



October 8, 2021

William Seuffert, Executive Secretary  
Minnesota Public Utilities Commission  
121 7<sup>th</sup> Place East, Suite 350  
Saint Paul, MN 55101-2147

***Subject: Dakota Electric Association Informational Letter***

***In the Matter of Distribution System Planning  
for Dakota Electric Association  
Docket No. E-111/M-21-728***

Dear Mr. Seuffert:

On November 2, 2020, the Minnesota Public Utilities Commission (Commission or MPUC) issued an *Order Accepting Integrated Distribution Plan and Modifying Filing Requirements* (Order) in the above-referenced docket. Ordering Point No. 5 stated:

The Commission delegates authority to the Executive Secretary to convene a process to engage representatives from each of the rate-regulated utilities and stakeholders to review and discuss the Commission's IDP orders for the next round of IDP reports to help ensure that data included in future IDPs is efficiently gathered and presented.

On January 8, 2021, the Commission held a stakeholder discussion regarding Integrated Distribution Planning (IDP). As part of the conclusion to this stakeholder discussion, the Commission drafted a next steps which stated in part:

Individual utility stakeholder meetings are encouraged to continue the relevant discussions in preparation of the 2021 IDPs.

Dakota Electric Association® (Dakota Electric or Cooperative) submits this informational letter noting that it held a stakeholder meeting regarding its 2021 IDP on September 15, 2021. Attached to this letter is the slide deck Dakota Electric used for its presentation. Dakota Electric notes that it previously filed these slides in the 2019 IDP docket on September 16, 2021.

If you have any questions about this informational letter, please contact me at 651-463-6258 or at [aheinen@dakotaelectric.com](mailto:aheinen@dakotaelectric.com).

Sincerely,

*/s/ Adam J. Heinen*

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Adam J. Heinen  
Vice President of Regulatory Services  
Dakota Electric Association  
4300 220<sup>th</sup> Street West  
Farmington, MN 55024

*/s/ Craig Turner*

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Craig Turner  
Sr. Principal & Regulatory Engineer  
Dakota Electric Association  
4300 220<sup>th</sup> Street West  
Farmington, MN 55024

## **Certificate of Service**

I, Melissa Cherney, hereby certify that I have this day served copies of the attached document to those on the following service list by e-filing, personal service, or by causing to be placed in the U.S. mail at Farmington, Minnesota.

**Docket No. *E-111/M-19-674***

Dated this 16th day of September 2021

*/s/ Melissa Cherney*

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Melissa Cherney

# Dakota Electric IDP Stakeholder Meeting

September 15<sup>th</sup>, 2021



Your Touchstone Energy® Cooperative 

# Agenda

Welcome

DER Forecasts

Distribution Capital Budget

Key Initiatives

AGi Project Update

DER Integration



# Welcome

Dakota Electric CEO – Mr. Greg Miller

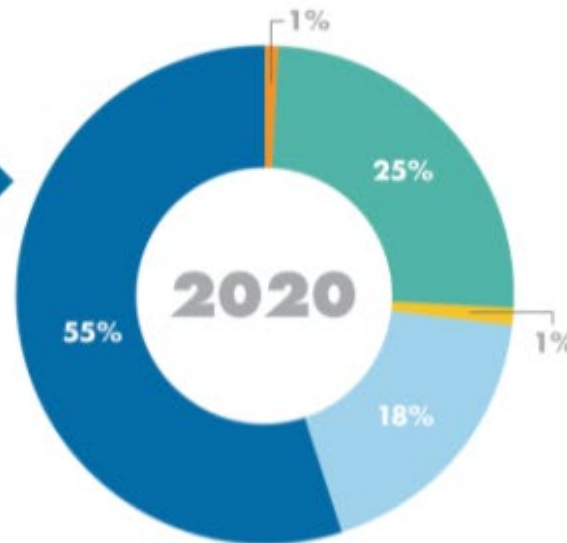
# Great River Energy – Renewable Resources

## Flexible resources, reliable electricity

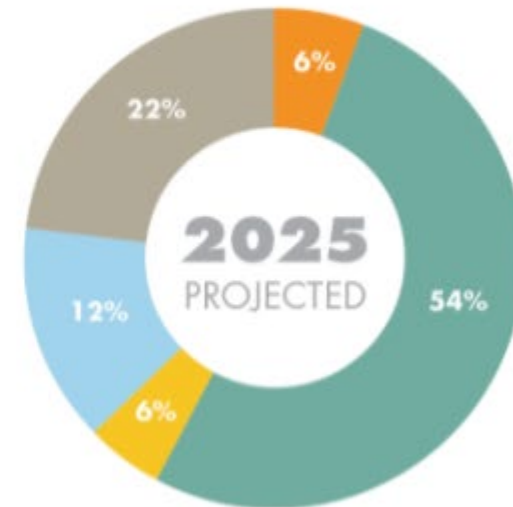
Great River Energy has a fleet of peaking plants ready to produce energy when its members or the larger grid need it. When combined with the Midwest's high availability of wind, natural gas provides stability today and flexibility for a future with new technologies and opportunities.

## ENERGY MIX PROGRESSION

Over the past several years, Great River Energy has begun to transition from an energy mix heavily reliant on coal to one that will be over half renewable energy sources by 2025.



All requirements energy



Energy served

COAL NATURAL GAS RENEWABLE HYDRO MARKET RAINBOW PURCHASE

# DER Forecast

## IDP DER definition includes;

- Solar
- Wind
- Energy Storage
- Demand Management
- Energy Efficiency

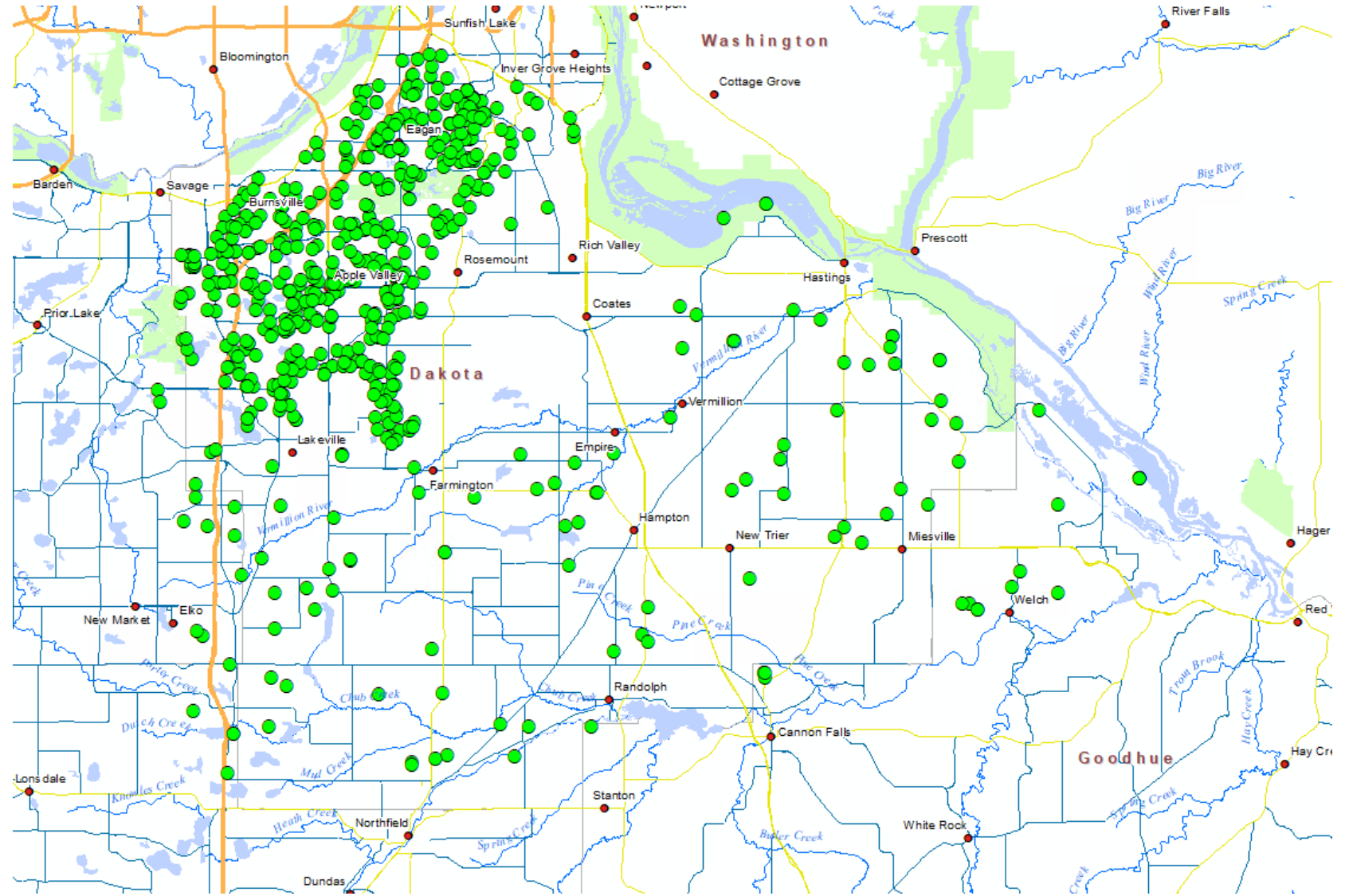
## We focused on Solar

- Not expecting any more wind
- Energy Storage expected to help reduce system issues
- Demand Management not expected to grow (mature)
- Energy Efficiency included in existing load forecasts





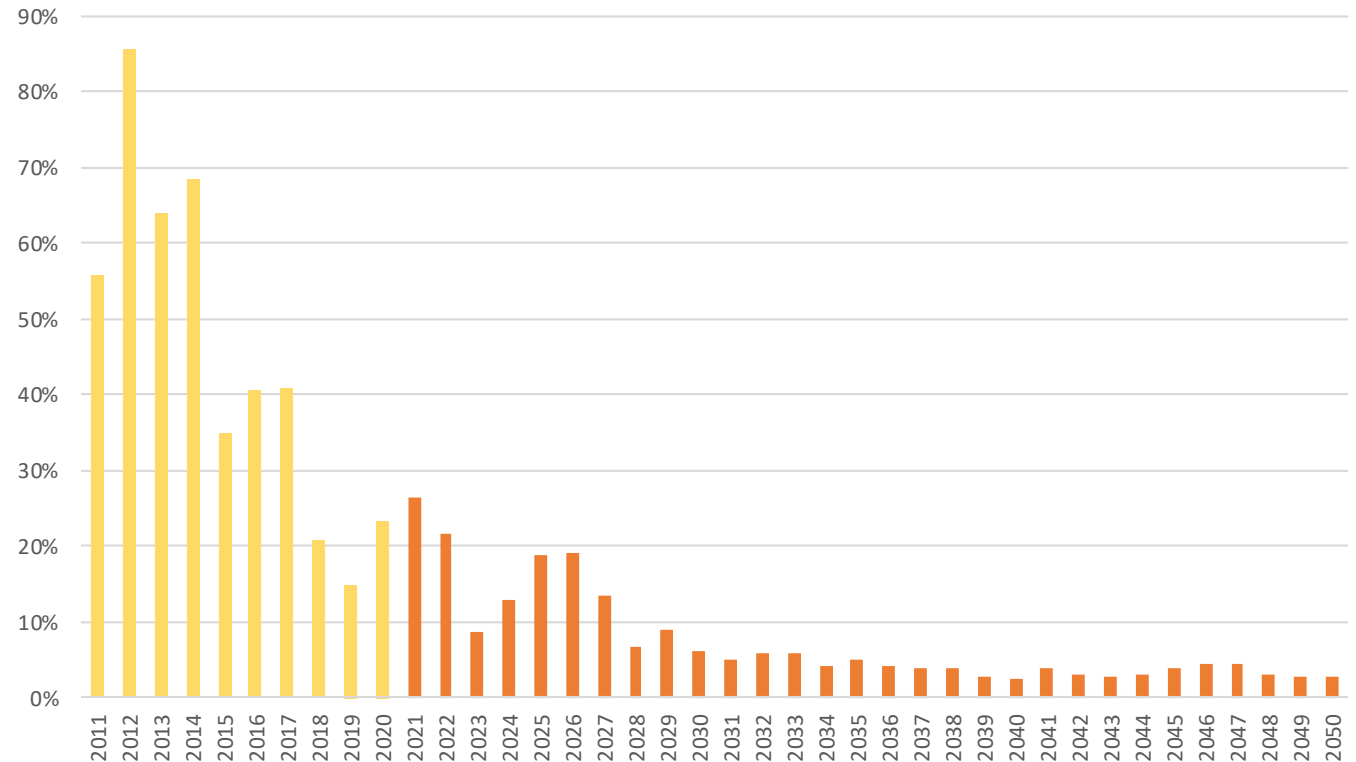
Existing DER  
on the DEA  
system



# Forecast Process

- Used EIA annual energy forecast - Solar
  - Annual % energy increase from EIA
  - Minnesota expected to have similar growth pattern
- Applied annual % increase to Dakota Electric residential solar
- Behind the meter solar

