

# Demand Response & a Flexible Distributed Grid

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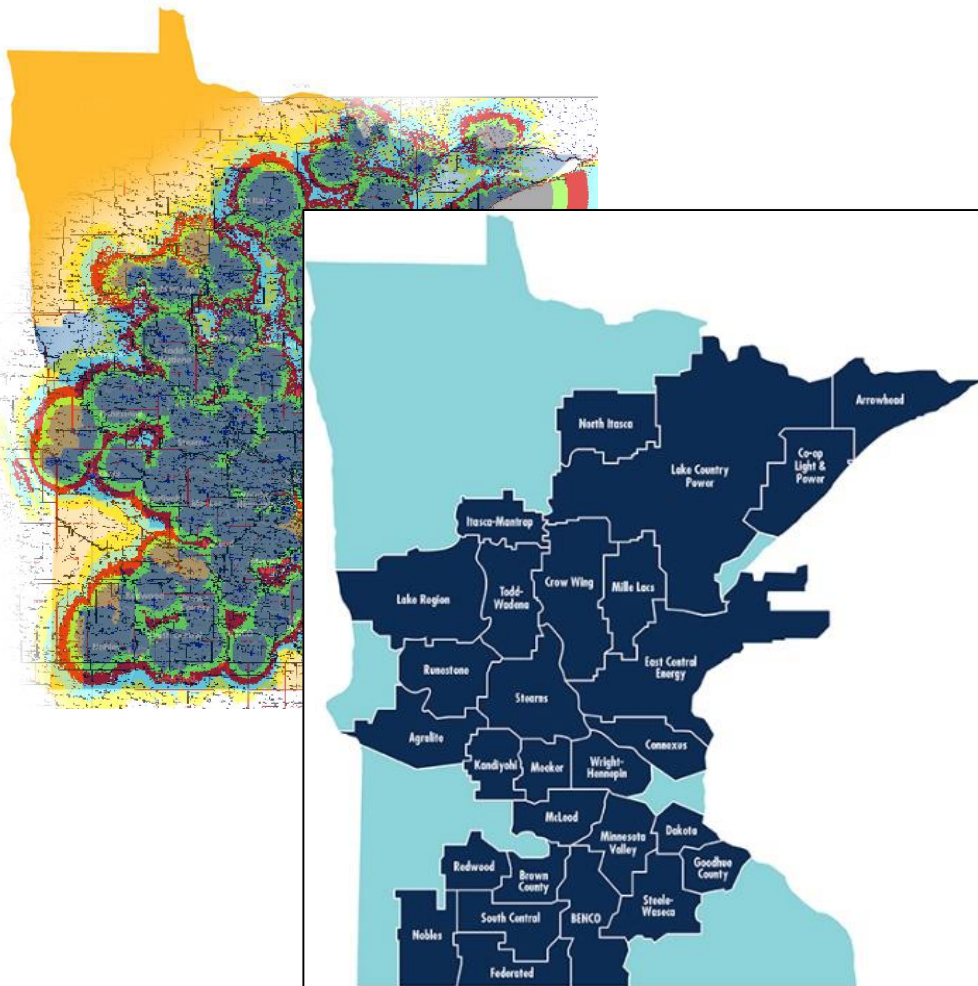
Great River Energy

*Manager, Distributed Energy Resource Portfolio*

October 21, 2022

# Demand Management at Great River Energy

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## Great River Energy

- Non-Profit Electric Cooperative
- 1.7 million consumers in Minnesota
- 40 years of Demand Response and Load Shifting.
- 350,000+ controllable loads
  - Summer DR: 175 MW (Res) + 205 MW (C&I)
    - **14% of summer peak 2,700 MW**
  - Winter DR: 360 MW (Res) + 120 MW (C&I)
    - **21% of winter peak 2,300 MW**
  - Daily off-peak load shifting (16h off/ 8h on)
    - 65,000 storage water heaters (**320 GWh/yr**)
    - 15,000 storage space heating (**157 GWh/yr**)
- Other Distributed Renewables:
  - PV: ~40 MW, BESS:~20 MW

