Southeastern Regional
TRANSMISSION PLANNING

2021 SERTP

SERTP - 1st Quarter Meeting

First RPSG Meeting & Interactive Training Session

March 18th, 2021

WebEx

Process Information

- The SERTP process is a transmission planning process.
- Please contact the respective transmission provider for questions related to real-time operations or Open Access Transmission Tariff (OATT) transmission service.
- SERTP Website Address:
  - www.southeasternrtp.com

Southeastern Regional TRANSMISSION PLANNING

2021 SERTP

Agenda

- **2021 SERTP Process Overview**
- **Form the "RPSG"**
  - Regional Planning Stakeholders Group
  - Committee Structure & Requirements
- **Economic Planning Studies**
  - Review Requested Sensitivities for 2021
  - RPSG to Select up to Five Economic Planning Studies
- **Interactive Training Session**
  - Energy Storage – Kentucky's Largest Battery
- **Miscellaneous**
  - Public Policy Requirement Stakeholder Requests
- **Next Meeting Activities**

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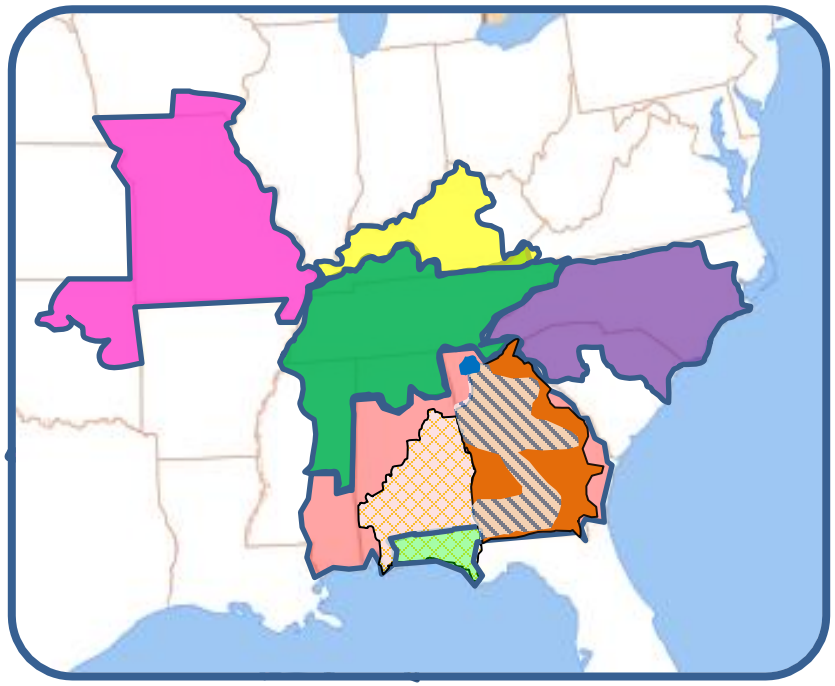
2021 SERTP Process Overview

Southeastern Regional Transmission Planning (SERTP)



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- Associated Electric Cooperative Inc.
- Dalton Utilities
- Duke Energy
- Georgia Transmission
- Gulf Power
- LG&E KU
- MEAG Power
- PowerSouth Energy Cooperative
- Southern Company
- TVA

Upcoming 2021 SERTP Process

- **SERTP 1st Quarter – *1st RPSG Meeting & Interactive Training Session***

  March 18th 2021

  – Form RPSG
  – Select Economic Planning Studies
  – Interactive Training Session

- **SERTP 2nd Quarter – *Preliminary Expansion Plan Meeting***

  June 2021

  – Review Modeling Assumptions
  – Preliminary 10 Year Expansion Plan
  – Stakeholder Input & Feedback Regarding the Plan

Upcoming 2021 SERTP Process

- **SERTP 3rd Quarter – *2nd RPSG Meeting***

  September 2021

  – Preliminary Results of the Economic Studies
  – Stakeholder Input & Feedback Regarding the Study Results
  – Discuss Previous Stakeholder Input on the Expansion Plan

- **SERTP 4th Quarter – *Annual Transmission Planning Summit & Input Assumptions***

  December 2021

  – Final Results of the Economic Studies
  – Regional Transmission Plan
  – Regional Analyses
  – Stakeholder Input on the 2022 Transmission Model Input Assumptions

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Regional Planning Stakeholder Group (RPSG)

The SERTP Stakeholder Group

- RPSG – Regional Planning Stakeholder Group
- Serves Two Primary Purposes
  1) The RPSG is charged with determining and proposing up to five (5) Economic Planning Studies on an annual basis
  2) The RPSG serves as stakeholder representatives for the eight (8) industry sectors in interactions with the SERTP Sponsors

RPSG Committee Structure

RPSG Sector Representation

1. Transmission Owners / Operators
2. Transmission Service Customers
3. Cooperative Utilities
4. Municipal Utilities
5. Power Marketers
6. Generation Owner / Developers
7. Independent System Operators (ISOs) / Regional Transmission Operators (RTOs)
8. Demand Side Management / Demand Side Response

