

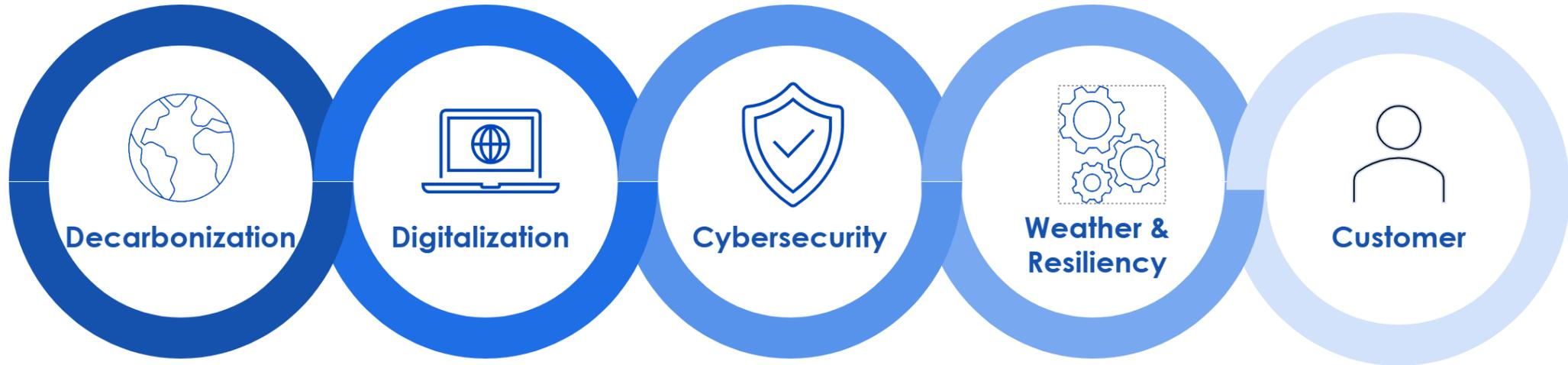


April 3, 2025

Electric System Modernization Strategy



Electric Industry is Evolving



Decarbonization goals at local and global levels will require KUB to implement the policies, processes, and systems to proactively manage the delivery of energy in a safe and reliable manner with a more holistic perspective

Digitalization of KUB to support emerging technologies will require KUB to work collectively toward the achievement of a common set of prioritized goals and objectives regarding data, integrations, architecture, and technology

Cybersecurity risks and a shifting threat landscape will require that security is at the forefront of any corporate-level holistic digital utility strategy and roadmap

Extreme Weather Events and Grid Resiliency challenges due to a changing climate will necessitate KUB be able to protect energy infrastructure and ensure critical systems operations

Customers are increasingly reliant on power in their daily lives and have a greater span of influence than ever before

Electric Industry is Evolving

TVA sets new record to meet power demand for second straight year amid freezing temperatures



[Daniel Dassow](#)

Knoxville News Sentinel

Published 12:34 p.m. ET Jan. 22, 2025 | Updated 4:45 p.m. ET Jan. 22, 2025

TVA unveils plans including more solar and gas to meet growing demand for energy



[Anila Yoganathan](#)

Knoxville News Sentinel

Published 5:29 a.m. ET May 12, 2023

The Washington Post
Democracy Dies in Darkness

CLIMATE SOLUTIONS

Why millions of Americans give up control of their thermostats

By [Nicolás Rivero](#) and [Niko Kommenda](#)
September 24, 2024 at 6:00 a.m. EDT

LOCAL

What we know: TVA ordered rolling blackouts for the first time in 90 years amid freezing temps

[Mariah Timms](#) and [Adam Friedman](#) Nashville Tennessean

Published 5:27 p.m. CT Dec. 23, 2022 | Updated 1:11 p.m. CT Dec. 24, 2022

THE WALL STREET JOURNAL.

