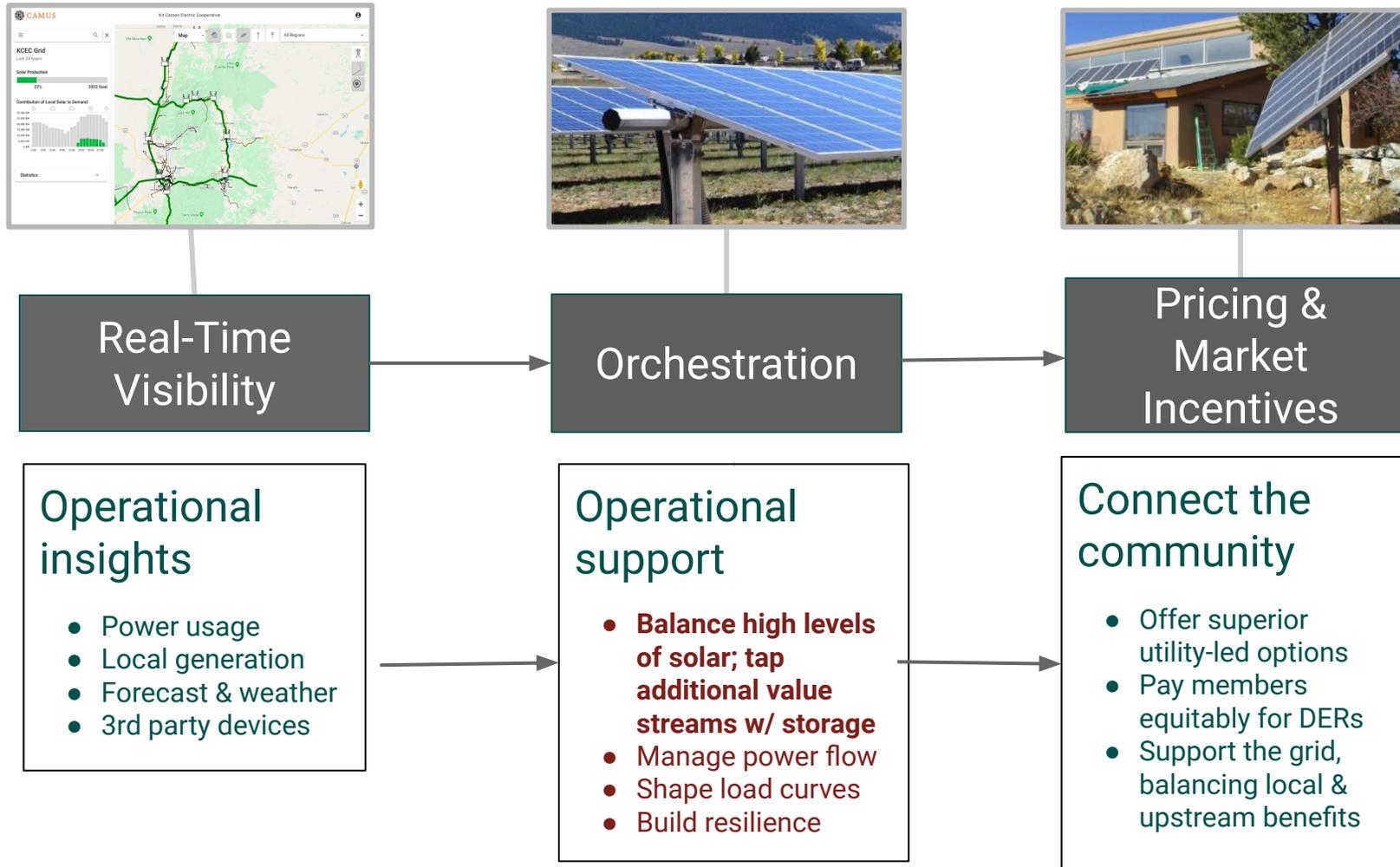
**SPECs: Solar-Plus
for Electric Co-ops**