RPSG Committee Structure

- Sector Representation Requirements
  - Maximum of two (2) representatives per sector
  - Maximum of sixteen (16) total sector members
  - A single company, and all of its affiliates, subsidiaries, and parent company, is limited to participating in a single sector

RPSG Committee Structure

- Annual Reformation
  - Reformed annually at 1st Quarter Meeting
  - Sector members elected for a term of approximately one year
  - Term ends at start of following year's 1st Quarter SERTP Meeting
  - Sector Members shall be elected by the Stakeholders present at the 1st Quarter Meeting
  - Sector Members may serve consecutive, one-year terms if elected
  - No limit on the number of terms that a Sector Member may serve

RPSG Committee Structure

- Simple Majority Voting
  - RPSG decision-making that will be recognized by the Transmission Provider for purposes of Attachment K shall be those authorized by a simple majority vote by then-current Sector Members
  - Voting by written proxy is allowed

RPSG Formation

- 2020 SERTP RPSG Sector Members

- 2021 SERTP RPSG Sector Members

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Economic Planning Studies

SERTP Regional Models

- SERTP will develop 6 coordinated regional models
- Models include latest transmission planning model information within the SERTP region
- Typically 3 versions created annually
- Available on the Secure Area of the SERTP website upon satisfying access requirements

No.	Season	Year
1	Summer	2023
2		2026
3		2031
4	Shoulder	2026
5	Winter	2026
6		2031

Economic Planning Study Process

- **RSPG selects the Economic Studies in the 1st Quarter Meeting**
- **SERTP Sponsors identify the transmission requirements needed to move large amounts of power above and beyond existing long-term, firm transmission service commitments**
  - Analysis is consistent with NERC standards and company-specific planning criteria
- **These studies represent analyses of <u>hypothetical</u> scenarios requested by the stakeholders and do not represent an actual transmission need or commitment to build**
- **Completed Economic Study Request Reports are Posted on the SERTP WebSite in the General Documents section of the Reference Library Tab**
- **Scoping Meeting typically held in April/May**

RPSG Selected List of Economic Study Requests

- 2020 Economic Planning Studies
- 2021 Economic Planning Studies

Kentucky's Largest Battery

Aron Patrick, Manager,
Justin Bencomo, Senior Research Engineer
Technology Research and Analysis

