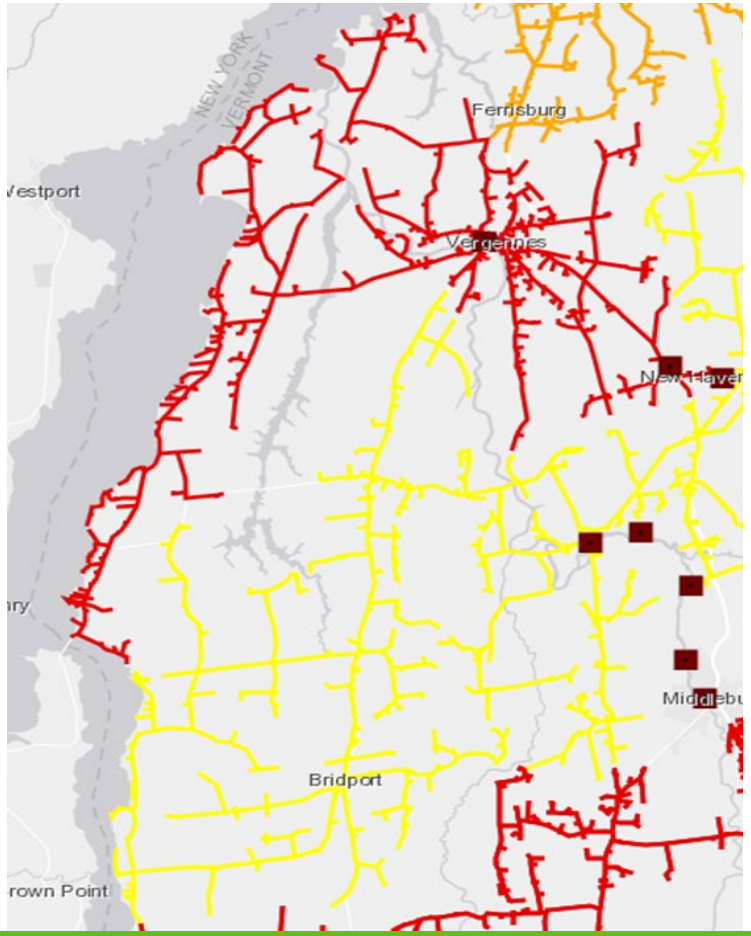
VSPC Generation Constraint Subcommittee May‘19

Green Mountain Power

Vergennes Generation Constrained Area



Agenda

- Vergennes Substation/Circuits Overview
- Available Generation Capacity
- Data
  - Load Duration Curve
  - Raw SCADA data @ Vergennes Bus (total all circuits)
  - Annual Daily Minimums and Maximums Per Month
  - High Solar Day Example (May 13, 2018)
- Energy Control
- Planning and Problem Solving
- Next Steps

Vergennes Substation/Circuits Overview

- One (1) 14 MVA Distribution Substation Transformer
- Three (3) Distribution Circuit Feeders (9G2,9G3 and 9G4)
- Feeds over 2,500 customers in Vergennes, Panton, Ferrisburg, Addison, Monkton, New Haven, Starksboro and Waltham
- Peak 10,352 MW (May 2018-May 2019)
- Largest Backfeed 8,415 MW (May 2018-May 2019)
- Data Available
  - Customers -AMI account usage data
  - Feeder data - SCADA
  - Solar data - AMI meters/MV90 meters

Vergennes Substation/Circuits Overview

Active/Proposed Solar

	Application Status	Project Count	Capacity (kW)
9G2	Active	57	7894.79
9G3	Active	1	150
9G4	Active	161	7600.79
total	Active	219	15645.58
9G2	Proposed	2	57.5
9G4	Proposed	6	43.25
total	Proposed	8	100.75

Vergennes Substation/Circuits Overview

DER BY SIZE ON VERGENNES SUBSTATION:

Project	AC Capacity (kW)	Project Count
Powerwall	55	7
SMALL <= 15	1197.45	188
MEDIUM > 15, <= 150	1256.13	12
LARGE > 150, <= 500	3990	8
CID 3252	2200	1
CID 6563	1047	1
CID 13491	4900	1
CID 28203	1000	1

Available Generation Capacity
What are we looking at?