BUSINESS

The U.S. Electric System Is Leaning on Customers to Avoid Blackouts

As the grid becomes more unstable, officials are compensating industrial and residential customers to curb usage during times of peak stress

POLITICS & GOVERNMENT

When lights went out in Western North Carolina, solar and batteries helped some power up

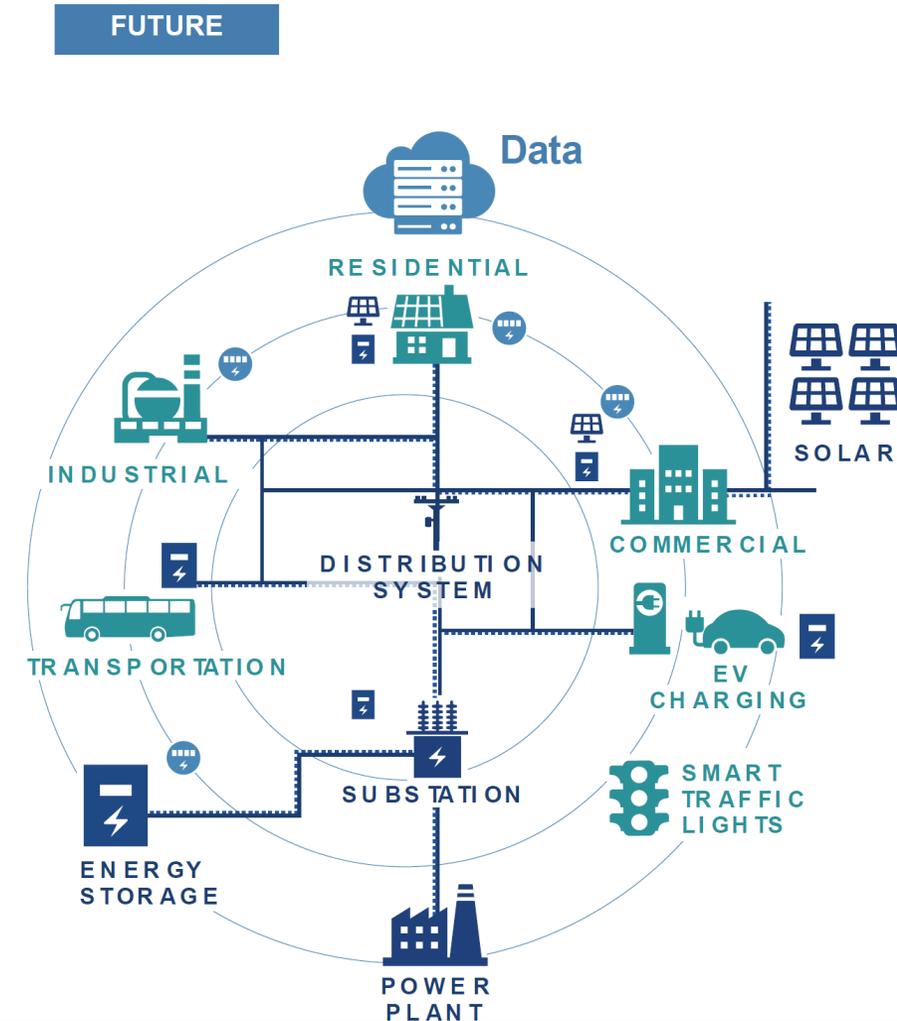
[Adam Wagner](#)