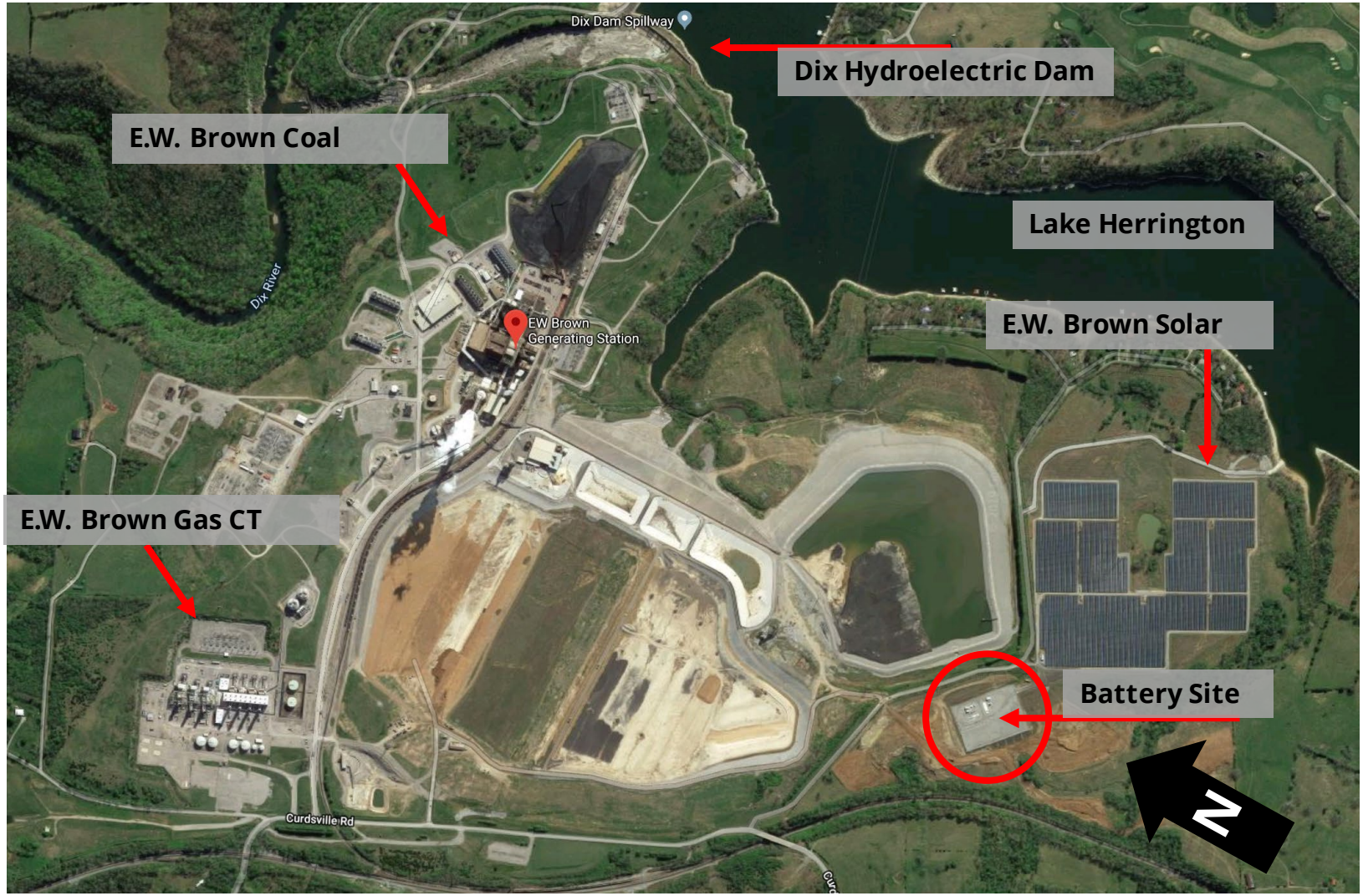
LG&E KU
PPL companies

Tour of the Battery

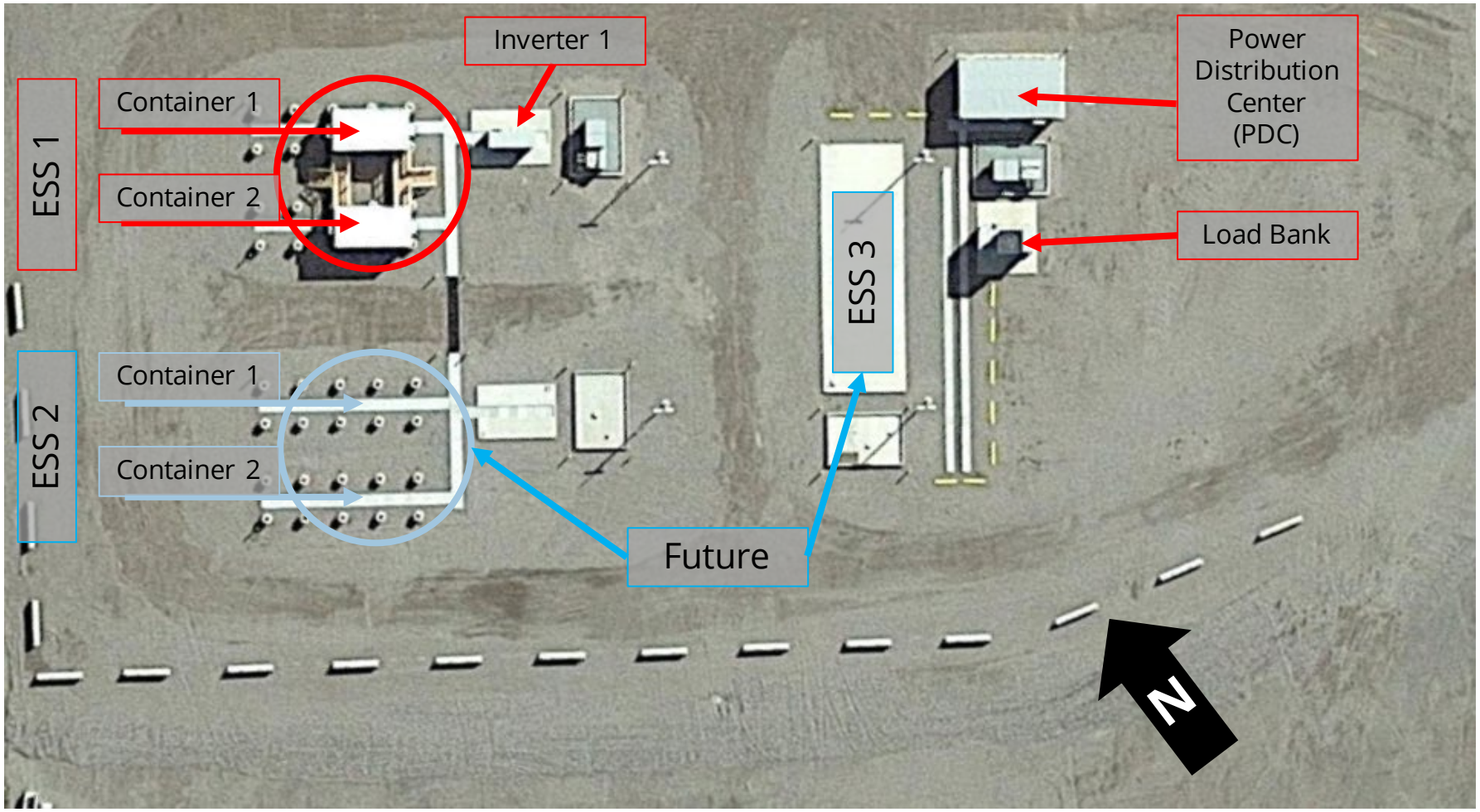
Overview

LG&E and KU Energy operates Kentucky's first and largest utility-scale energy storage system—a 1-megawatt, 2-megawatt-hour lithium-ion battery. The battery is co-located with E.W. Brown Solar, allowing the company to explore how batteries can improve the inherent intermittency of solar power.