Available Generation Capacity is calculated as:

Capacity Remaining =
Max transformer rating – Active & Proposed DG
14,000 kVA – 15,746 kW [1] = -1,746 kW

What is Active & Proposed DG?

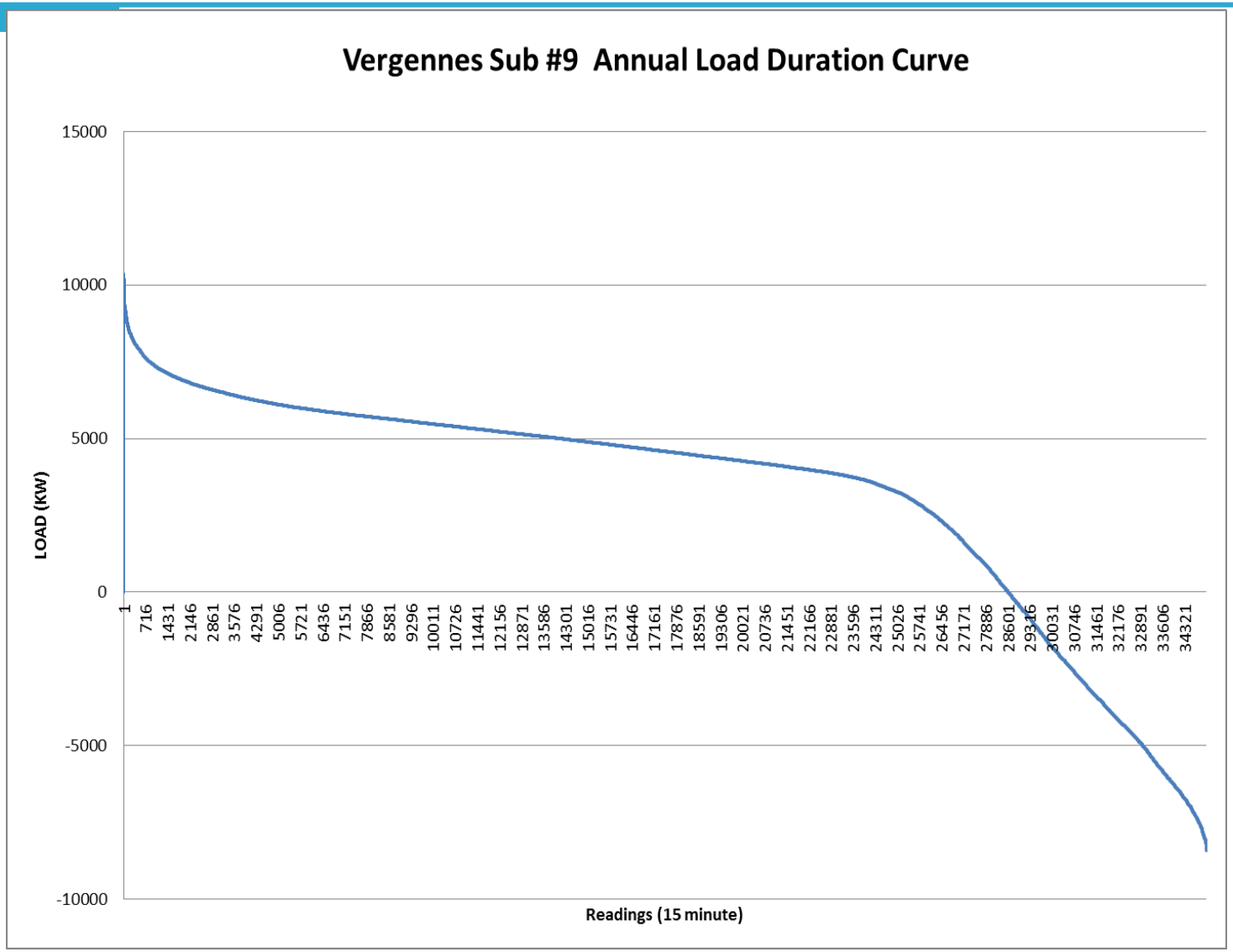
- In data where ***"applicant status"*** = active, in review, on hold, or evaluated. This represents all DG currently connected or proposed to be connected.
- All DG types are included- Solar, Hydro, Wind, Cow Power etc.