EIA Solar Energy Growth Forecast  
for United States  
(Percent Growth Year over Year)

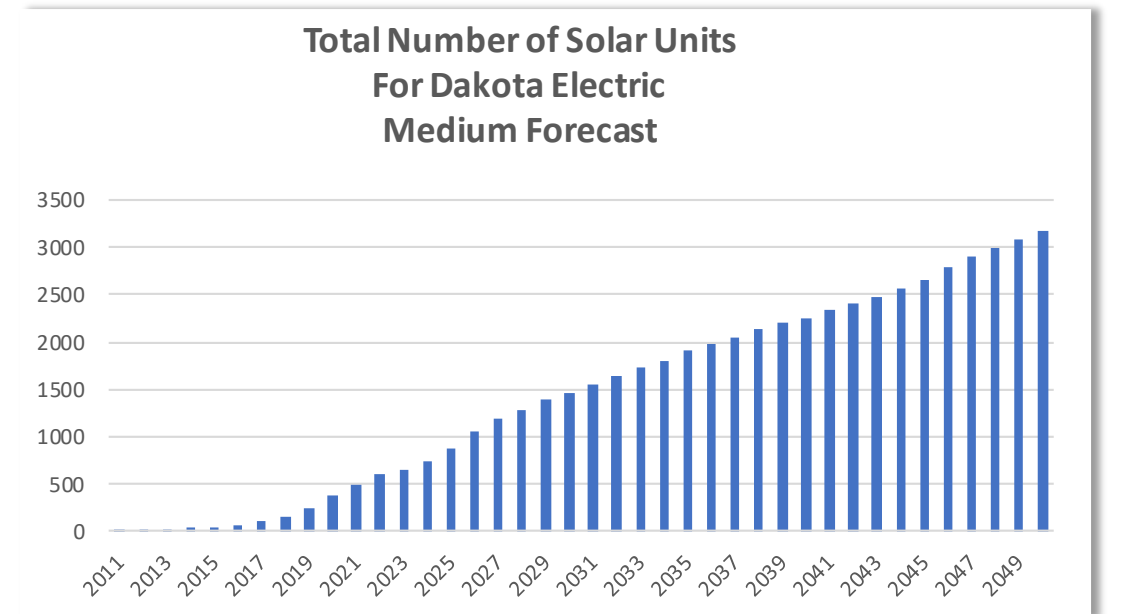
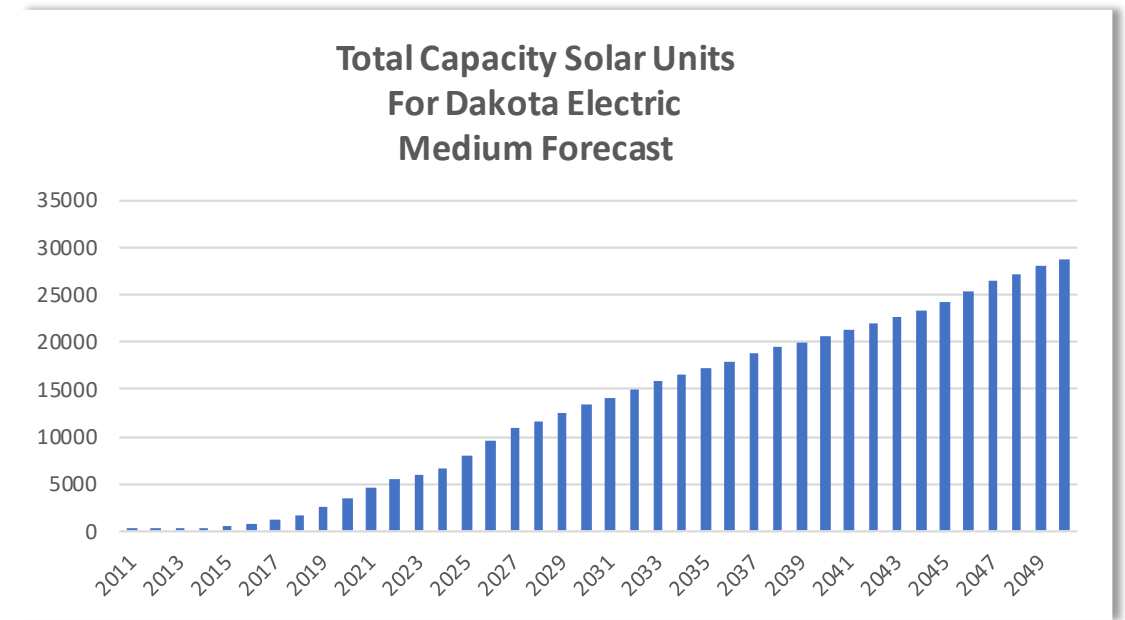


# Solar-Medium Forecast

- Assumptions
  - Growth Follows EIA Forecast

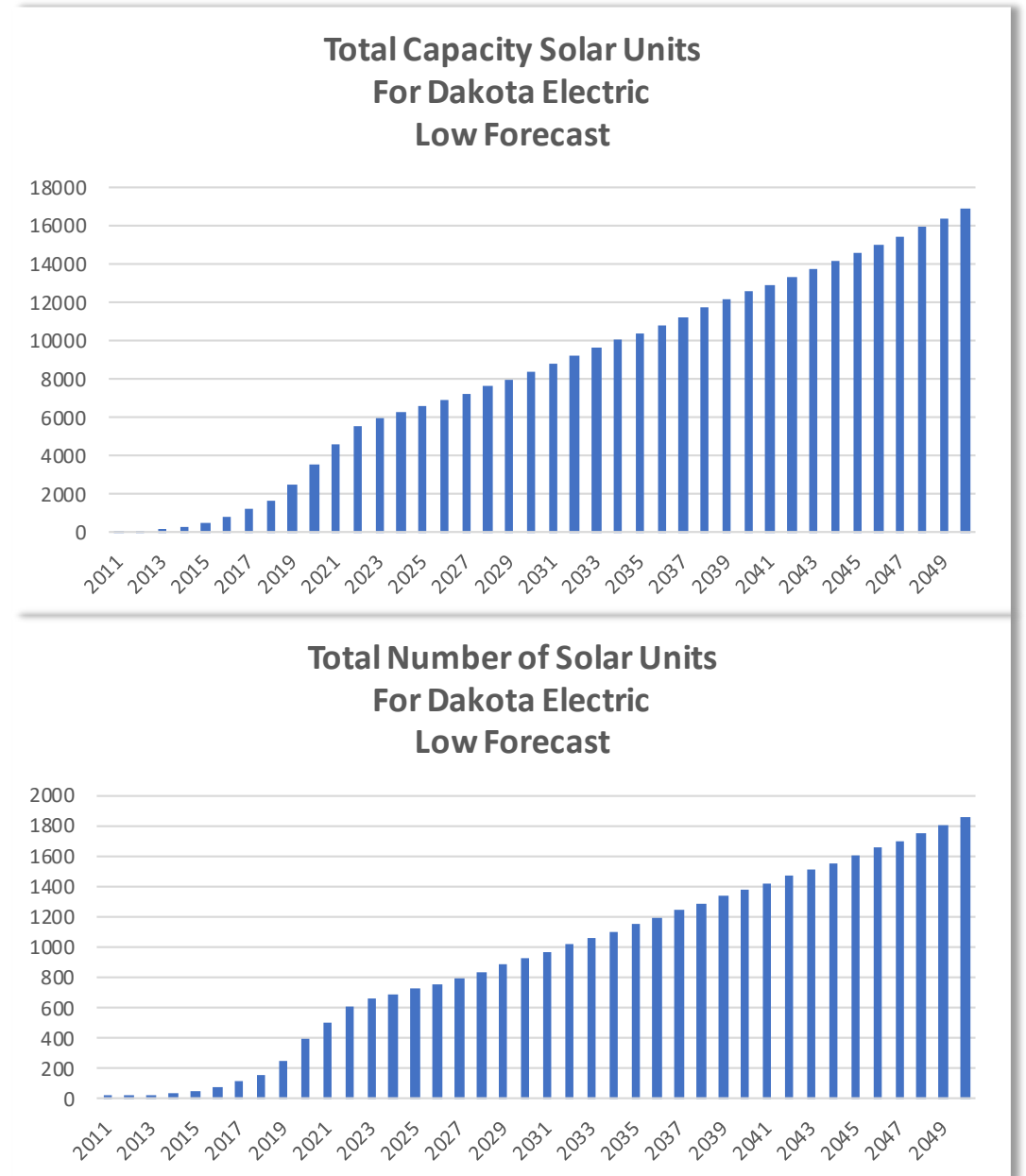
## Behind the Meter Solar

- 3.5 MW in 2021
- 13 MW in 2030
- 28 MW in 2050



# Solar-Low Forecast

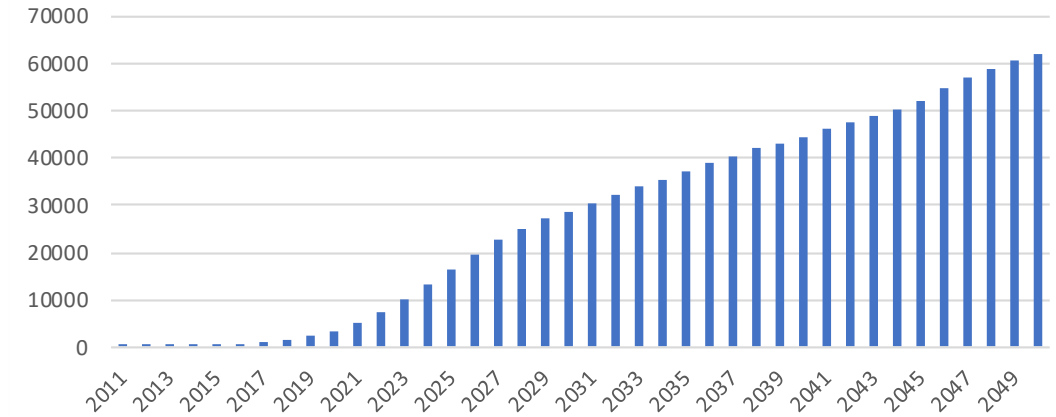
- Assumptions
  - Tax support for DER is sunset
  - COVID impacts on equipment delivery
  - Future reductions in cost of DER are not achieved
  - 2021 & 2022 exceed EIA
  - Lower than EIA 2023-2035
- 3.5 MW in 2021
- 8.4 MW in 2030
- 16.8 MW in 2050