Map of Energy Storage System at E. W. Brown

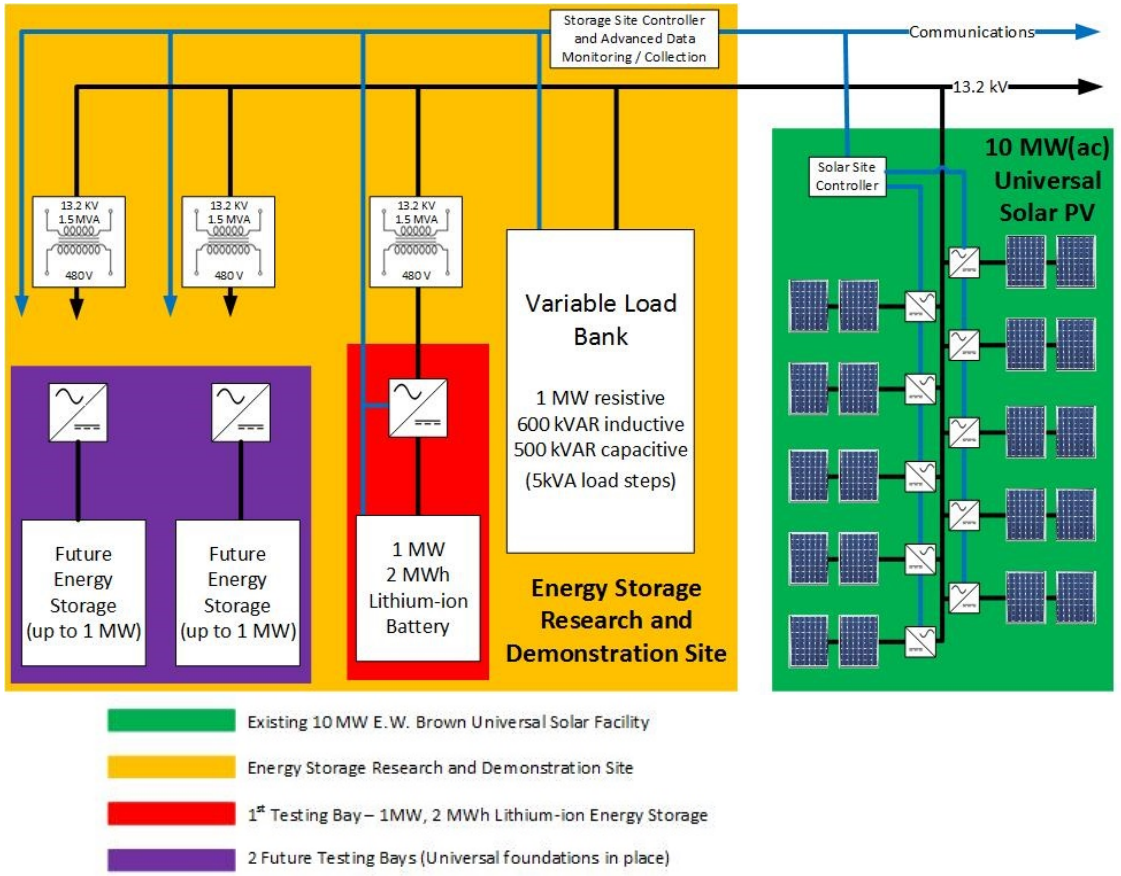


Location of Battery Containers at ESS Site



Site Features

- Three testing bays
- Modular construction
- 1.2 MVA resistive, inductive, capacitive (RLC) load bank
- Grid-connected or islanded
- High accuracy metering and data logging
- User-facility-style site
- Operational: Dec. 2016