NOTES

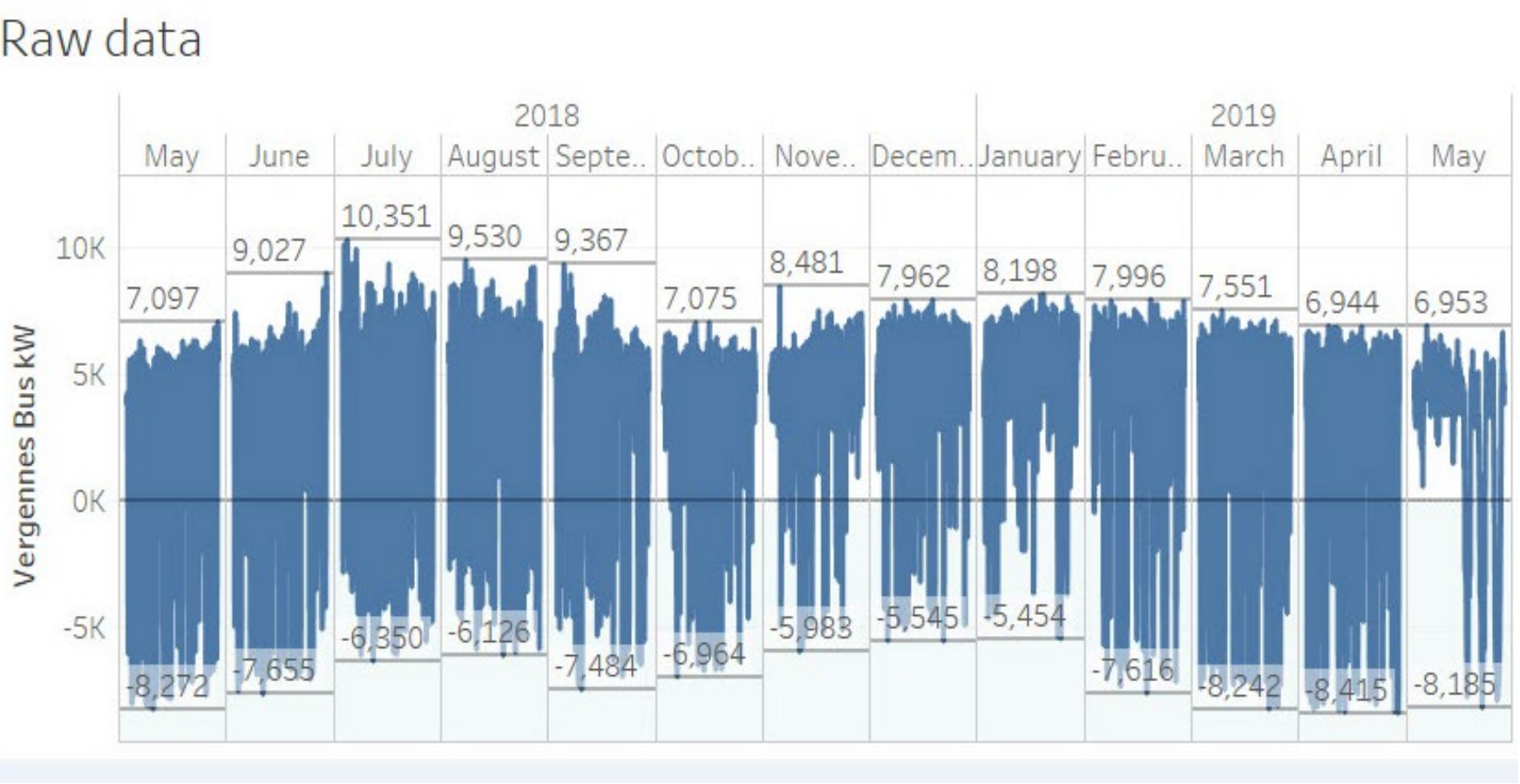
- We do not account for any load in this number.
- This type of data is currently driving our DG Solar map.