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

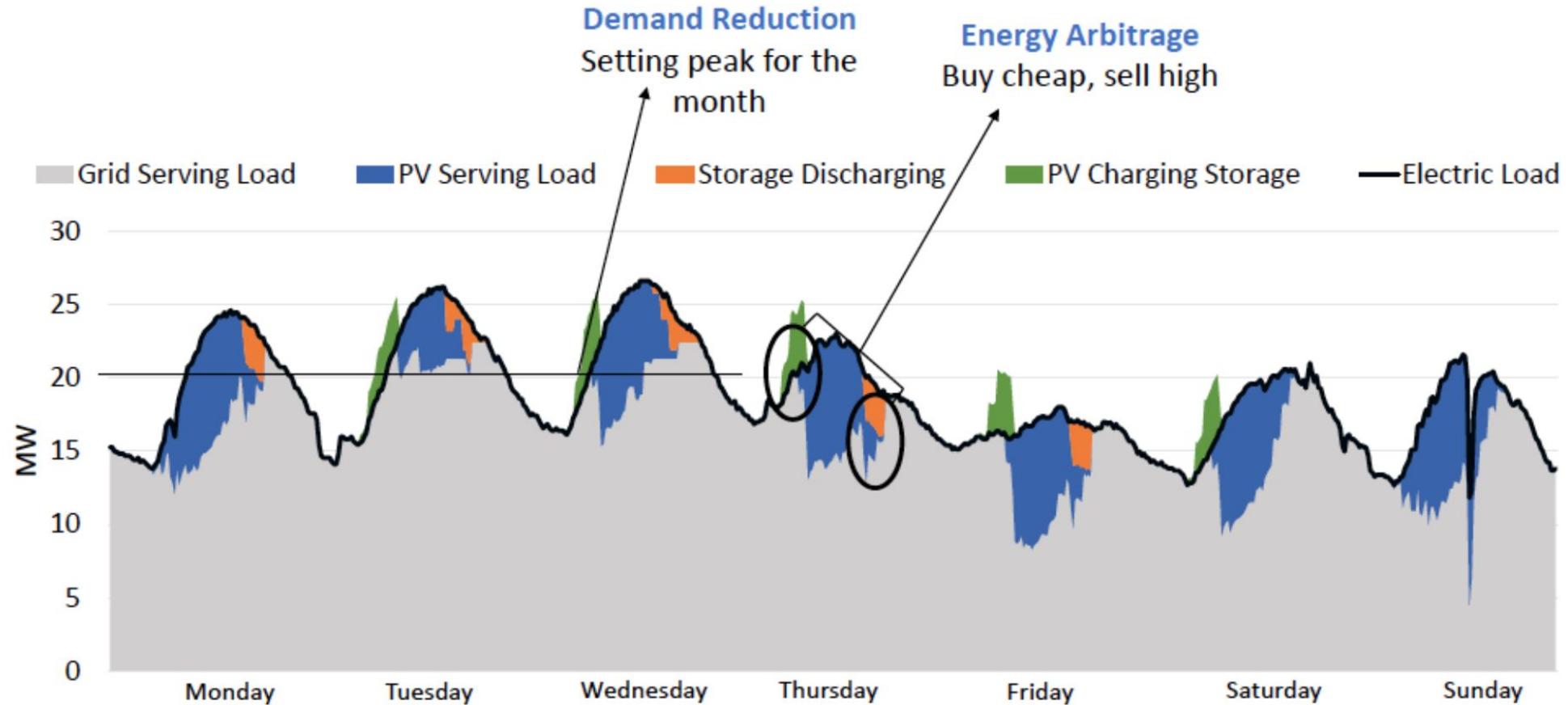
*High-value means
storage solutions that
are economic, strategic
& synergistic*



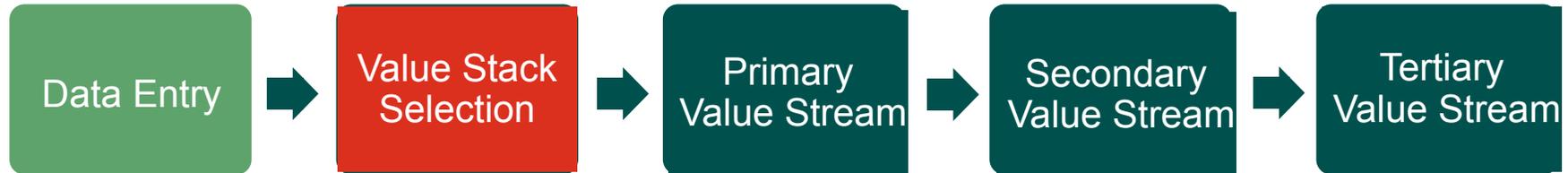
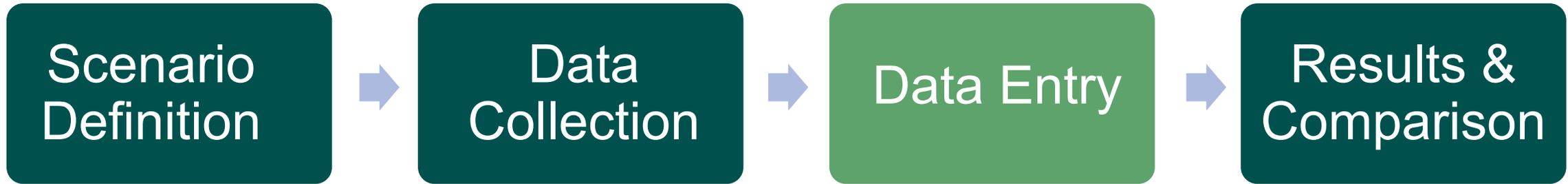
A Shared Vision