3D Walkthrough

https://my.matterport.com/show/?m=J38KueiFfFk

Open Rack of Battery Modules inside Container 1

4,760 Cells

14 Cells per Module

17 Modules per Rack

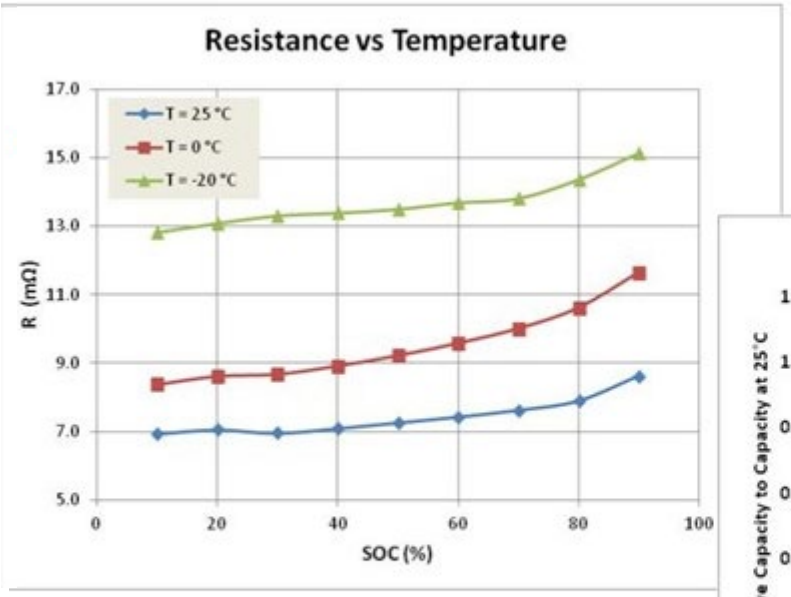
10 Racks per Container

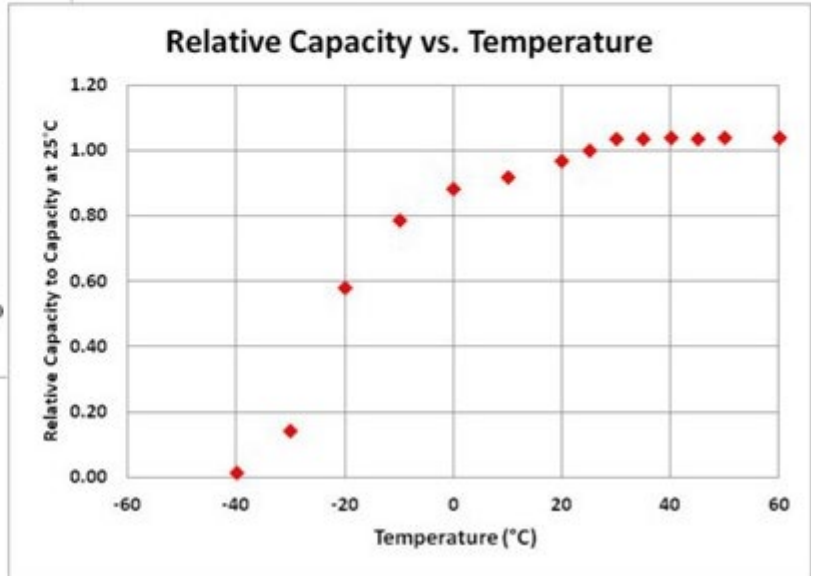
2 Containers

Battery Thermals

Batteries lose capacity at lower temps.

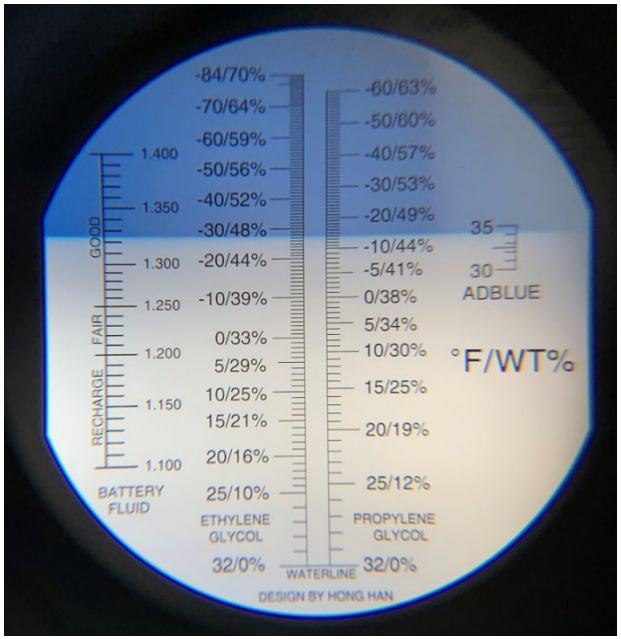
Exposure to temperatures below 65° F degrade battery performance and reduce available capacity. At 32° F, if not heated by HVAC, a battery would lose ~20% of capacity. At -30° F, the battery would have no available capacity at all.



