

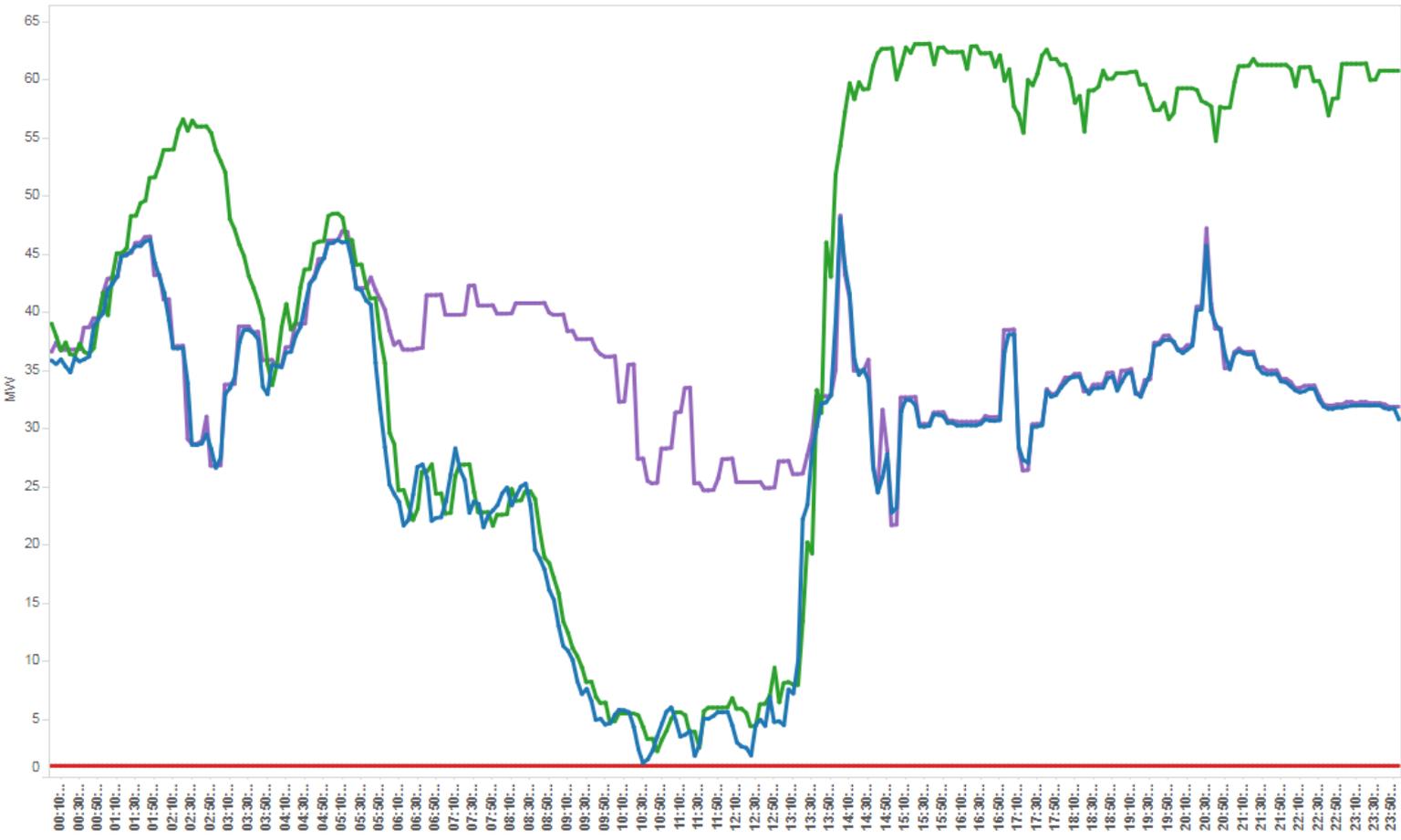


# SCREENING OF POTENTIAL SHEI SOLUTION STEPS

**UPDATE** 4-24-2019

# An Illustration of SHEI Congestion (recent view from KCW)

5 Minute Unit Operation Tracking



DDP Tracking Error >1 MW

Date	Asset	Unit Name
4/3/2019	35979	KINGDOM COMMUNITY WIND

Measure Names  
■ Actual MW    ■ Economic Min    ■ Economic Max    ■ DNE

On this day, SHEI congestion was apparent when purple line (KCW's DNE limit, or max allowed output) was lower than KCW's potential output (green line) >> in early AM, and from early afternoon to midnight  
 Note the strong variance across the day, and even within hours. Depth & shape of congestion comes in many daily "shapes/sizes."  
 Congestion yields two types of cost to VT customers: reduced generation in SHEI, and LMP congestion on actual generation.

# Screening of Potential Solutions: Overview

- ▶ First goal: cost-effectively address existing SHEI congestion
  - ▶ Benefit to Vermont customers
  - ▶ Foundation to understand expansion options
- ▶ Key lens: would a few moderately sized solution steps be sufficient?
  - ▶ Or would major infrastructure (e.g., new bulk lines) be required?
- ▶ Approach: test effectiveness at addressing actual conditions since ISO's DNE framework began
  - ▶ June 2016 through December 2018 (~2.5 years)
  - ▶ Two limits (voltage and thermal)
  - ▶ During All Lines In ("ALI") conditions and outage conditions
  - ▶ Key tool: Northern VT Export Study ("NVES") by VELCO/EIG
  - ▶ Using 5-minute interval data
  - ▶ Two types of benefits to GMP/VDU customers
    - ▶ Maximize KCW generation
    - ▶ Limit congestion costs (reduced LMP revenue) for generation in SHEI area

# Draft Screening Results Suggest:

- ▶ Existing congestion could largely be addressed with a limited package of solution steps
  - ▶ Sheldon Springs AVR; B-20 and B-22; Sheffield AVR