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



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

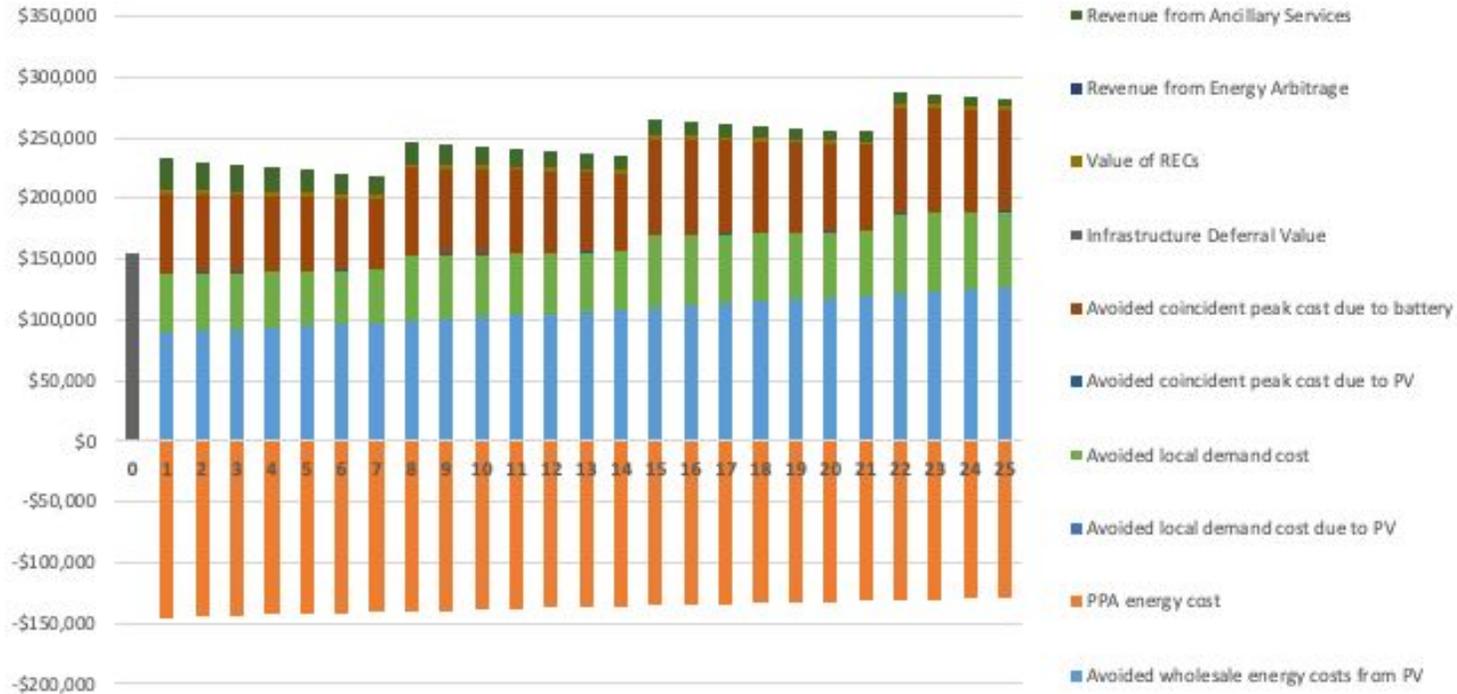


| Value Stack Priority | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|----------------------|--------------------|--------------------|------------------|--------------------|------------------|--------------------|--------------------|--------------------|
| 1st | Local Demand | Local Demand | Local Demand | Local 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 |

Optional Gap Analysis, adding Strategic Values: Deferral, Resilience



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's Community-Focused, High-Renewables Energy Transition

Kit Carson's Progress...