# GRE Energy Transition



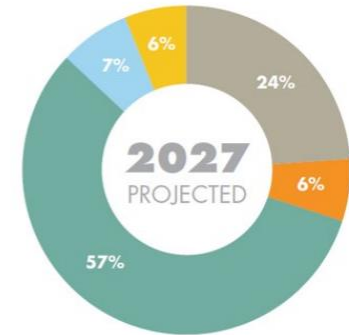
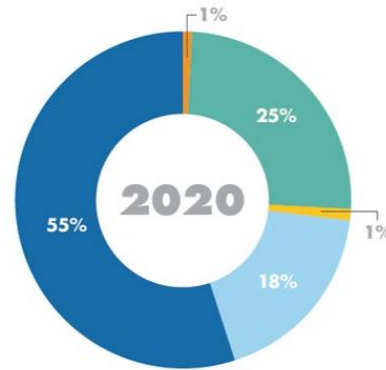
## 2023-37 INTEGRATED RESOURCE PLAN UPDATE

Submitted to the Minnesota Public Utilities Commission  
Docket No. E2/RP-17-286  
Docket No. ET-2/RP-22-75  
Oct. 3, 2022



INNOVATE, COLLABORATE, AND LEAD TO COMPETITIVELY POWER THE FUTURE

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● FUEL OIL   
 ● COAL   
 ● NATURAL GAS   
 ● RENEWABLE   
 ● HYDRO   
 ● MARKET   
 ● RAINBOW PURCHASE

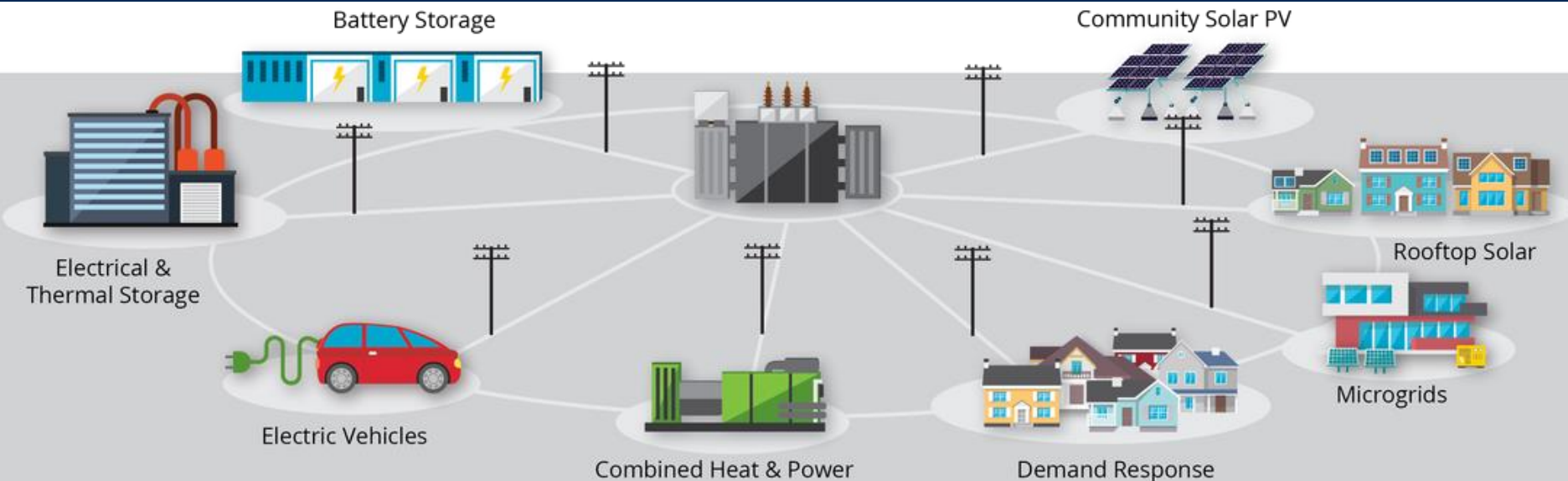


Figure 2 - Graph represents GRE carbon reductions from direct portfolio emissions compared to GRE emissions representative of all market purchases and PPAs - both looks result in deep decarbonization.