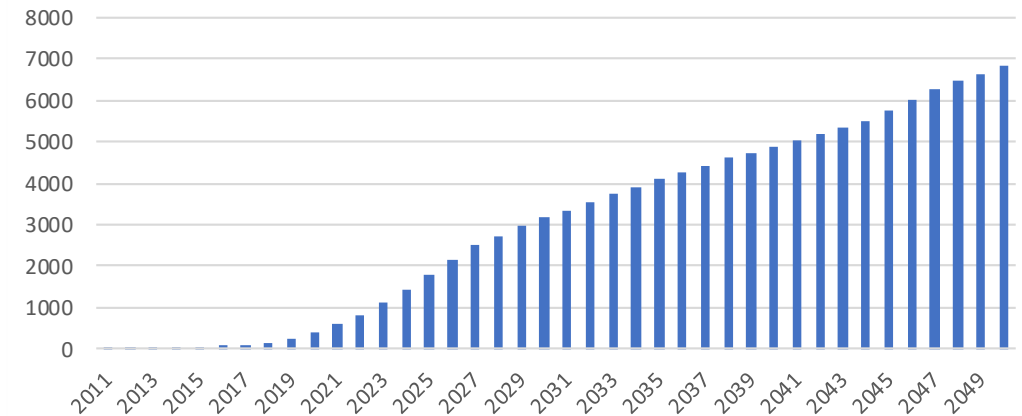
# Solar-High Forecast

- Assumptions
  - DER growth exceeds EIA
    - 2021-2028
  - Matches EIA after 2028
- 3.5 MW in 2021
- 28 MW in 2030
- 62 MW in 2050

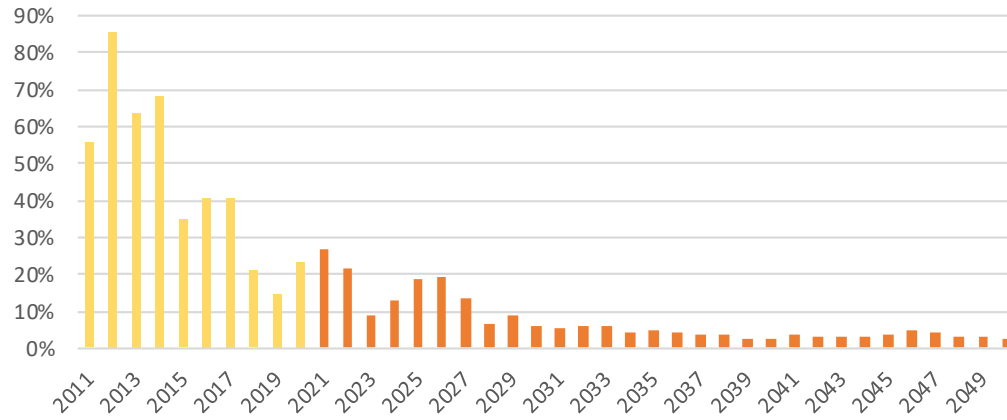
**Total Capacity Solar Units  
For Dakota Electric  
High Forecast**



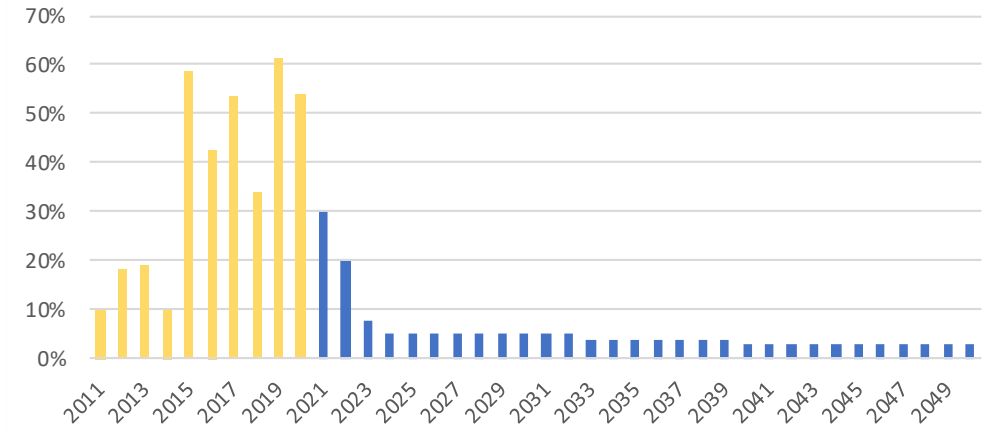
**Total Number of Solar Units  
For Dakota Electric  
High Forecast**



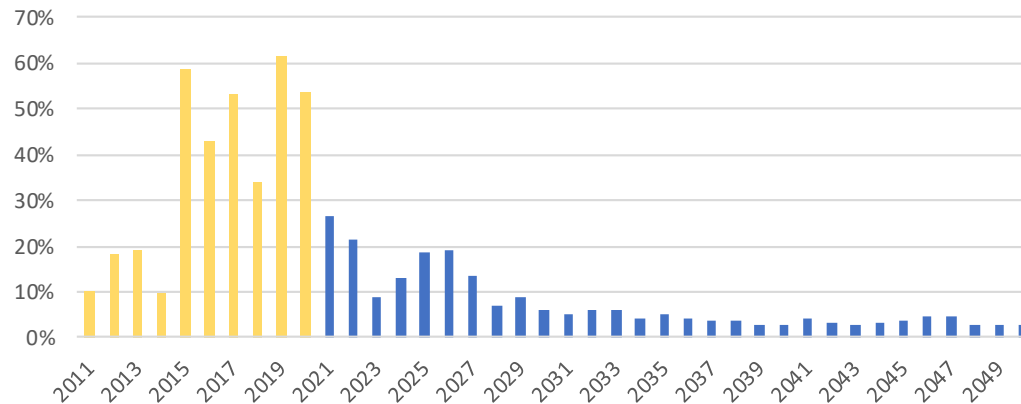
**EIA Solar Energy Growth Forecast  
for United States  
(Percent Growth Year over Year)**



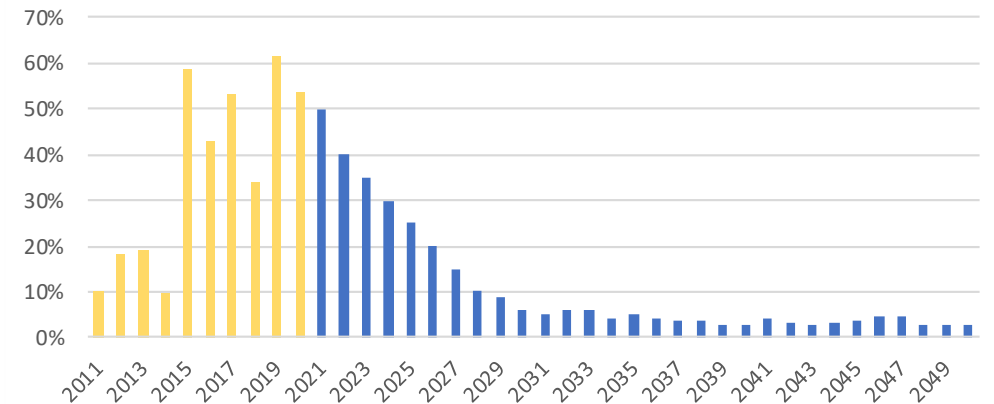
**Growth in Number of Solar Systems  
For Dakota Electric - Low Forecast  
(Percent Growth Year over Year)**



**Growth in Number of Solar Systems  
For Dakota Electric - Medium Forecast  
(Percent Growth Year over Year)**



**Growth in Number of Solar Systems  
For Dakota Electric - High Forecast  
(Percent Growth Year over Year)**



Questions?



# Distribution Capital Budget

Dakota Electric accounts for what was built not why it was built

- Using engineering estimate to move dollars into why it was built categories.

Dakota Electric's 5-year forecast is mostly extrapolation from historical spending

- Exceptions are Substation, Aging Related, Grid Modernization

System expansion and spending on new members is driven by actual load growth and actual needs.

- We wait to build the distribution system, until it is needed.
- Cities / county do not tell us about road moves ahead of time



# Distribution Capital Budget - Historical

- 2020 includes AGI spending (meters and load control devices)
- Age related \$ up due to >60 years old pole replacement projects

	2016	2017	2018	2019	2020
Age Related Replacement	\$150	\$105	\$0	\$316	\$126
System Expansion (Due to Capacity)	\$1	\$5	\$0	\$0	\$0
System Expansion (Due to Reliability)	\$0	\$0	\$0	\$0	\$0
New Members	\$1,458	\$1,344	\$1,301	\$1,982	\$1,419
System Project (Driven by Mandate)	\$246	\$121	\$890	\$164	\$149
Metering	\$0	\$0	\$0	\$0	\$0
Grid Modernization (Advanced Technologies)	\$0	\$0	\$0	\$0	\$0
<b>Annual Total</b>	<b>\$1,854</b>	<b>\$1,575</b>	<b>\$2,191</b>	<b>\$2,462</b>	<b>\$1,694</b>

Note: All dollars are in Thousands

# Key Capital Drivers

## Age Related

- Replacing poles > 60 years old

## Metering

- 2020-2022 replacing meters (AGi)

## Advanced Technologies

- 2020-2023 replacing Load Control Receivers

# Draft Capital Spending 5- year Forecast

- Currently developing 2022 capital budget
- Future years are estimated
- Board review – approval at the end of November

	2021	2022	2023	2024	2025
Age Related Replacement	\$2,854	\$2,981	\$2,982	\$2,963	\$2,960
System Expansion (Due to Capacity)	\$3,034	\$2,730	\$3,047	\$3,319	\$2,832
System Expansion (Due to Reliability)	\$1,209	\$1,396	\$1,397	\$1,388	\$1,387
New Members	\$3,659	\$4,173	\$4,491	\$4,463	\$4,458
System Project (Driven by Mandate)	\$1,828	\$1,820	\$1,821	\$1,809	\$1,807
Grid Modernization (Advanced Technologies)	\$4,117	\$3,926	\$3,826	\$220	\$220
Metering	\$10,762	\$487	\$2	\$2	\$2
Other	\$0	\$0	\$0	\$0	\$0
<b>Annual Total</b>	<b>\$27,462</b>	<b>\$17,513</b>	<b>\$17,566</b>	<b>\$14,166</b>	<b>\$13,666</b>

Note: All dollars are in Thousands

# Projects > \$2 Million

- Dodd Park Substation – Lakeville
  - Double end
  - Transformer / switchgear on order
  - Install transformer spring 2022
- Cedar Ave Substation – Lakeville
  - Purchased Land
  - Permitted with the City
  - 2022-2023 construction
- Proposed - Elko Substation
  - Waiting for load growth
  - 2024-2025?