The News & Observer

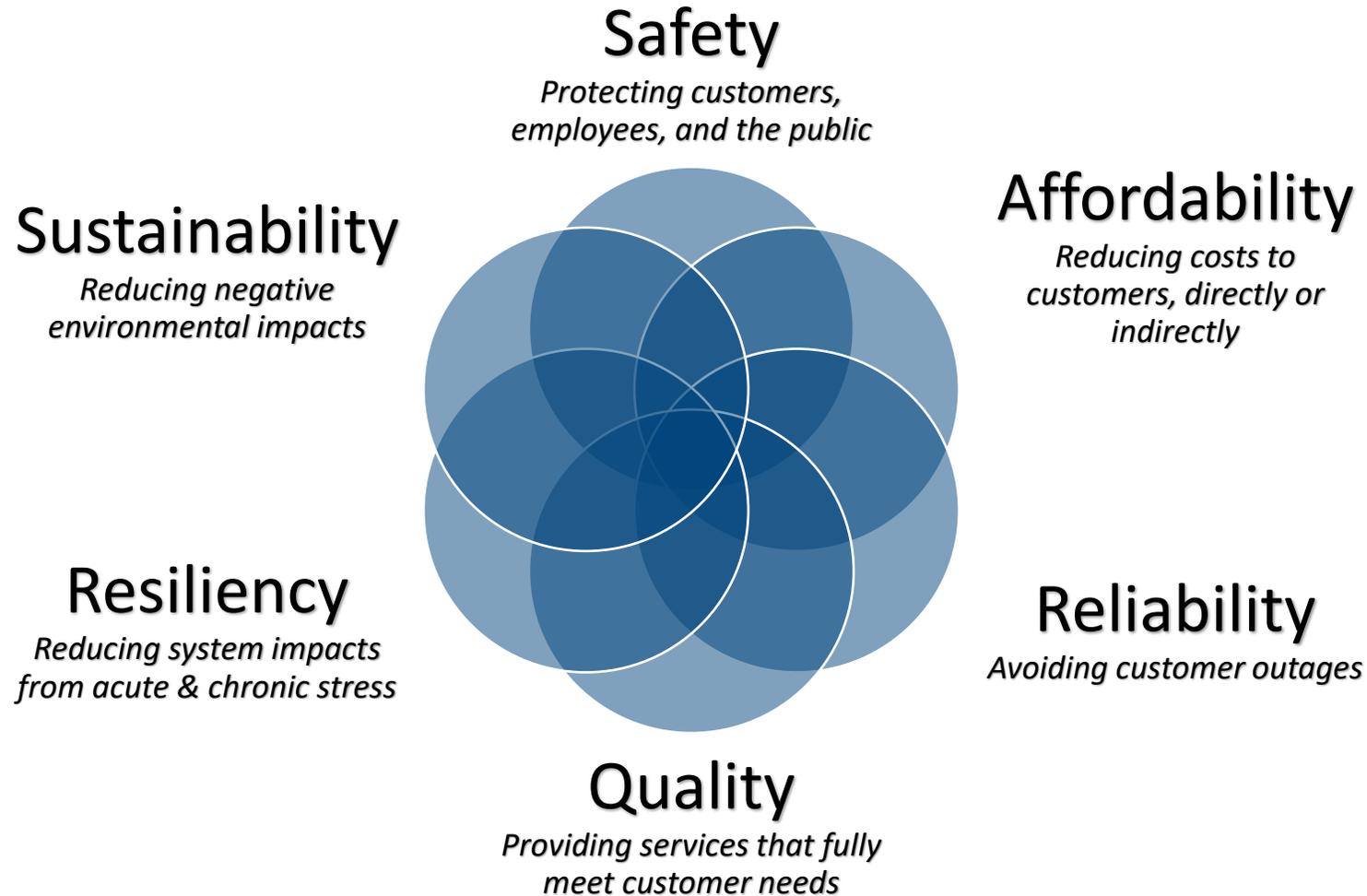
Updated December 03, 2024 7:03 PM |

Evolving Landscape Demands Agility

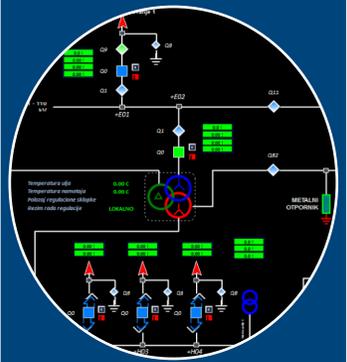
- KUB is responsible for meeting our customers' energy needs, even amidst significant changes and new extremes.
- New technology has and will help KUB maintain high-quality services that are safe, reliable, and affordable.
- Customer-facing options and programs can maximize benefits for both customers and the electric system.