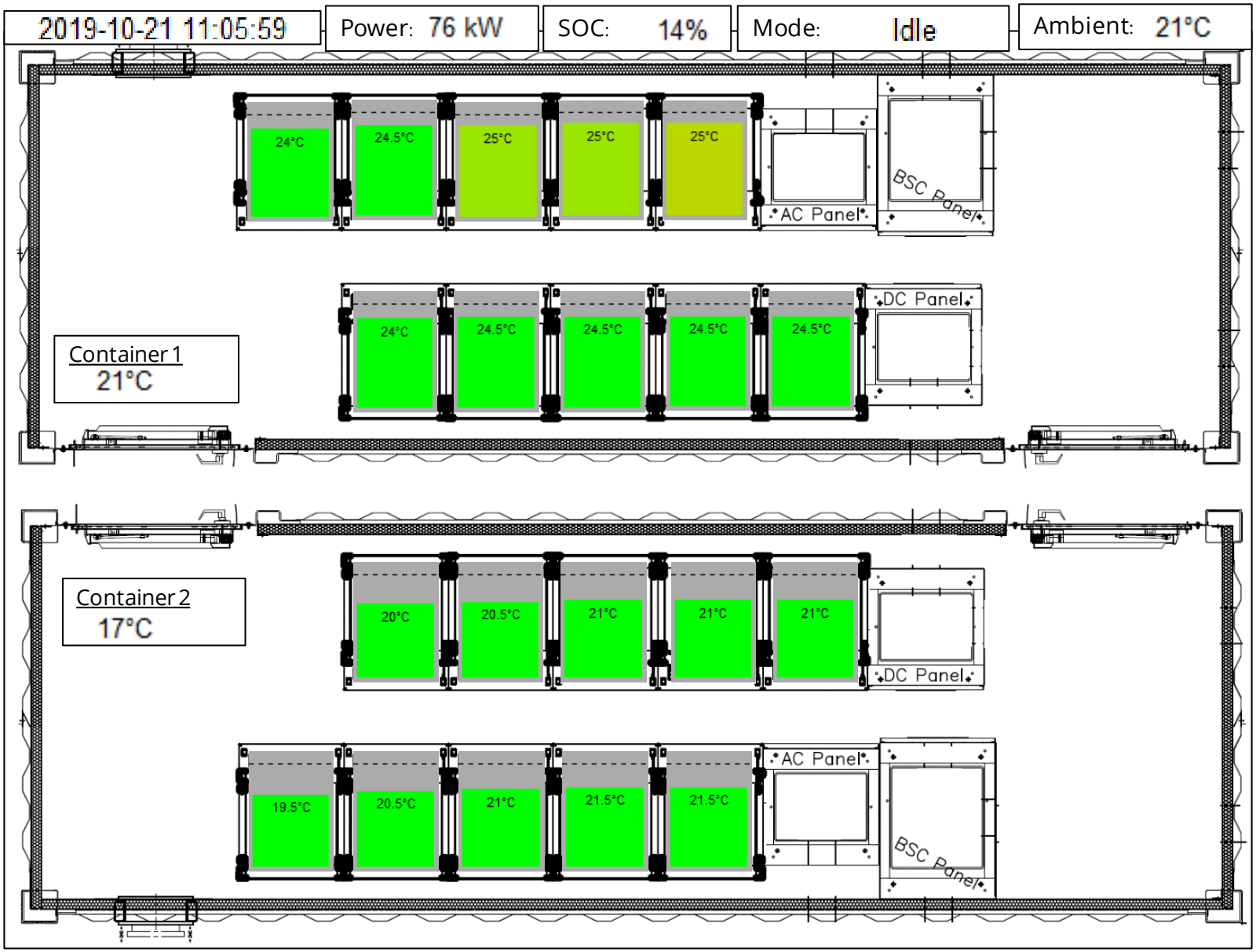


Winterizing the Inverter

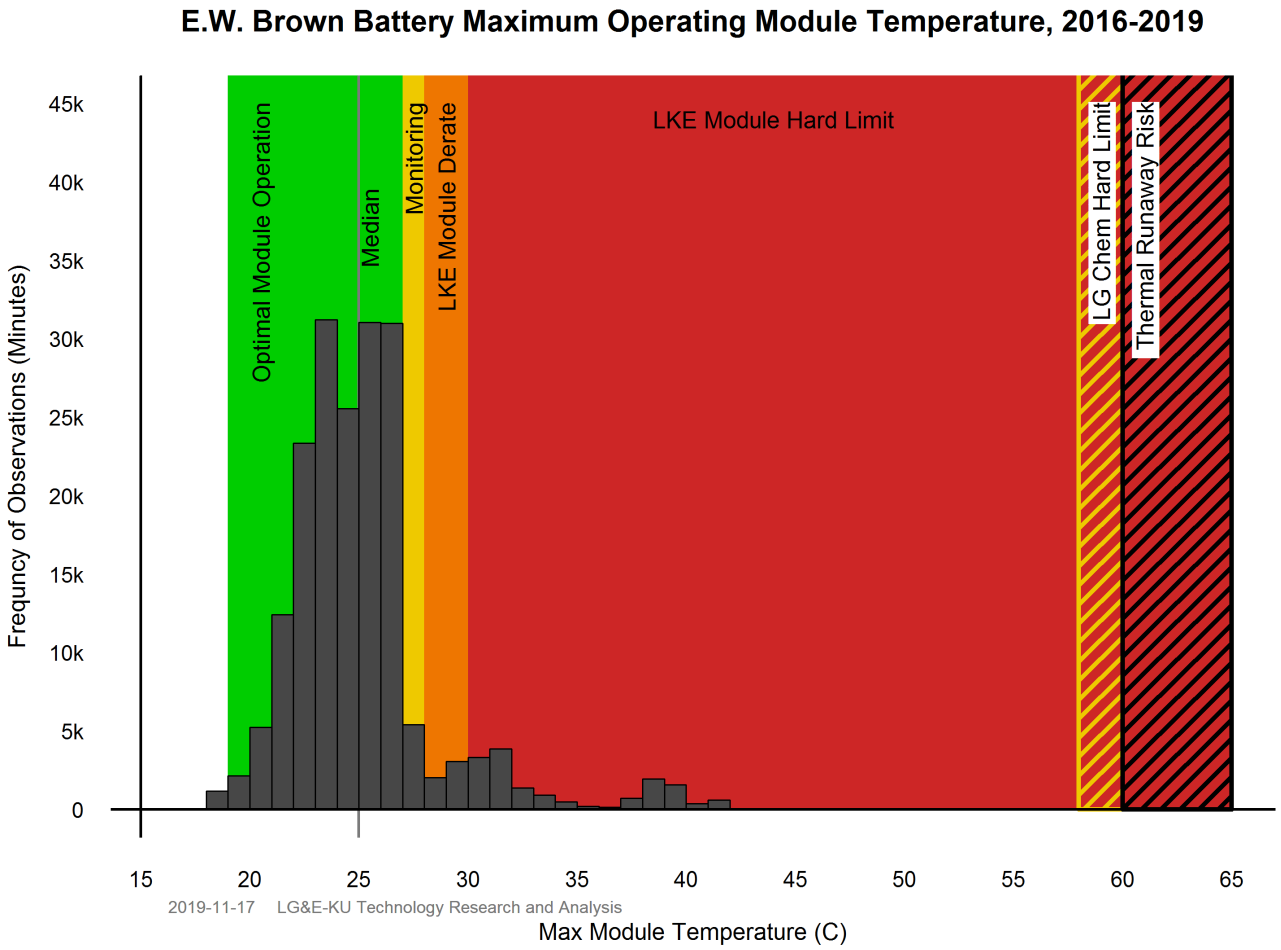
- Refractometer to measure the concentration of propylene glycol in inverter
- Concentration of glycol at 46% was sufficient to withstand temperatures as low as -14°F (-25°C)