# Aging Substation Equipment

- Several Substations
- Transformers > 40 years old
  - Expected life is 30-50 years
- Switchgear > 40 years old
  - Relaying technology – original digital units
  - Functionality is limited
  - Replacement parts not available
- Replacement costs
  - Estimated \$2 million per substation







# Substation Security

- Have experienced some substation security issues
  - Limited intrusion, but we were alarmed and responded
- Looking at methods to increase substation security
  - Additional methods to alarm upon intrusion
  - Updating other monitoring systems

Questions



# Dakota Electric's – Key Initiatives

- Finish the AGi project
  - Obtain all the benefits



- Support Municipal sustainability initiatives

- Member Initiatives

- Prairie Island Community – Net Zero project
- City of Burnsville DOE Grant – Solar / EV





# Key Initiatives - Continued

- Energy Storage – develop rates and options for members
- Continued participation in statewide stakeholder processes
- Electric Vehicles – continue developing options
  - Rates for Members in apartments
  - Support commercial charging
- Great River Energy – carbon reduction initiatives





# Reliability Initiatives

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- Continued replacing line where poles are > 60 years old
- Continued URD replacement program
- Aging substation equipment
  - Transformers
  - Switchgear
- Tree Trimming program
- Adding remote monitoring / control to line devices
- Continuing analysis of members with > 3 outages / year



Key Initiative  
Cyber Security

# Traditional Cyber Security

## Access Control

- Password Management

Anti-  
Virus/Malware

## Border Management

- Firewalls

Encryption

# Contemporary Enterprise Cyber Security (SecOPS)

## Architecture

- Start with Security (“Baked-In” rather than “Sprinkled On”)
- On-premise and Cloud-based infrastructures, others
- Vendor/Partner management

## Proactive - Identify vulnerabilities

- Assessments
- Penetration testing
- Training, humans are weak links

## Response Planning

- Actions to take WHEN an incident occurs

## Adaptive

- Keep pace with constant evolution of business ideas and technologies

# Countermeasure Evolution

## Traditional – Known Patterns

- Blocks & Barriers
- BOLO (Be On the Look Out for)

## AI – Monitors Behaviors

- Flag anomalies
- Detect lateral movements
- Take preventative action on its own

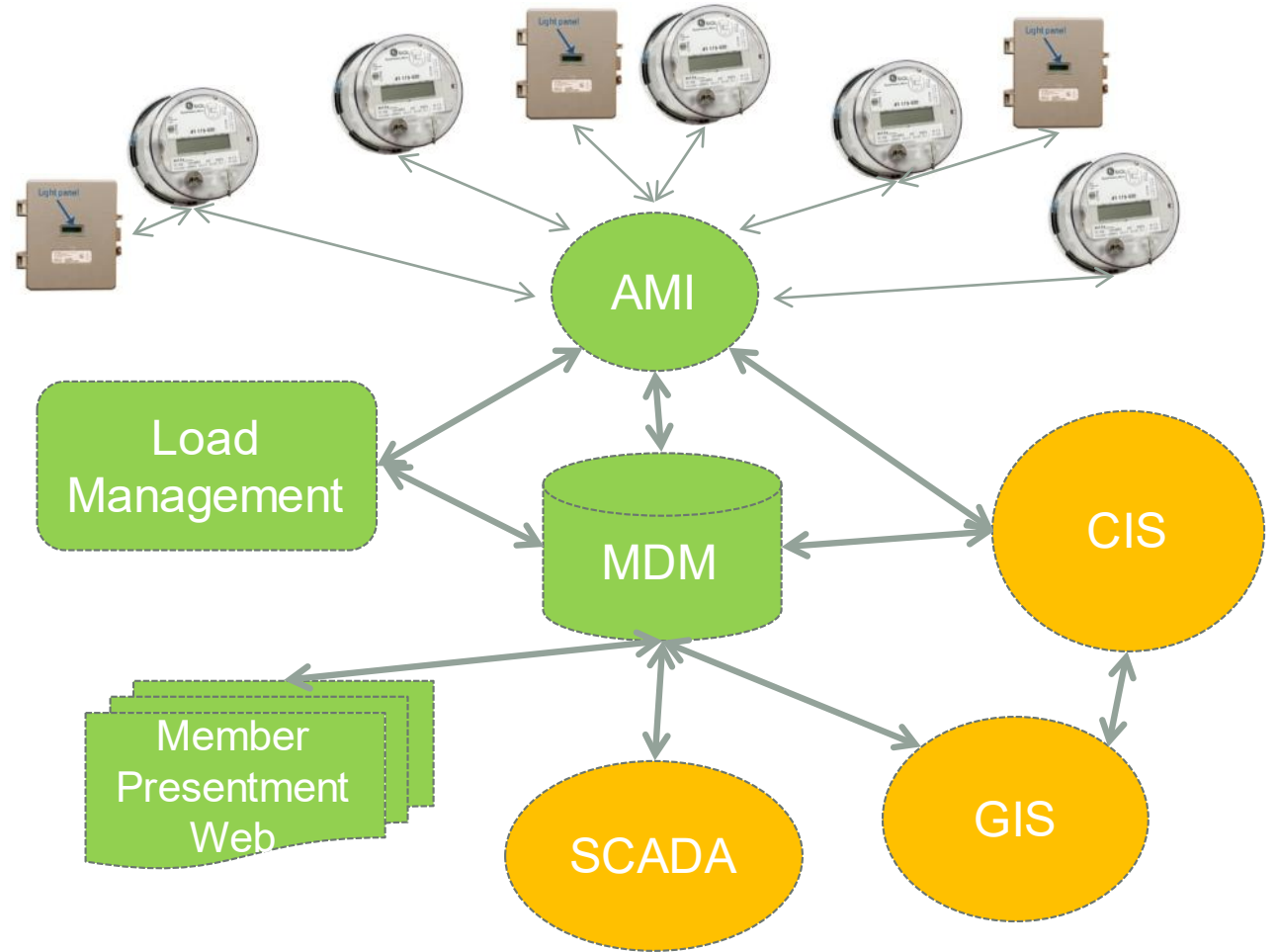
Questions





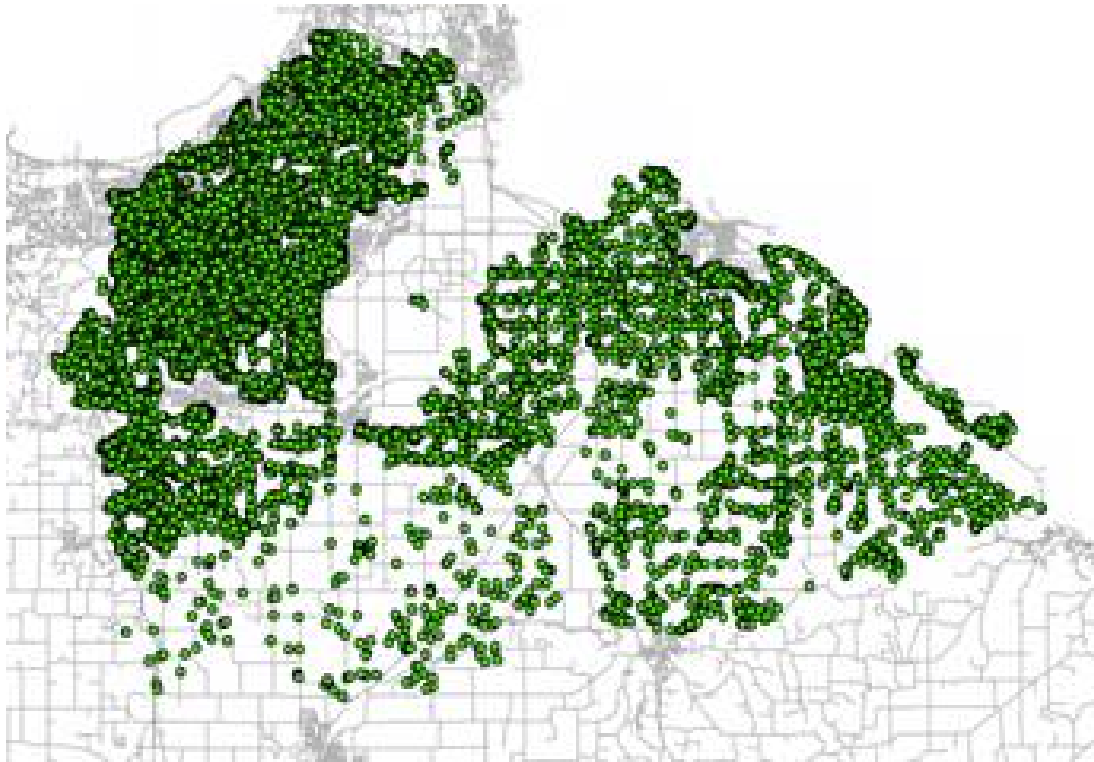
# AGi Project Update

- Member Benefits
  - Few estimated bills
  - Resolve high bill complaints
  - Identify power quality
  - Resolving metering issues
  - Identify power outages
- Operational Data
  - Usage by Class (ie EV's)
  - DER production