# Distributed Energy Resource (DER)

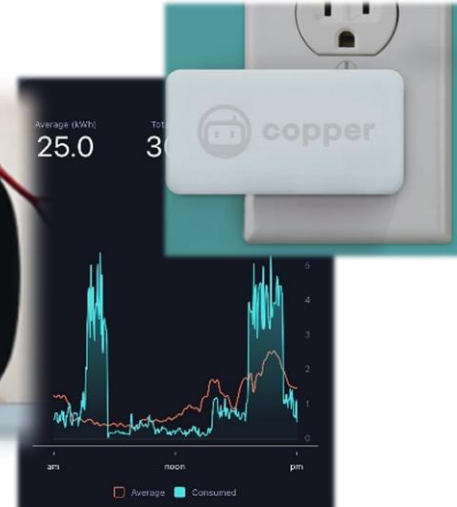
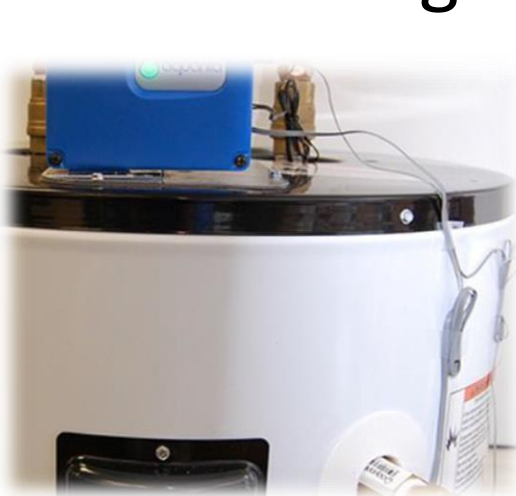
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- DER defined as “any resource located on the distribution system, any subsystem thereof or behind a customer meter.”
  - May include, *but not limited to*, resources that are in front of and behind the customer meter, e.g. electric storage resources, intermittent generation, distributed generation, demand response, energy efficiency, thermal storage, and electric vehicles and their supply equipment.