  - ▶ Could largely mitigate SHEI congestion during ALI
  - ▶ Could substantially reduce SHEI congestion during outage conditions
- ▶ Strong cost-effectiveness for VT customers
  - ▶ Estimated simple payback periods of 2 to 5 years
  - ▶ #s will be refined, but not likely to change high-level indications
- ▶ Positive interactions with other solutions
  - ▶ These solutions increase SHEI voltage & thermal limits
  - ▶ B-20/22 is needed for potential increases to thermal ratings of VELCO K-42 line (or future upgrade) to increase SHEI limit

- ▶ Complete screening of battery storage, load growth/shifting
  - ▶ Could one of these displace one of the solution steps? Supplement them?
    - ▶ Note: bulk system location entails higher interconnection capital cost vs. distributed systems
- ▶ B-20/22 upgrade
  - ▶ Refine B-20 project design and cost estimates
  - ▶ Engaging Morrisville/VPPSA on the B-22 portion
  - ▶ Develop project plan, prepare CPG petition
  - ▶ Reach understanding with VELCO/ISO on protocols needed to ensure that B20/22 upgrade would be reflected in the SHEI limit structure
- ▶ Confirm viability of Sheffield AVR project, explore implementation with plant owner
- ▶ Extend benefit estimates to include impacts on other VDUs
  - ▶ And develop a proposed cost sharing method

- ▶ Finding, implementing steps to mitigate congestion: ongoing
- ▶ Other potential solution steps
  - ▶ Battery storage
  - ▶ Load building/shifting
- ▶ Cost allocation TBD, pending clarity on ultimate solution steps
  - ▶ And refined estimation of project costs, DU-specific benefits, etc.
  - ▶ Principle discussed by VDUs: beneficiaries of solutions pay
- ▶ This evaluation only addresses existing levels of SHEI congestion
  - ▶ Not “headroom” for potential future generation in the area
  - ▶ But provides foundation for assessing future mitigation steps