- Reaching 100% daytime solar
- Adding renewables to the grid - 41 MW Solar; 15 MW BESS
- Lowering energy costs while increasing choice
- Fiber optic network upgrade
- Deploying EV charging stations
- Resilience and reliability
- Developing industry and research partnerships

Toward

- Grid Orchestration
- Load Flexibility
- Demand Response
- Beneficial Electrification
- Vertical Business Integration
- Rate Changes
- Promoting equity
- De-carbonization

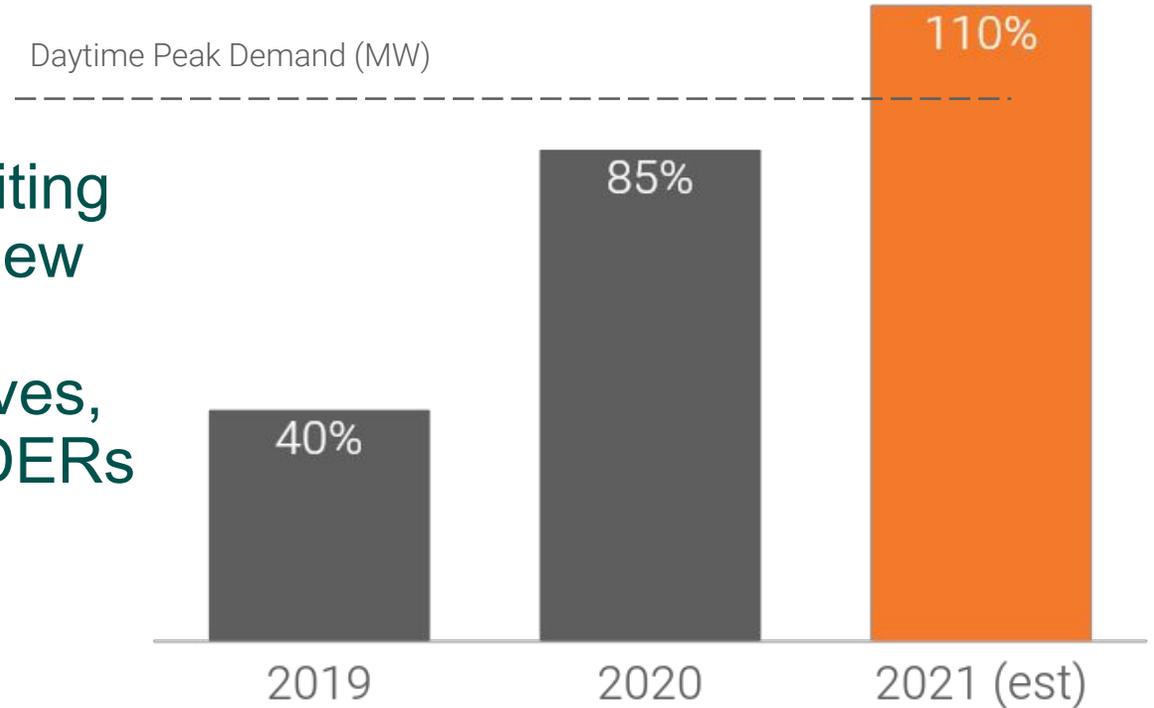


Kit Carson knows that change happens fast.

As we gain real-time visibility, we see where and how to address grid impacts of increasing renewables and DERs...

- ▲ To manage solar over-production and system backflow
- ▲ To support system planning, including siting solar+storage, EV charging stations & new technologies on both sides of the meter
- ▲ *Further*, to evaluate new rates & incentives, payments for managed customer-side DERs and behaviors