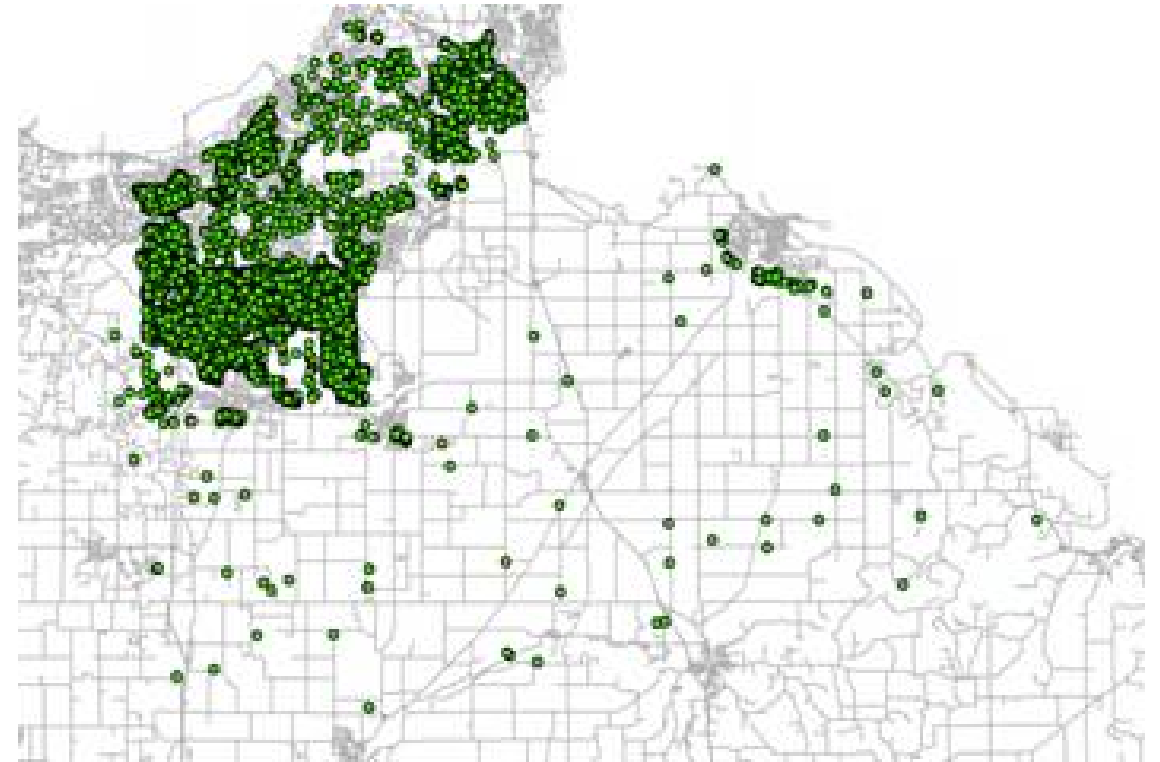




# AGi Deployment - Current Status

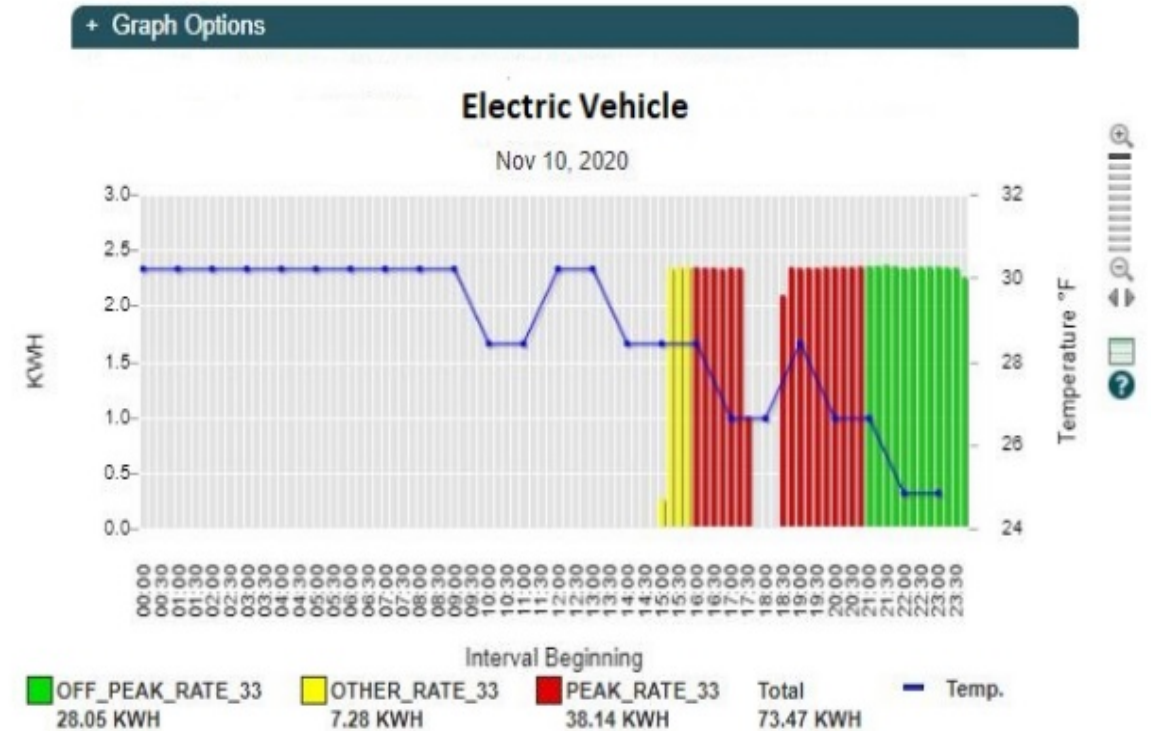
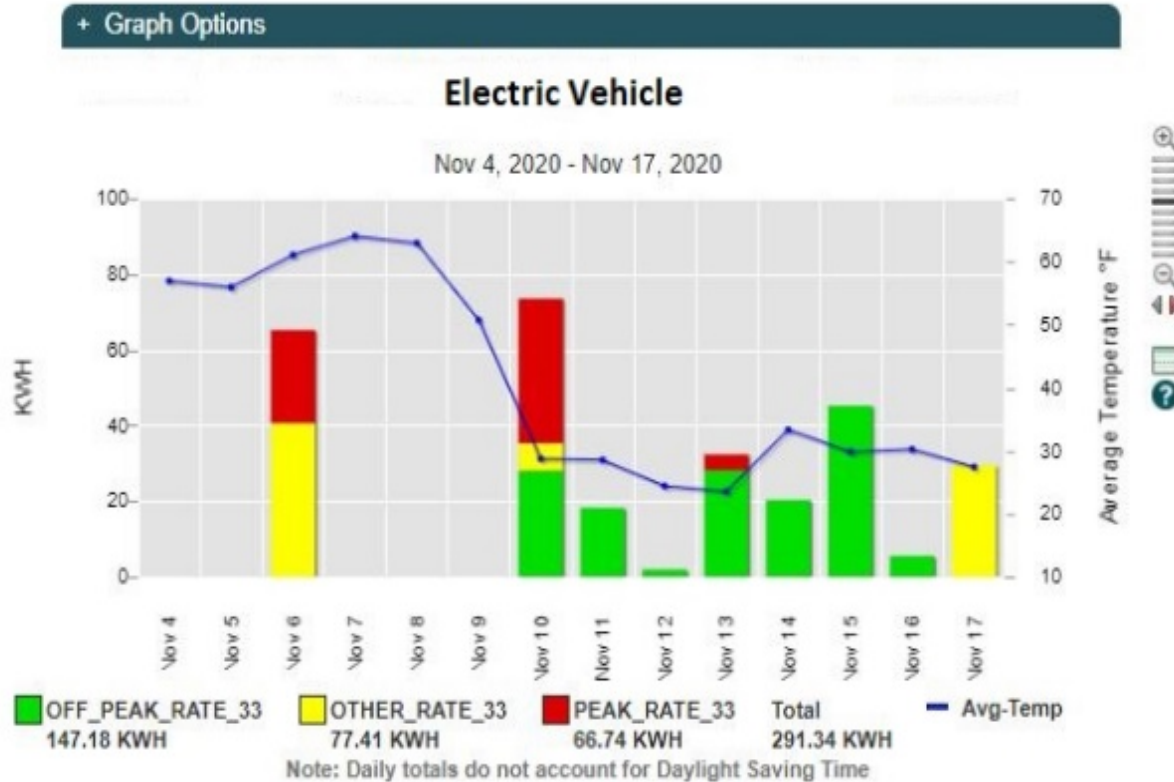


**Meters**



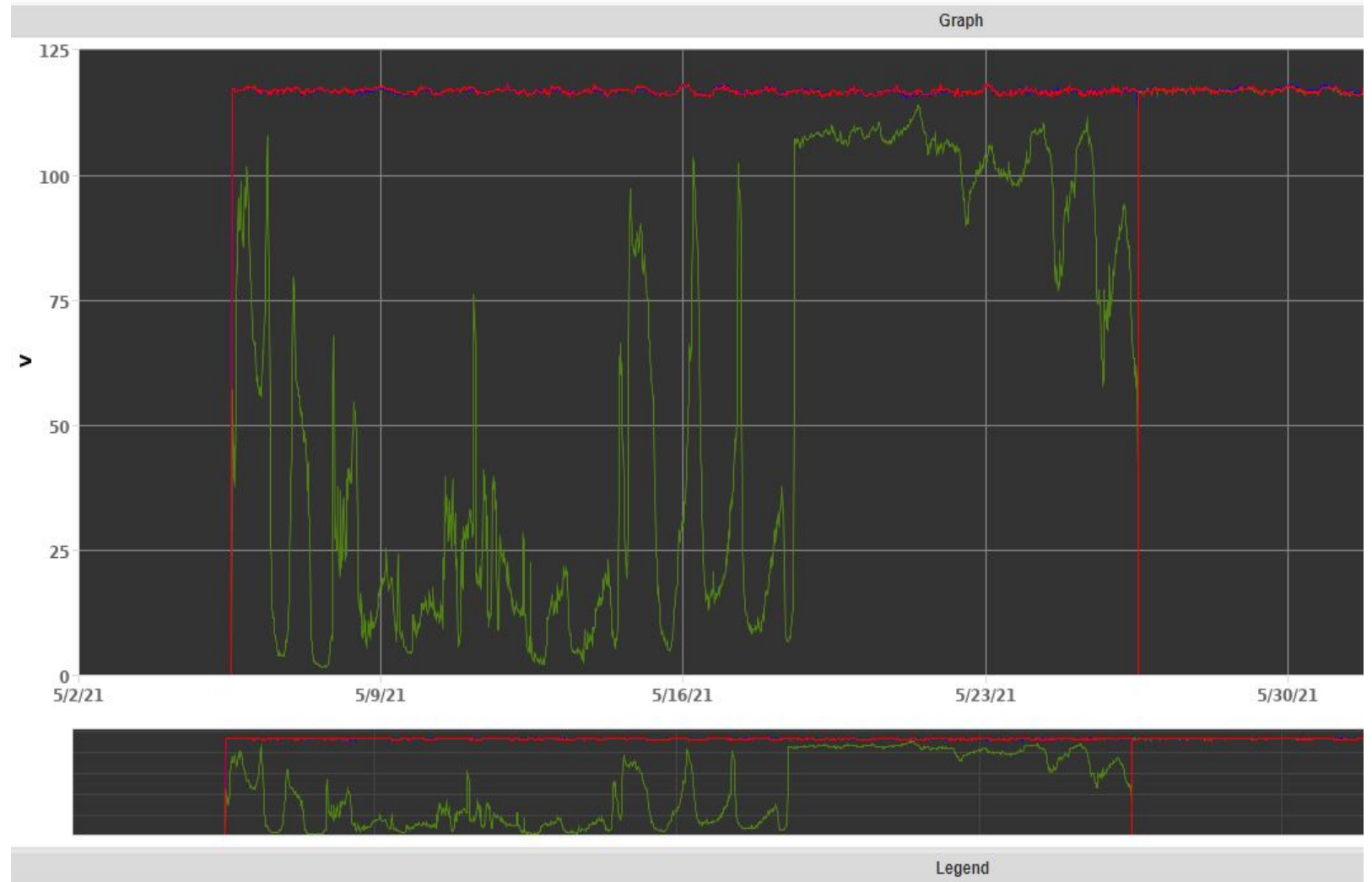
**Load Control Receivers**

# Electric Vehicles – TOU usage



# Metering Issues

- Loss of phase voltage to meter



# Safety – Issues found during meter exchange

- Saved an outage
- Possibly saved a fire!