Heat is also a problem.



Self-Imposed Temperature Limits

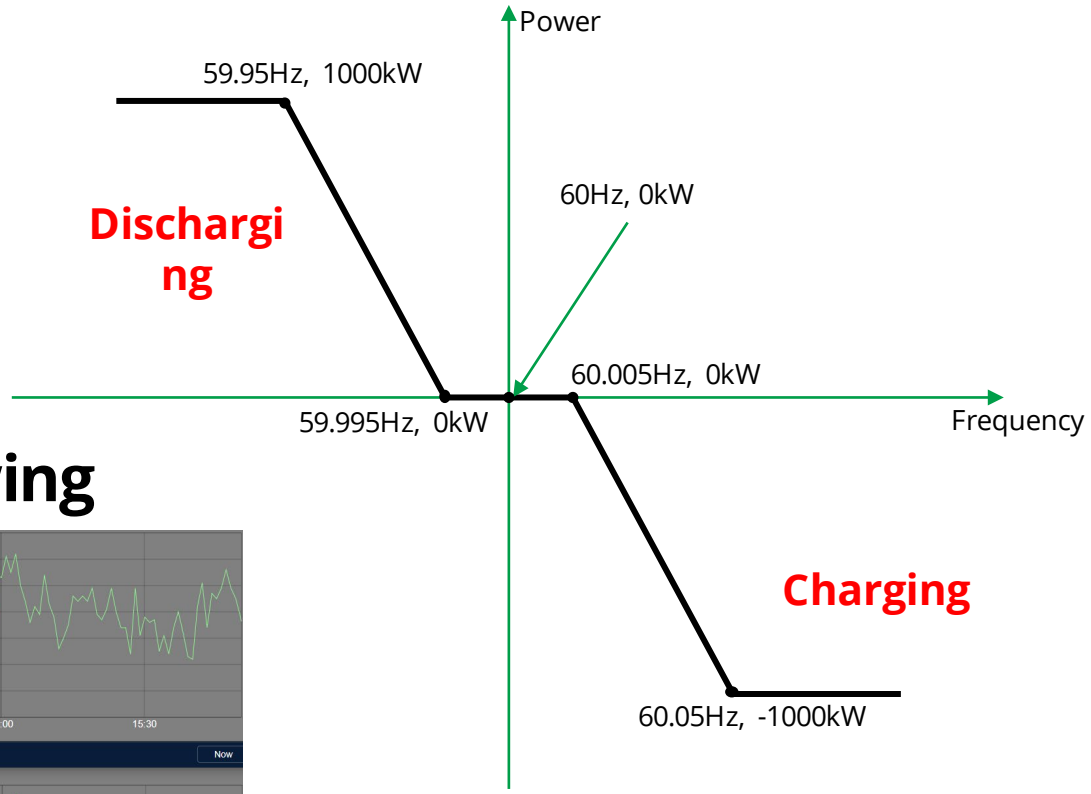


- At LG&E-KU safety is our #1 priority.
- We have set stricter limits than the manufacturer LG Chem.
- At 28°C we derate the system to 50%.
- At 30°C we will shutdown operation.
- These limits allow for the safer operation while maintain consistent functionality.