KCEC Distributed Solar Generation as Percentage of Daytime Peak Demand



KCEC Storage at 15 MW and Growing

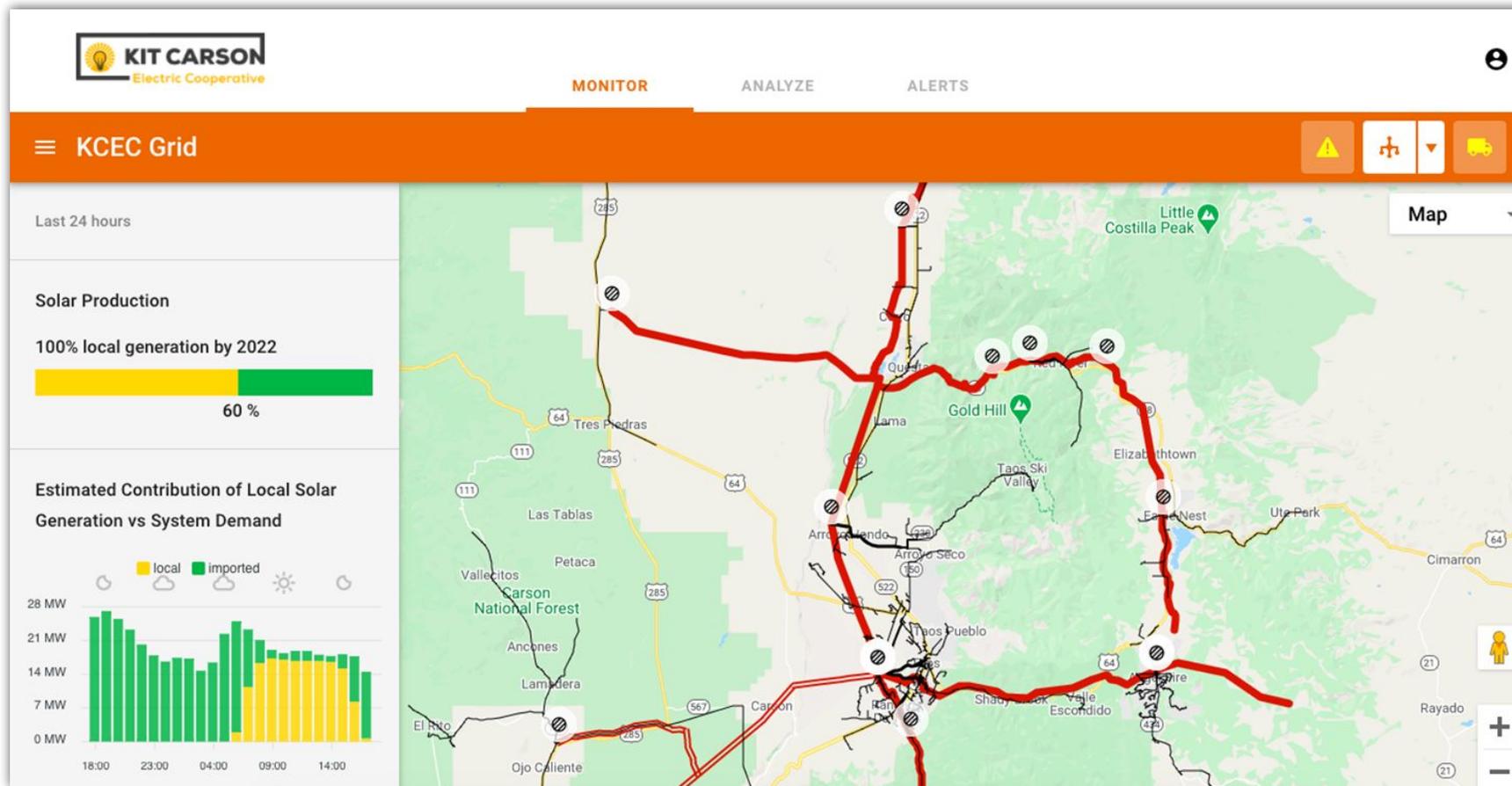
- Signed agreements on 2 storage project sites, totalling 15 MW, targeted completion, late 2021
- Additional utility-side sites under consideration throughout KCEC service territory

Value streams that are top-of-mind:

- ▲ Renewable energy goals
- ▲ Managing rising solar penetration & backflow
- ▲ Possible savings on other infrastructure upgrade costs (deferral)
- ▲ Possible market for ancillary services
- ▲ Resilience