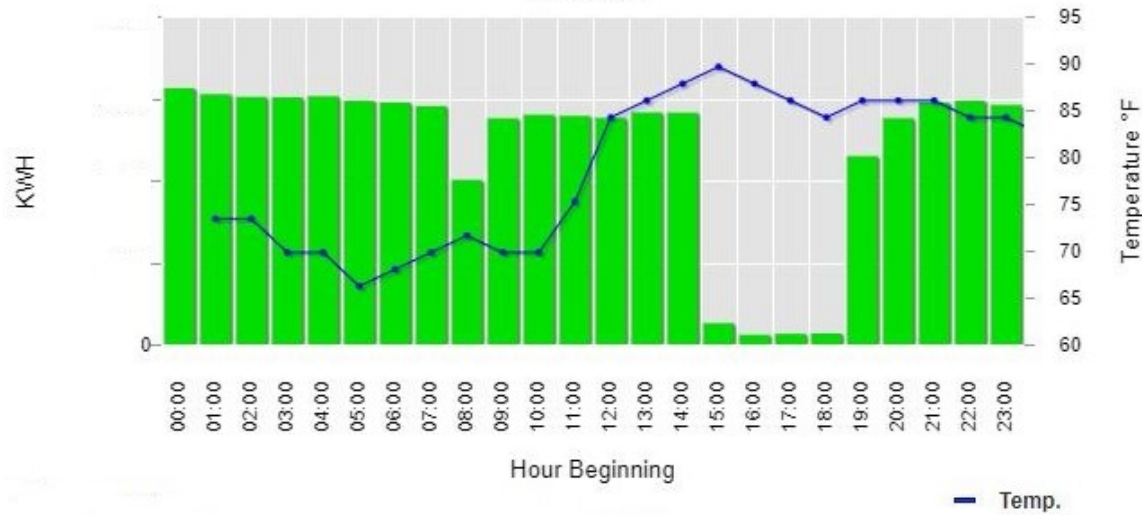




+ Graph Options

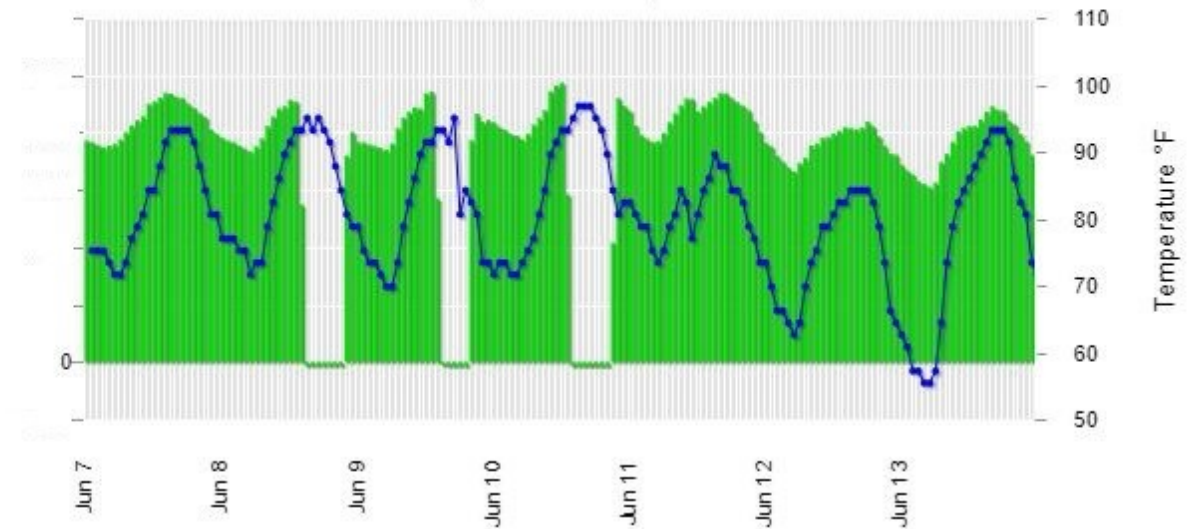
### Sum of kWh for Rate 37

Jul 28, 2021



+ Graph Options

Jun 7, 2021 - Jun 13, 2021



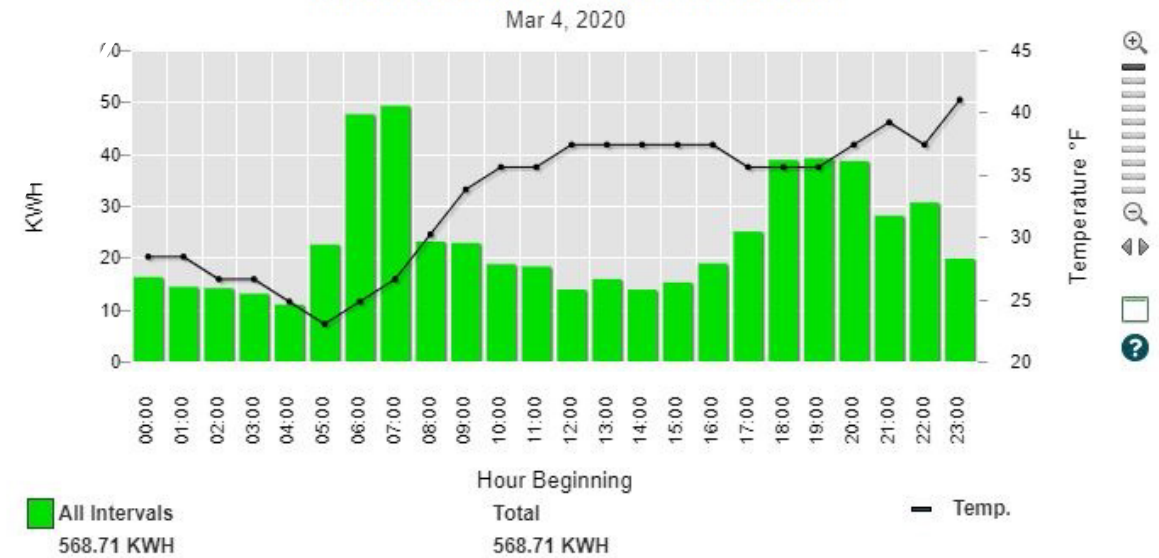
# Confirming Load Control Operation

# Power Outages

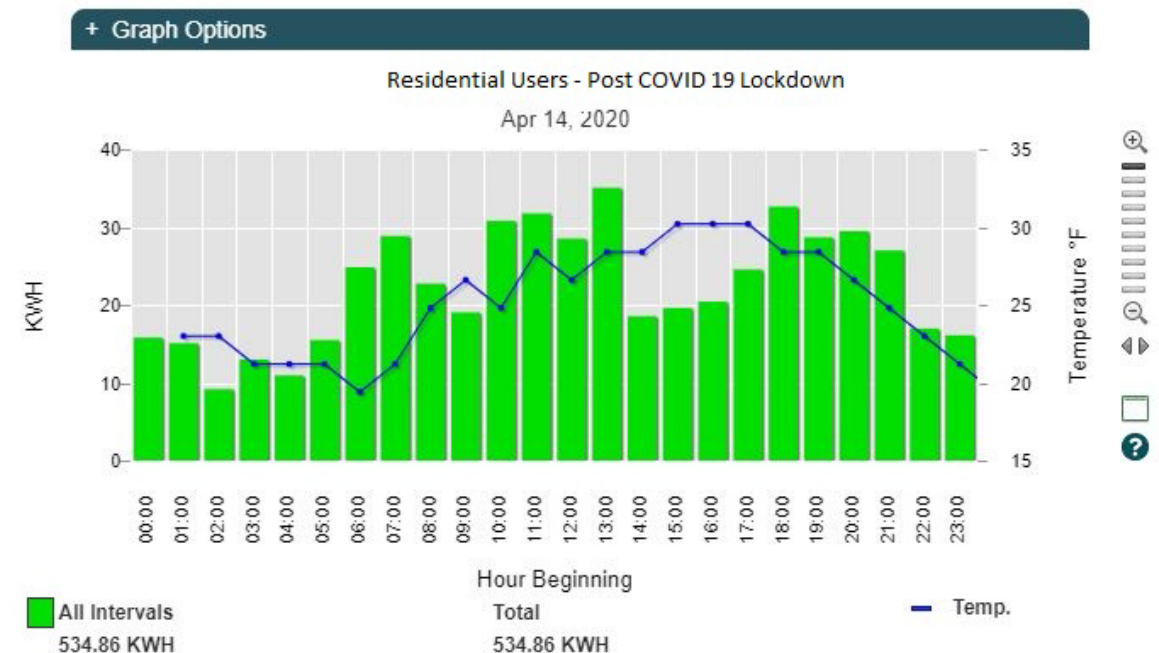


# Operational Data

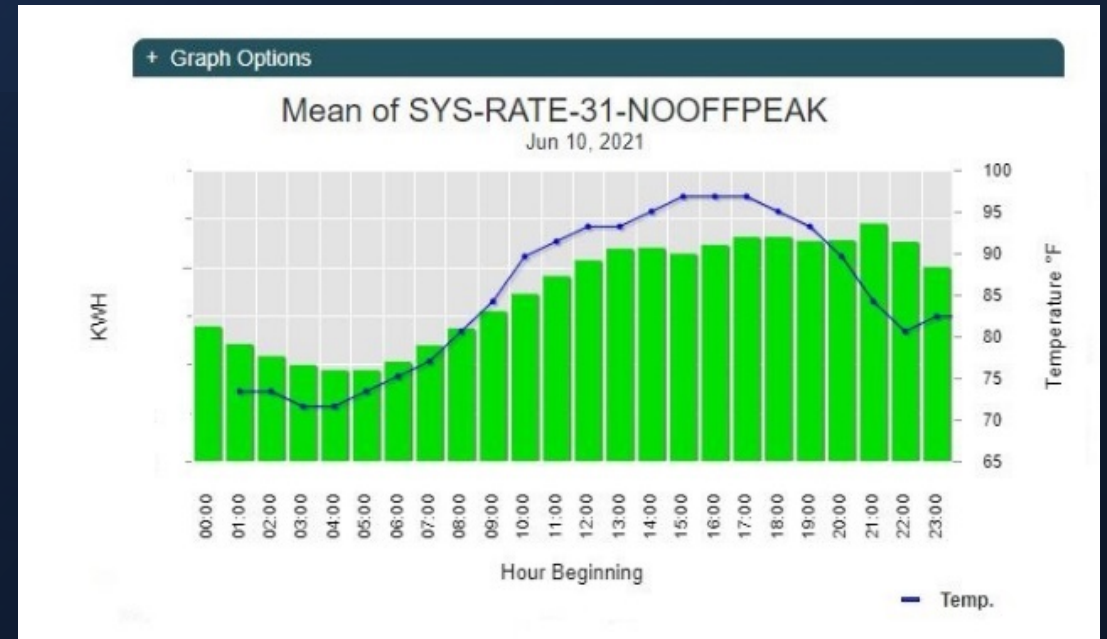
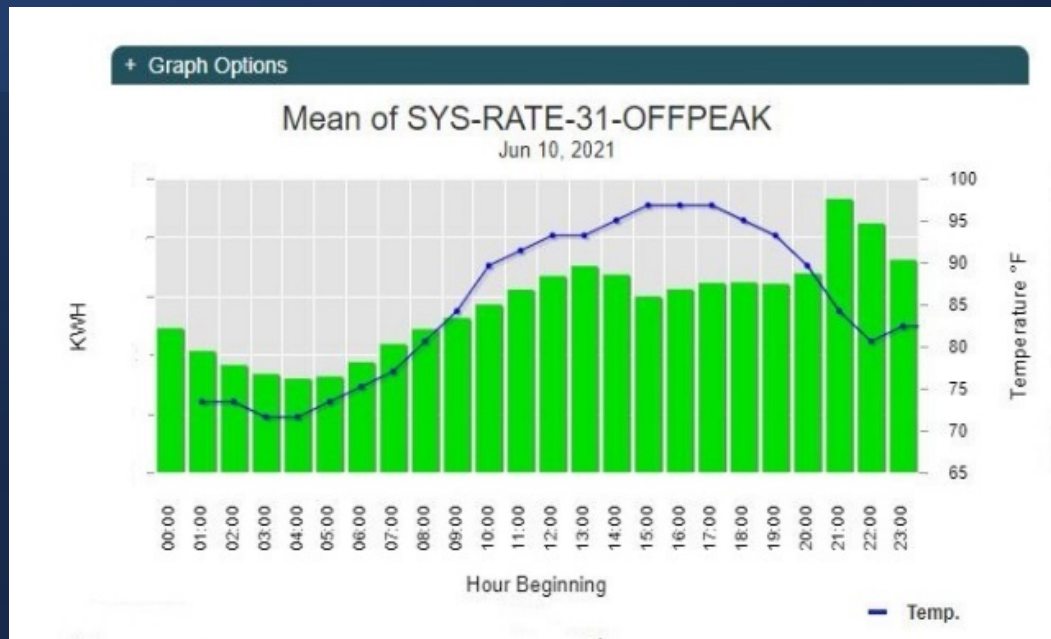
## Effect of Covid Stay at home order