Operational Modes

We operate the battery in several modes.

- Target SOC
- Power Smoothing
- Auto Volt-Var
- Auto Frequency Watt
- Load/Generation Following



Battery Safety

Batteries Pose Risk of Fire and Explosion

Safety Perimeter with Signage and Gate

Emergency Stops

- Installation of emergency power shut off switches, locking mushroom panic 86 buttons, in battery control room, E.W. Brown coal unit control room, and battery parking lot.

FM200 Fire Suppression System

- 10 seconds or less to discharge
- Extinguishing gas that eliminates free radicals
- Clean agent leaves no residue, eliminating the need for cleanup
- The FM200 System must be inspected at least semiannually based on the 29 CFR 1910.160(b) 6 and 7.

Li-ion Tamer for Off-gas Detection

- Nexceris Inc. installed their Li-Ion Tamer off-gas detection system in both battery containers.

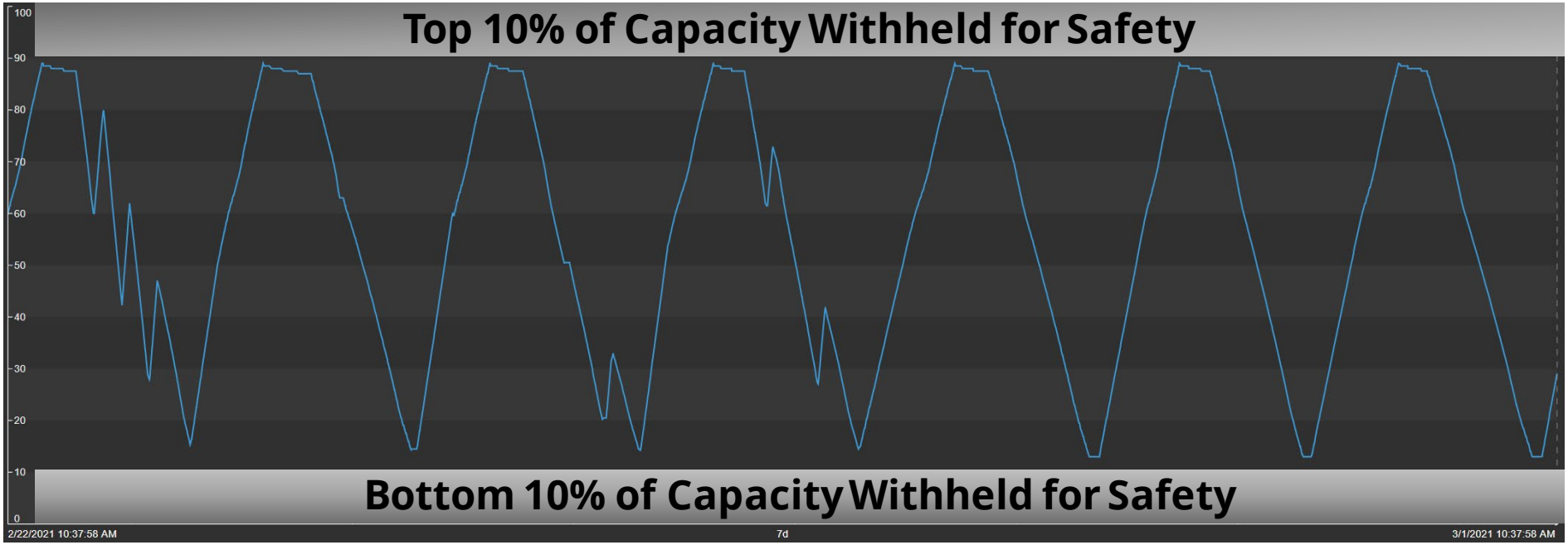
Security Cameras

- Use of site cameras for site personnel safety monitoring.

Notification and Automation

- Air horns and strobes
- Remote notification for alarms and operating conditions and faults
- Automatic shutdown for container door opening

State of Charge Limits



3rd Party Safety Audit

- Audit completed by LG Chem, Warner ESS, and Benson Fire
- Scope:
  - Documentation Review
  - Site Review
  - BESS Safety System Design Review
  - Emergency Response Review
  - On-site First Responder Training

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Public Policy Requirements Stakeholder Proposal

SERTP Evaluation

Transmission Needs Driven by Public Policy Requirements (PPRs)

- **The SERTP process did not receive any proposals for transmission needs driven by Public Policy Requirements for the 2021 planning cycle. Therefore, no transmission needs have been identified for further evaluation of potential transmission solutions in the 2021 SERTP planning cycle.**

Next Meeting Activities

- **2021 SERTP 2nd Quarter Meeting**
  - **Date: June 2021**
  - **Purpose:**
    - Review Modeling Assumptions
    - Discuss Preliminary 10 Year Expansion Plan
    - Stakeholder Input & Feedback Regarding the Plan

2021 SERTP

Questions?

www.southeasternrtp.com