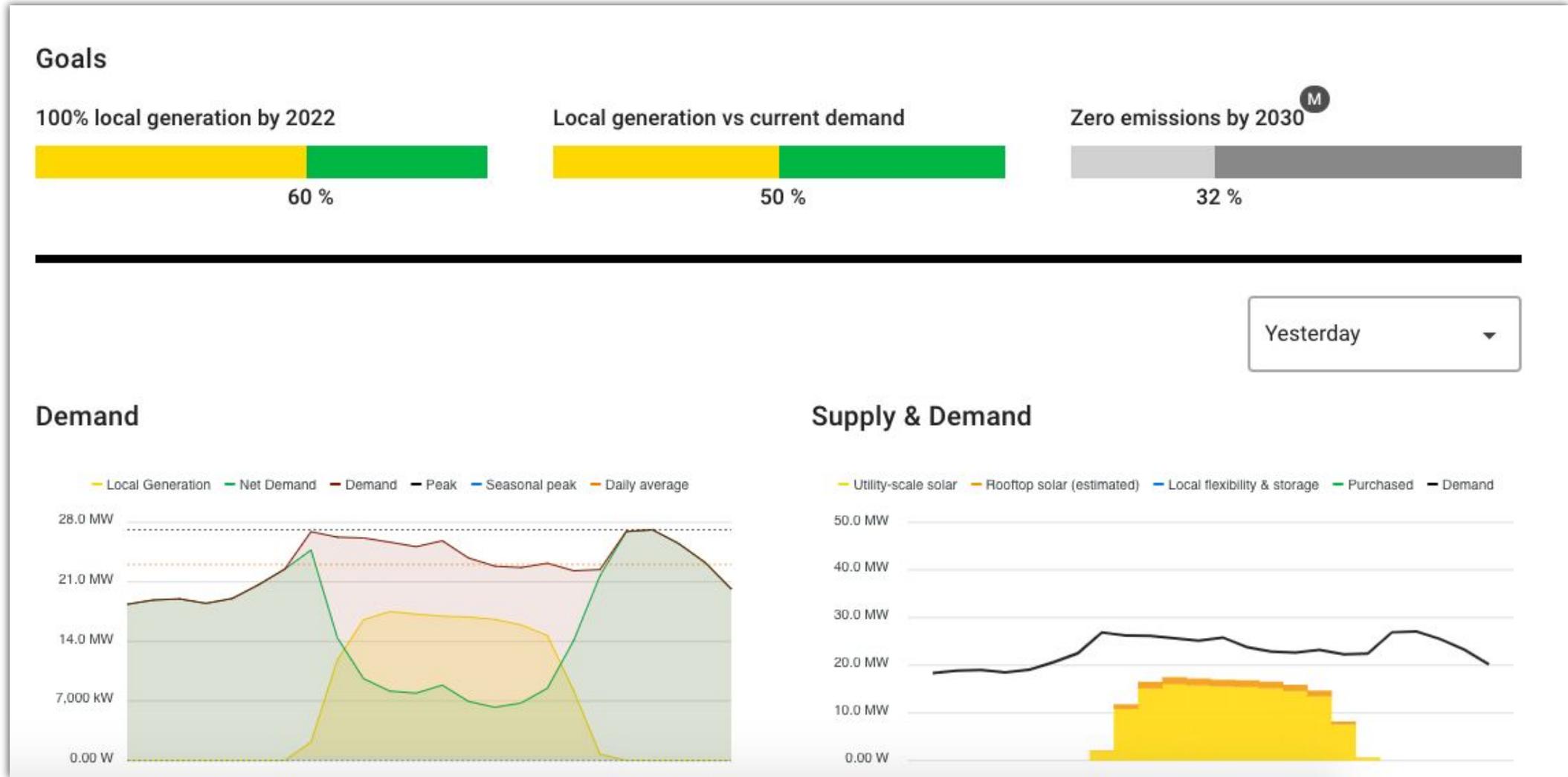


First Steps: Leveraging the broadband network to collect real-time data from multiple sources (solar, battery, EVs and more) to give KCEC an overview of what is happening across the grid – how to manage it better, while keeping the community informed of our progress.