Interval Bar Graph



# Able to compare classes of Members







Questions

# DER Integration

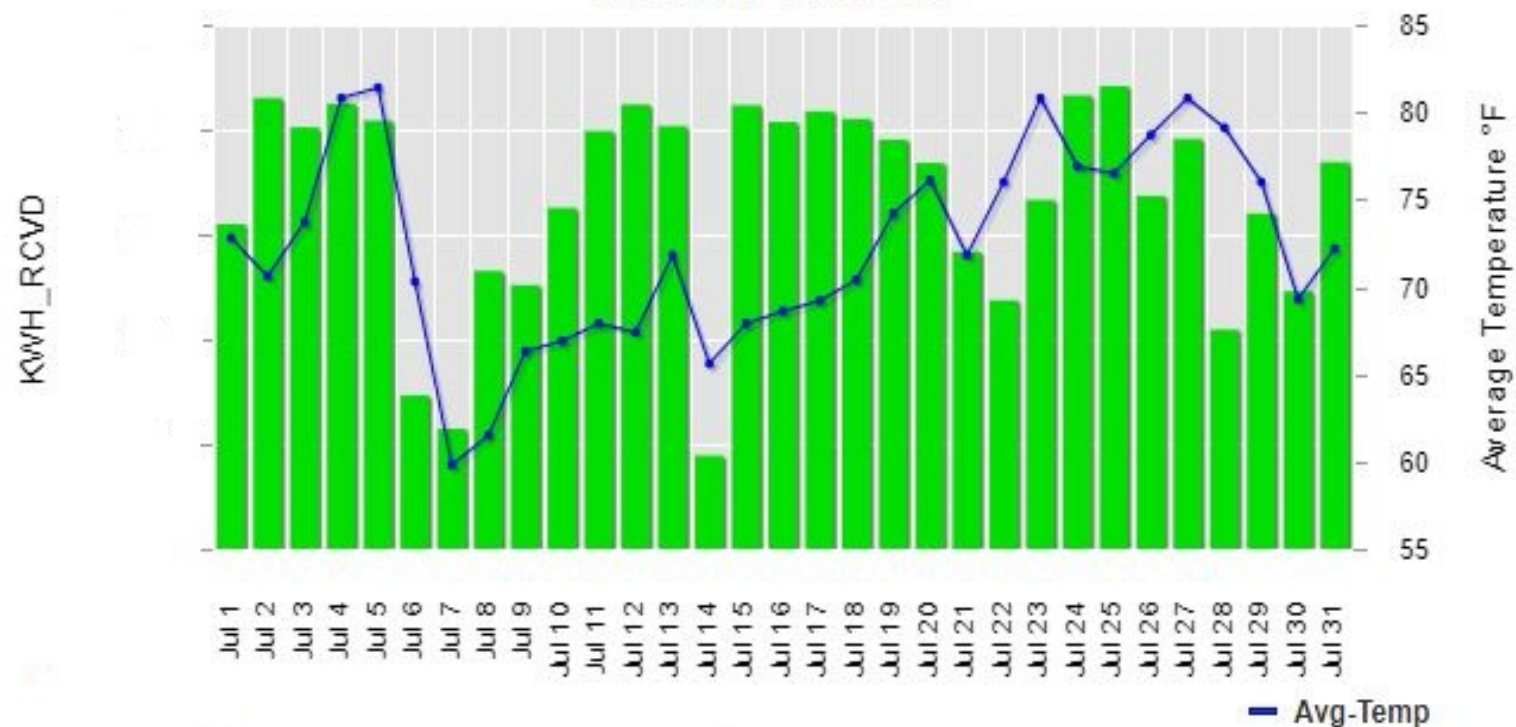


# DER Production Variable

+ Graph Options

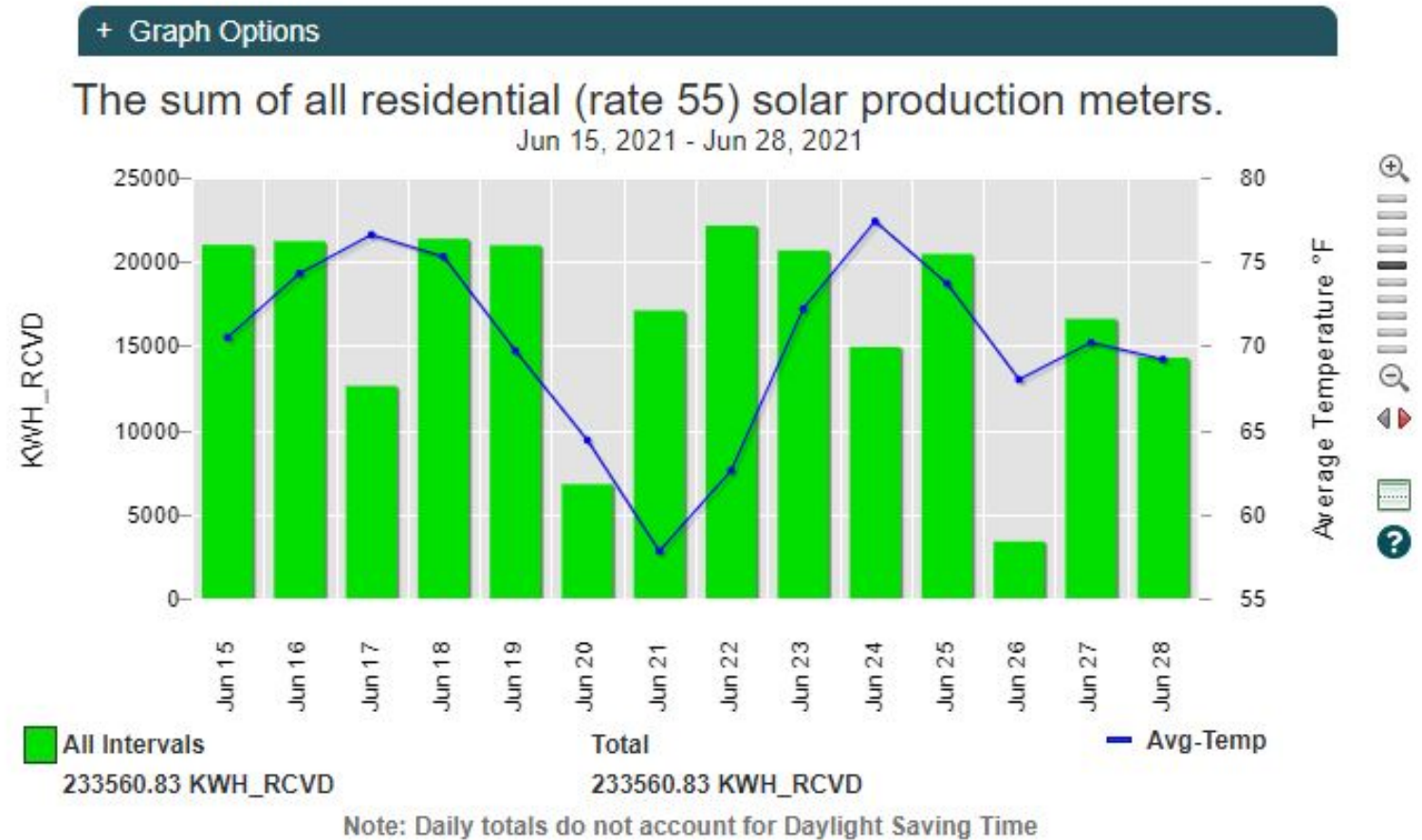
Sum of KWH\_RCVD for all Rate 55 solar. (Active - Production  
Meter, Channel 2)

Jul 1, 2021 - Jul 31, 2021



# Solar Output Variability – June 2021

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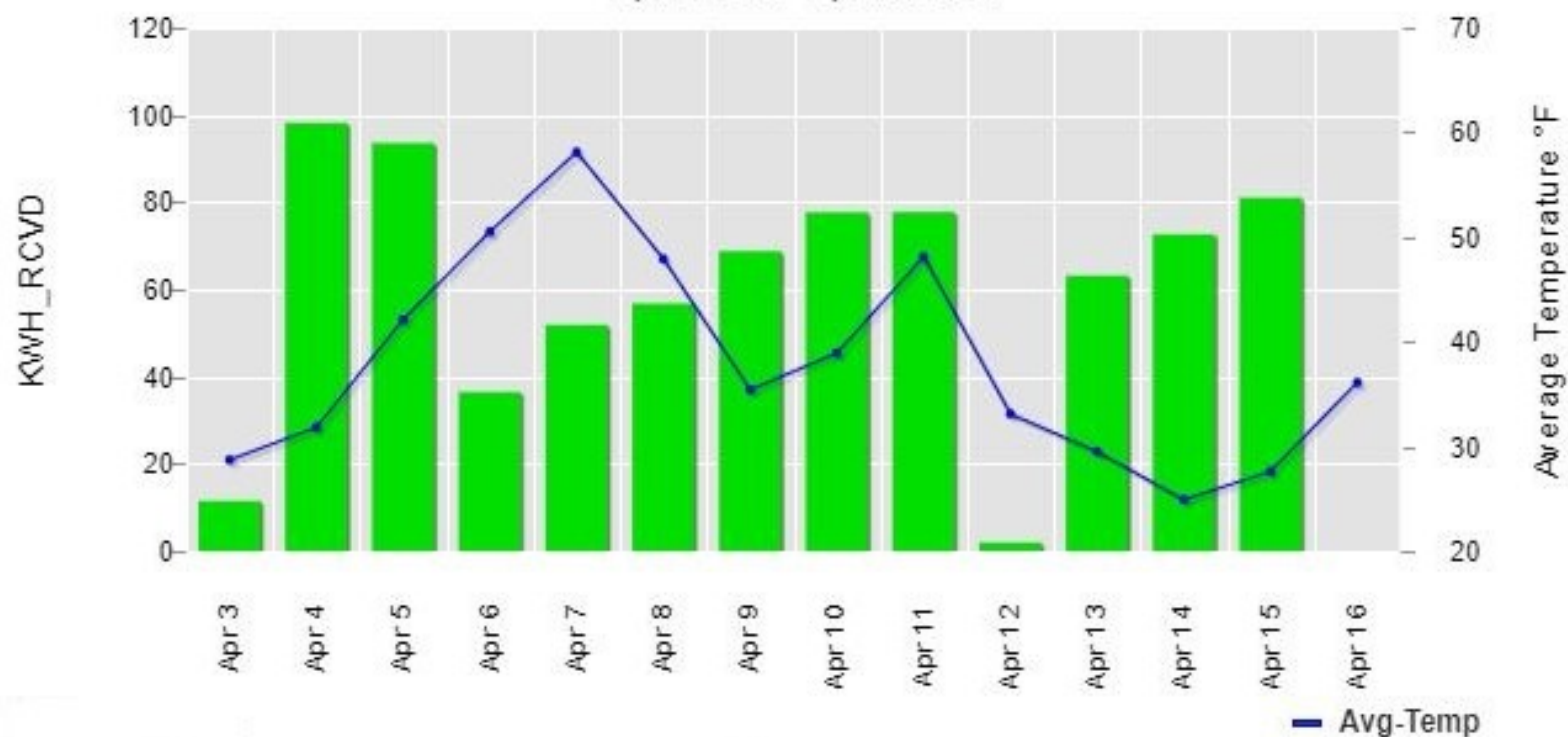