Decisions Balance Needs & Priorities



KUB Technology Journey: Unlocking Agility



SCADA



GIS



Outage
Management



Smart Meters



Fiber



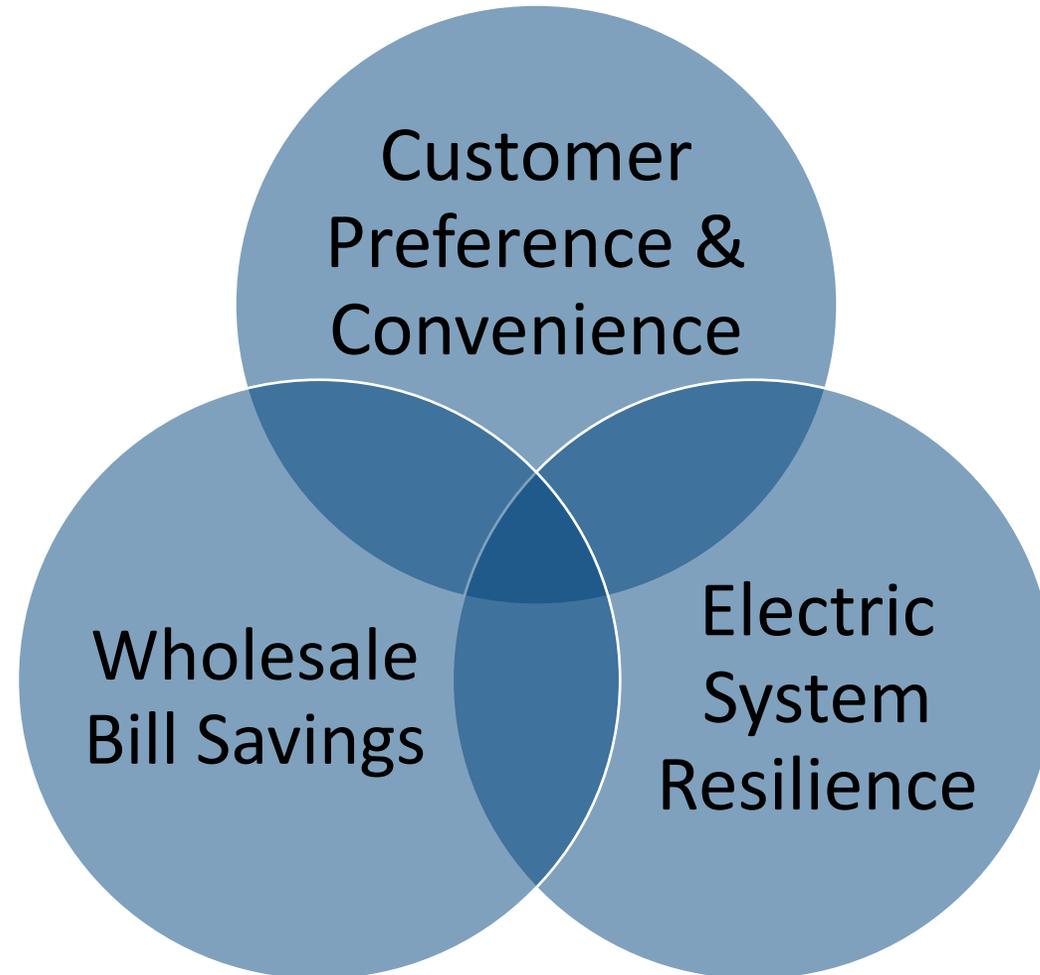
Self-Healing
Grid



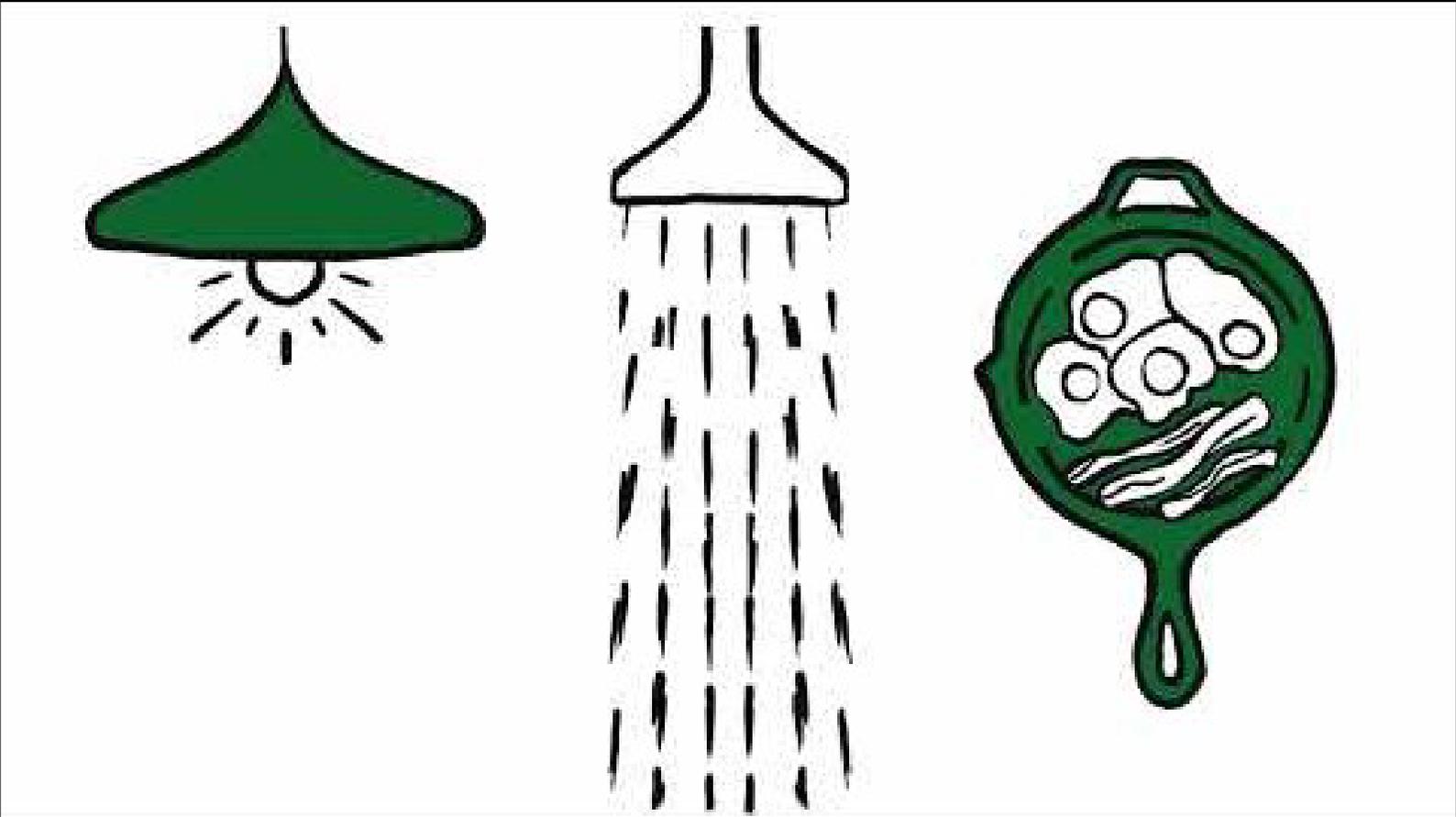
Advanced
Distribution
Management



Opportunities to Advance Multiple Goals



Peak Load: A Key Variable



Peak Demand Reduction Examples



Utility Projects (On Horizon for KUB)