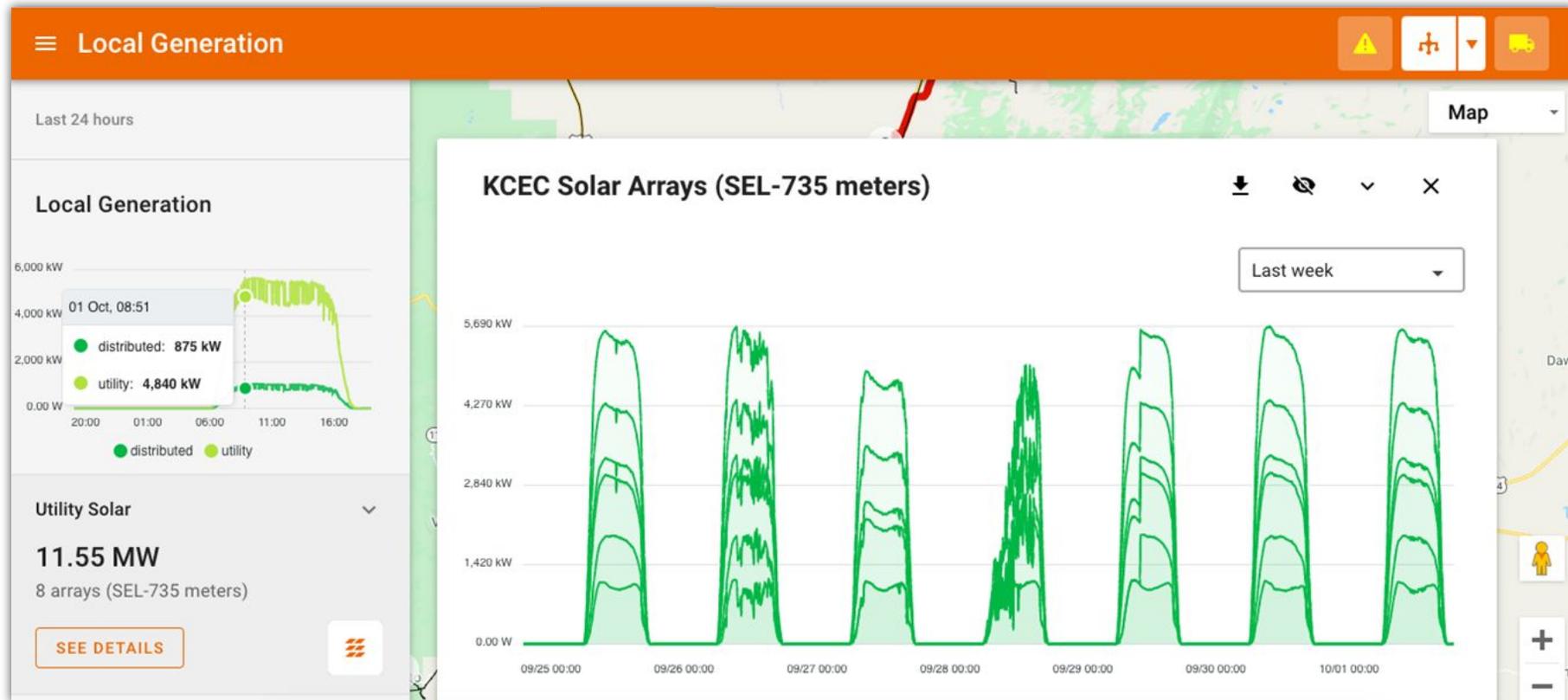
Source: KCEC & Camus Energy

Visibility Into the Grid for the Utility and the Community



Ready for New Challenges as Grid Modernization Continues

Using both metered and modeled data, the utility can **understand and plan** for the role of customer solar-plus-storage and other DERs, along with utility resources, as KCEC achieves high-solar grid modernization.



References and Links

<https://kitcarson.com/electric/100-daytime-solar-energy-by-2022/>

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

<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.

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

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

The Solar Value Project website will host all the tools and resources of the Solar-Plus for Electric Co-ops (SPECs) project, including access to the Early-Stage Decision Model, Users 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. (Late May 2020)

For new on release of the SPECs analytic model, e-mail jkcliburn@cliburnenergy.com



Speaker Bios and Contact Information



Luis Reyes has been CEO and General Manager at Kit Carson Electric Cooperative, Inc. (KCEC) since 1993. He began work as the Electrical System Engineer in 1984. He has led KCEC in developing diverse, competitive services, including broadband Internet, renewable energy and low-cost propane. His dedication to the co-op's mission is to deliver exceptional customer service with efficiency, reliability, professionalism, accountability and develop sustainable economic opportunities benefiting its member communities. See <https://kitcarson.com/>



From her consultancy in Santa Fe, NM, Jill Cliburn provides program-design, market development, evaluation and process leadership for solar and solar-plus projects, integrated energy strategies. She is widely known as an innovator in community solar and solar-plus storage and DR. She is co-leader of the Community Solar Value Project, with Extensible Energy. See www.solarvalueproject.com. jkcliburn@cliburnenergy.com