Loss of DER  
due to snow

+ Graph Options

### ENG-ALL Solar Meters

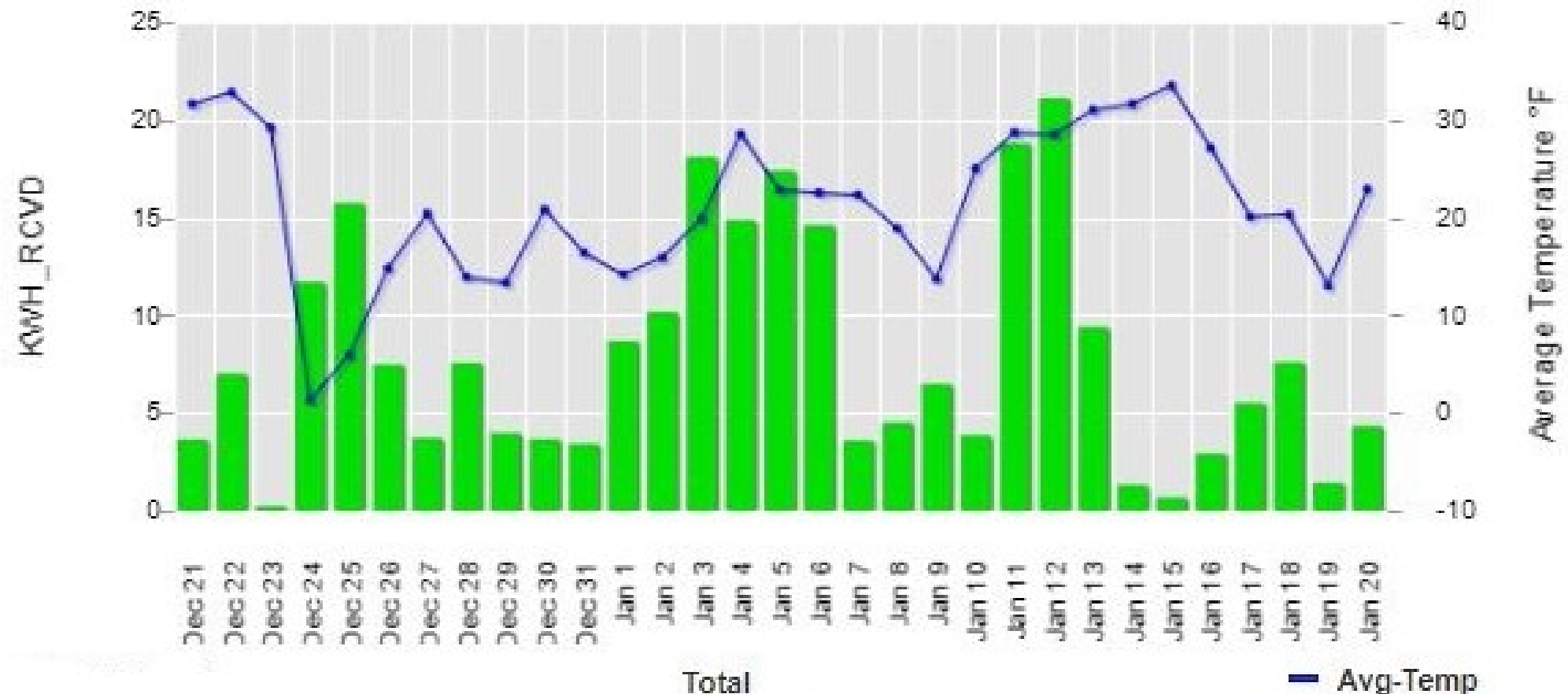
Apr 3, 2020 - Apr 16, 2020



## + Graph Options

Average solar production for all rate 55 and residential production meters.

Dec 21, 2020 - Jan 20, 2021

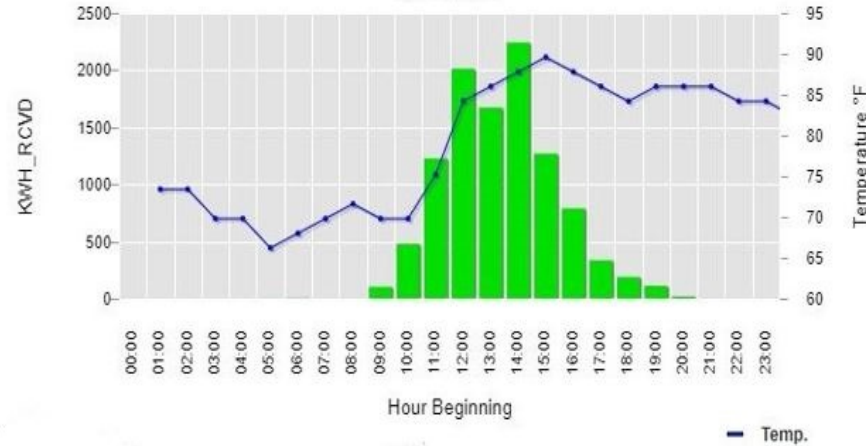


## Peak Day – Wednesday July 28th

+ Graph Options

Sum of KWH\_RCVD for all Rate 55 residential solar.

Jul 28, 2021



+ Graph Options

Sum of all meters under rate 31.

Jul 28, 2021

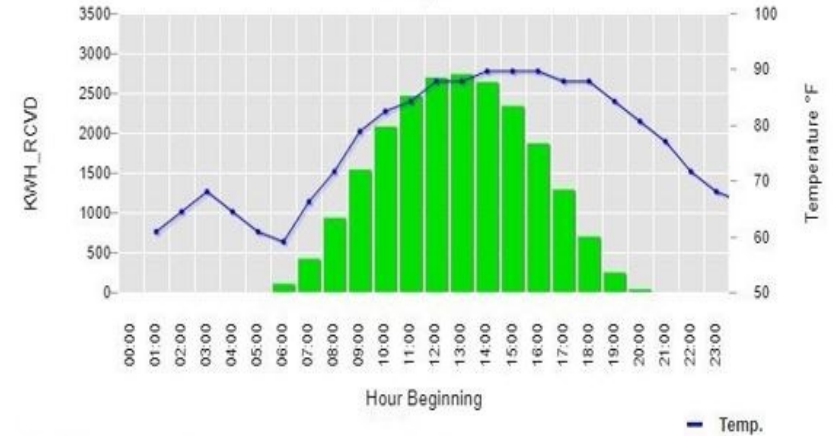


## Sunday July 25th

+ Graph Options

Sum of KWH\_RCVD for all Rate 55 residential solar.

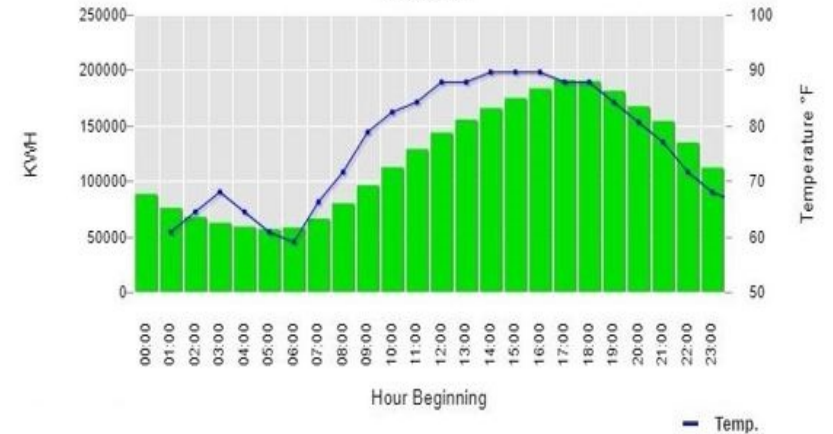
Jul 25, 2021



+ Graph Options

Sum of all meters under rate 31.

Jul 25, 2021



DER output  
does not align  
with peak  
demands

# Questions





# DER Integration Challenge

## Transmission Issues – Back feeding Issues



### Energy

Dakota Electric is a distribution only utility

How is energy accounted for which is sent into the transmission?



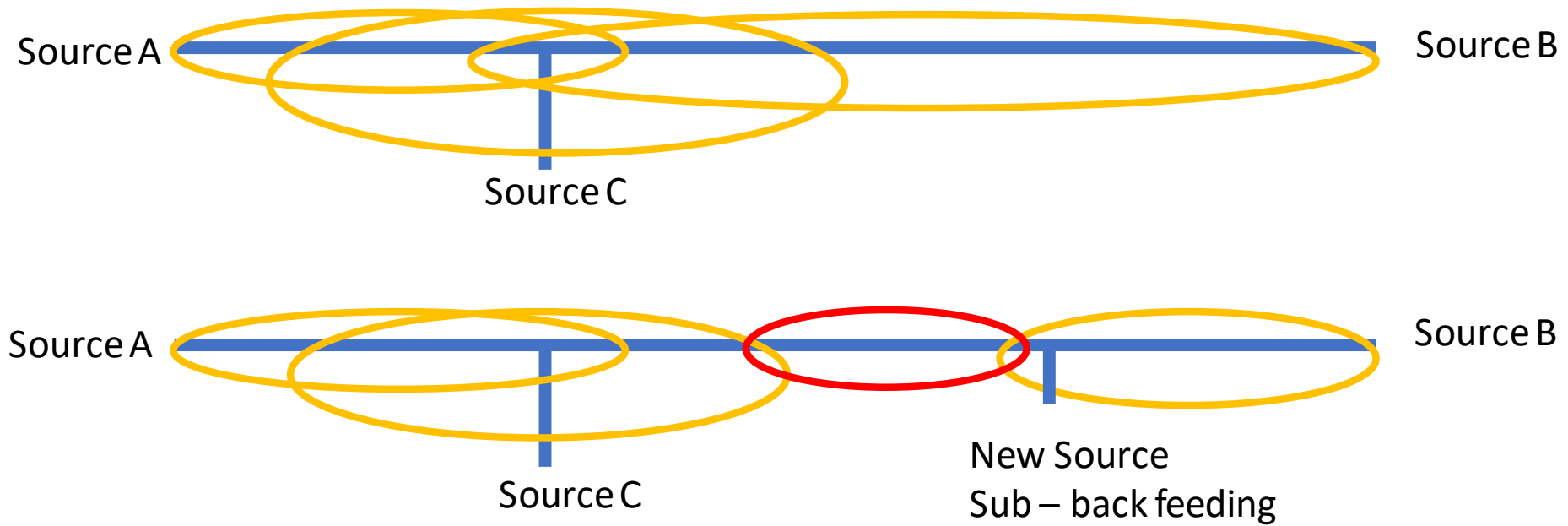
### Physical Limitations

Can the transmission safely support back feeding?

- Transmission lines with 3 sources -----  
NO BACK FEEDING ALLOWED!
- Back feeding can cause overloads to transmission lines in contingency -  
\$\$\$\$\$

# 3 – Terminal Transmission Lines

- Zones of Protection



# Causes of Back-Feeding

Adding more DER generation than minimum load

Reduction in minimum load

- Loss of minimum load due to energy efficiency (LEDs?)
- Loss of load due to businesses closing (Temporary - COVID)

Reconfiguration of distribution system

- When new substations / feeders added
- To improve reliability or operational constraints
- To support lower cost solar integration?

# Future Items for Back Feeding Transmission



## Energy

Need to develop accounting methods to receive credit / payment for energy flowing onto transmission lines?

Will there be a MISO charge for this energy using the transmission system?



## Physical

Three terminal Issue - Possible curtailment of DER or...

Looking into Utility Scale Battery Energy Storage

- Absorb excess energy
- Release that energy later in the day and evening
- Expensive and only handles the problem, until we run out of load to absorb the energy.

# Other Transmission Limitations

- Reduction in distribution load and back-feeding of transmission causes a change in how energy flows on the transmission
  - ❖ Local and regional effects
- Transmission studies
  - ❖ Does change in flow cause transmission overloading / constraints?
  - ❖ With a loss of transmission line, does DER back feeding cause overloads?
  - ❖ Cost to mitigate transmission issues is very expensive – can be in the millions



# Potential Substation Energy Storage

- Released RFI in July
  - Tax incentives unknown (coupled with solar)
- Released RFP in Aug / responses due Sept 21st
  - 1 MW / 4 MWhrs or 2 MWs / 8 MWhrs
- Initial Comments
  - Project appears too small for bidders
  - Vendors want to sell the system not lease
- Items Learned (so far)
  - Cost of disposal / removal is unknown for vendors
  - Risk of system not performing
  - Systems are one-off / future spare part issues
  - Batteries are in very short supply (1-2 years out!!)



Snohomish County PUD Installation  
(Picture provided for scale)

Questions?