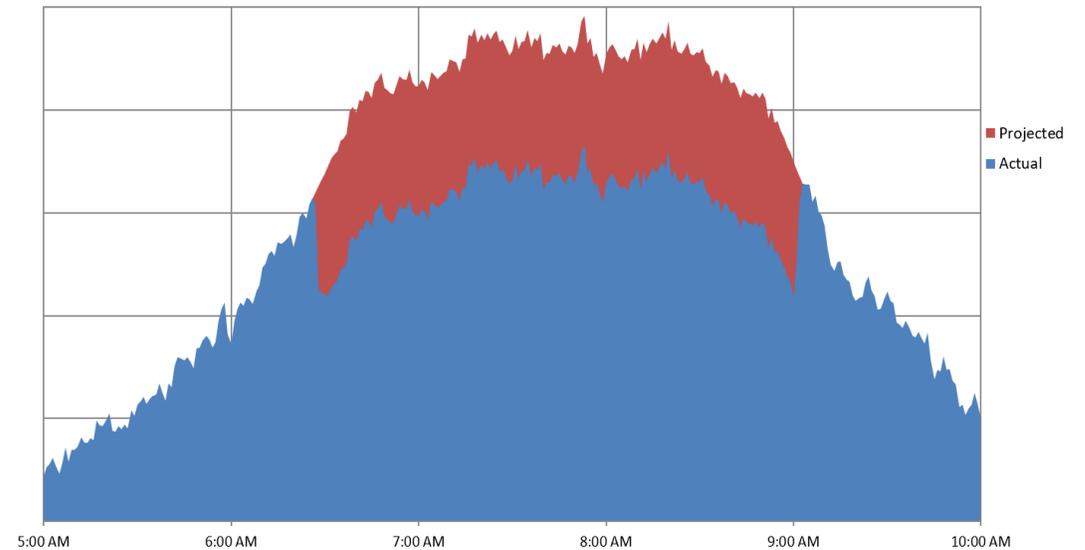


Customer Programs (Examples for Early Discussion)

Utility Project Example #1 – Voltage Optimization

- Voltage Optimization Benefits

- System Resilience
 - Minimize likelihood of rolling blackouts
- Wholesale Bill Savings
 - Reduce peak demand charges
 - Reduce energy consumption
- Environmental Benefits
 - Minimize operation of peaking plants
 - Lower greenhouse gas emissions