# Smart Home Involvement

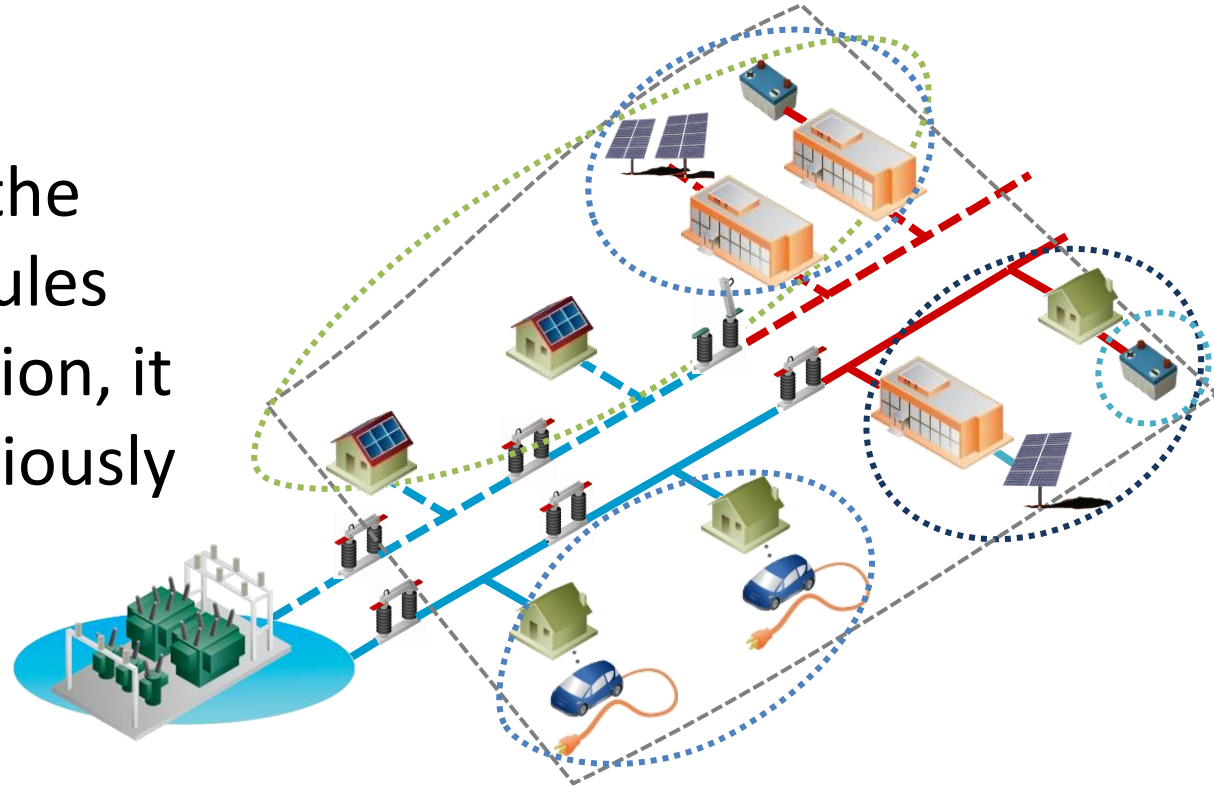
- ▶ Home Energy Monitor
- ▶ Water Heaters
- ▶ Thermostats
- ▶ EV Chargers





# A Virtual Power Plant

- ▶ Technology is great. But you also need to know how to monetize new tech in bulk operations
- If it can play by the same dispatch rules as older generation, it will be taken seriously and given fair economic value.



# Member-owned DER is an asset

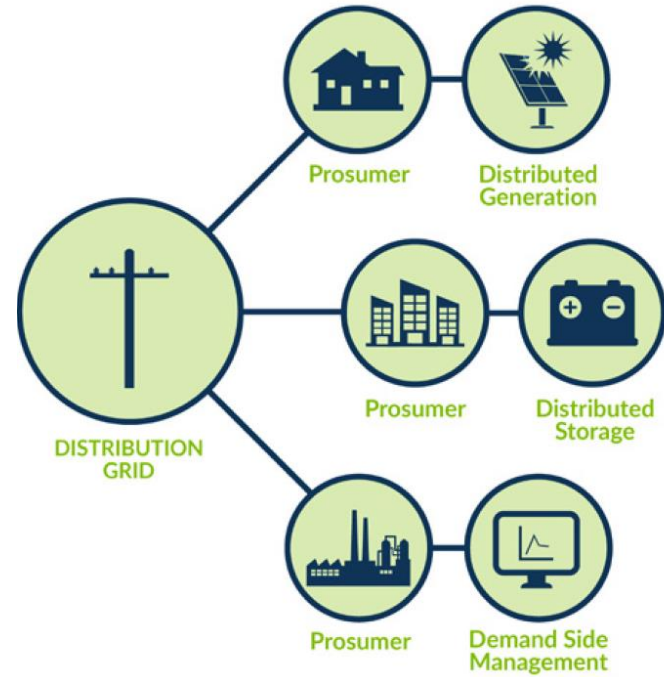
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- ▶ GRE continues to see value in DER technology and data science
  - Flexible load is a **tool for grid management**
  - Agile scheduling of DER is equivalent to the strategic dispatch of a virtual power plant
  - Avoid costly transmission upgrades, a **non-wires alternative**
- ▶ As a **virtual peaking power plant**, DER programs have created a common vehicle for improved member reliability and diverse economic savings



# Renewable & Sustainable Future

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*It used to be that we managed generation to match the load; in the future we'll manage the load to match the generation.*