KUB Potential
Impact:

15 - 20 MW Peak
Reduction

Est. \$2M Savings
/ Year

Est. 3 Year ROI

Utility Project Example #2 – Grid Scale Battery Storage

- Energy Storage Benefits:
 - System Resilience
 - Backup power in the event of an outage
 - Minimize likelihood of rolling blackouts
 - Wholesale Bill Savings
 - Reduce peak demand charges
 - Energy arbitrage to optimize cost
 - Environmental Benefits
 - Minimize operation of peaking plants
 - Lower greenhouse gas emissions



KUB Potential
Impact:

20 MW Capacity

Est. \$1.8M
Savings / Year

Est. 5-6 Year ROI

Utility Project Discussion Questions

- As we roll these types of programs out, what questions do you have as a customer?
- What types of information or updates would you like us to be thinking about as we develop communications about these projects?

Project Example #1 – Microgrid Partnership

- Microgrid = localized energy system that can operate independently or in conjunction with a utility grid
- Envisioned to support a community center or other critical “hub”
- Energy sources: generators, storage, solar, etc.
- Advantages include:
 - Community resiliency
 - Cost savings
 - Grid support
 - Renewable integration

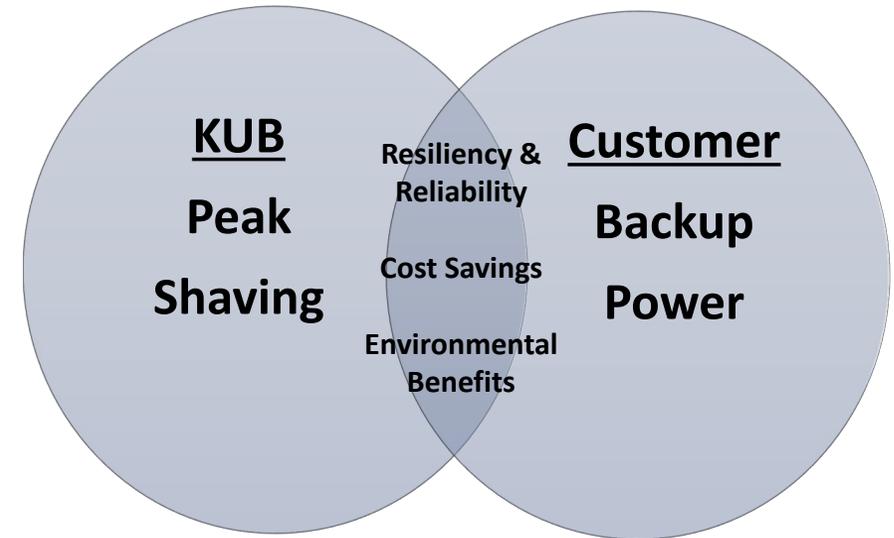


During Hurricane Helene’s aftermath, the microgrid was quickly restored and started providing power to Hot Springs’ downtown area after “the substation that fed the town was washed away by the floods.”

Jason Handley, general manager of Duke’s Distributed Energy Group

Customer Program Example #2 – Residential Energy Resources

- Customers connect a battery or generator that utility can control to reduce peak demand
- In the event of an outage, those devices support the customer's home
- Upfront technology costs in the ballpark of \$10k - \$15k, potentially offset by federal tax credit
- Utility incentives may cover a portion of upfront costs, either through one-time / annual rebate or a lease option



Customer Program Example #3 – Smart Thermostats

System Benefits:

- Heating and cooling are the primary drivers for residential utility system demand

How it Works:

- Customers with a smart thermostat opt-in to participate (requires internet)
- Participants earn incentives for allowing automatic thermostat adjustments during specific events
- Participants can override events and can opt out anytime

Example Program Design:

Maximum Hours

- 4 hours per event
- 120 hours per year

Maximum Adjustment

- 4 degrees
- Upper and lower limits

Incentives

Pre-Enrollment (new purchase)	Existing Device Enrollment	Annual Participation
Up to \$100	\$65	Year-Round: \$65
		Summer-Only: \$20

Customer Program Discussion Questions

- What are your initial impressions?
- Does anyone have experience with these types of programs or know someone who has?
- How much of an appetite do you have for these types of programs?
 - Are you inclined (or not) to participate in such a thing?
- What types of considerations are top of mind?
 - What would excite you?
 - What would frustrate you?

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