[1] For simplicity assume KW = KVA

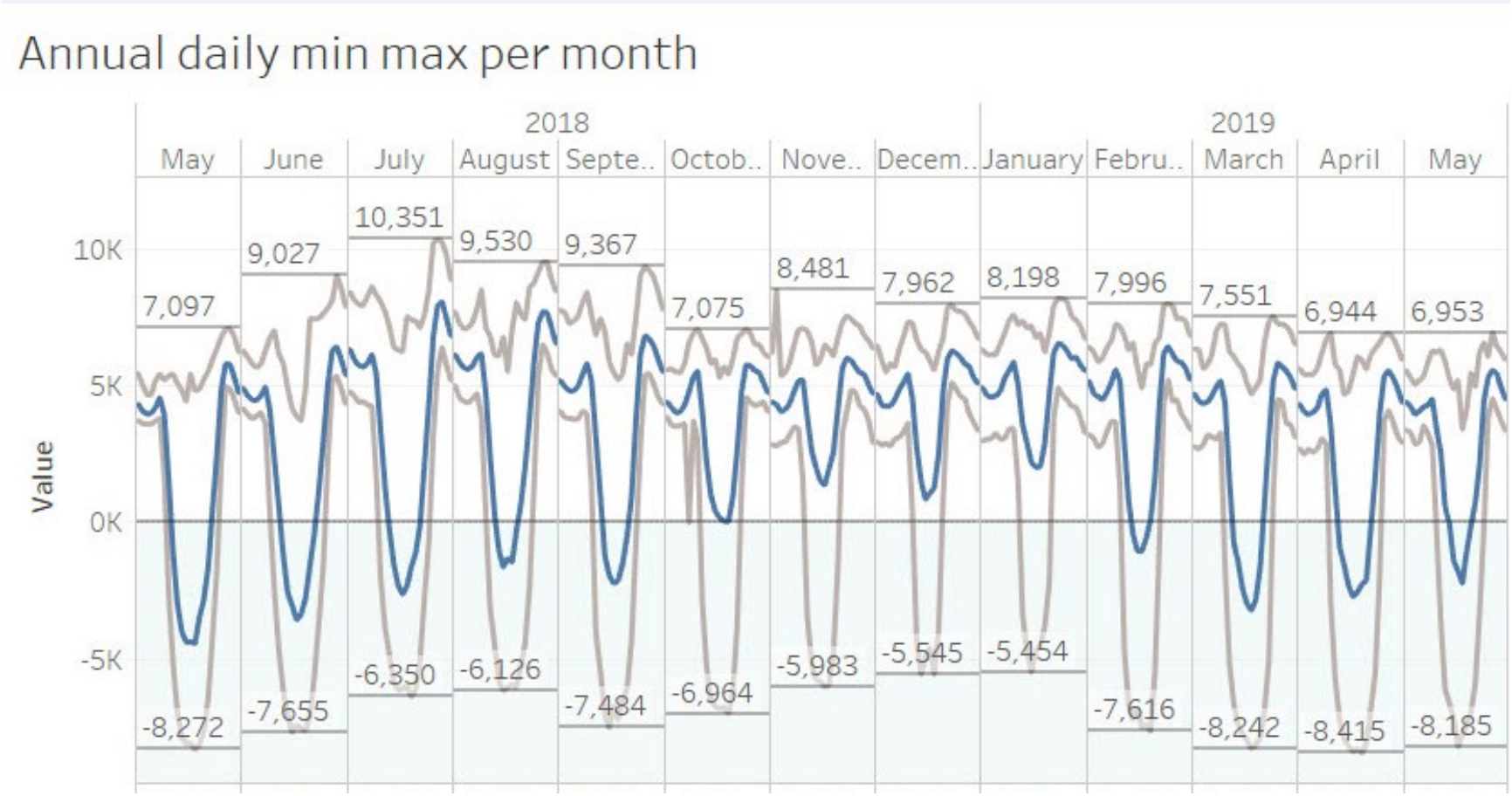
Load Duration Curve



Raw SCADA data @ Vergennes Bus

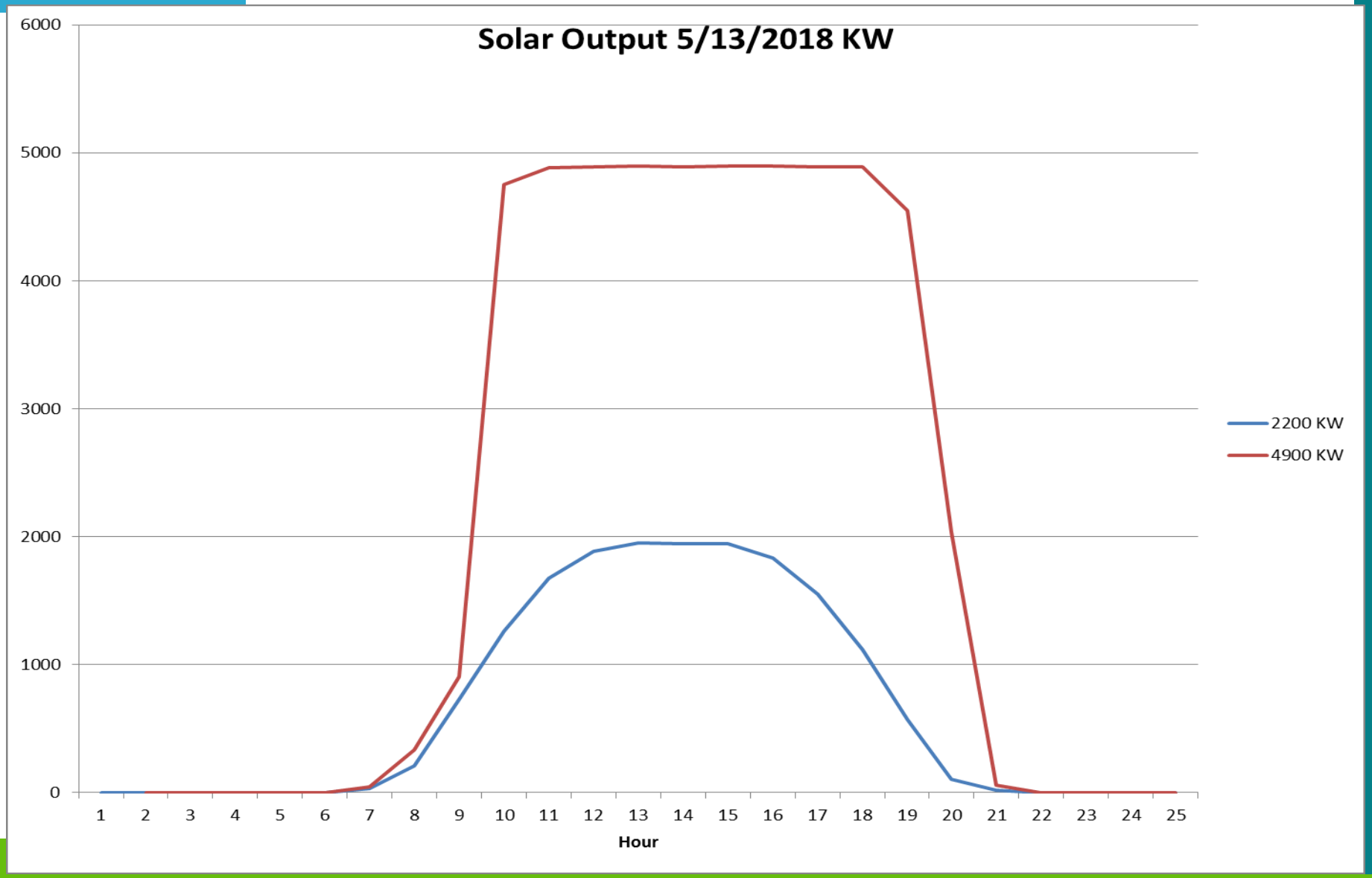


Annual Daily Mins and Maxs Per Month



High Solar Day Example (May 13, 2018)

Solar Generator Output (May 13, 2018)



Energy Control

What is Energy Control?

- Process of turning loads, generation or storage on and off to regulate amount of energy consumption or flow on the system. Allows utility to reduce or increase customers / circuit / system demands at certain times.

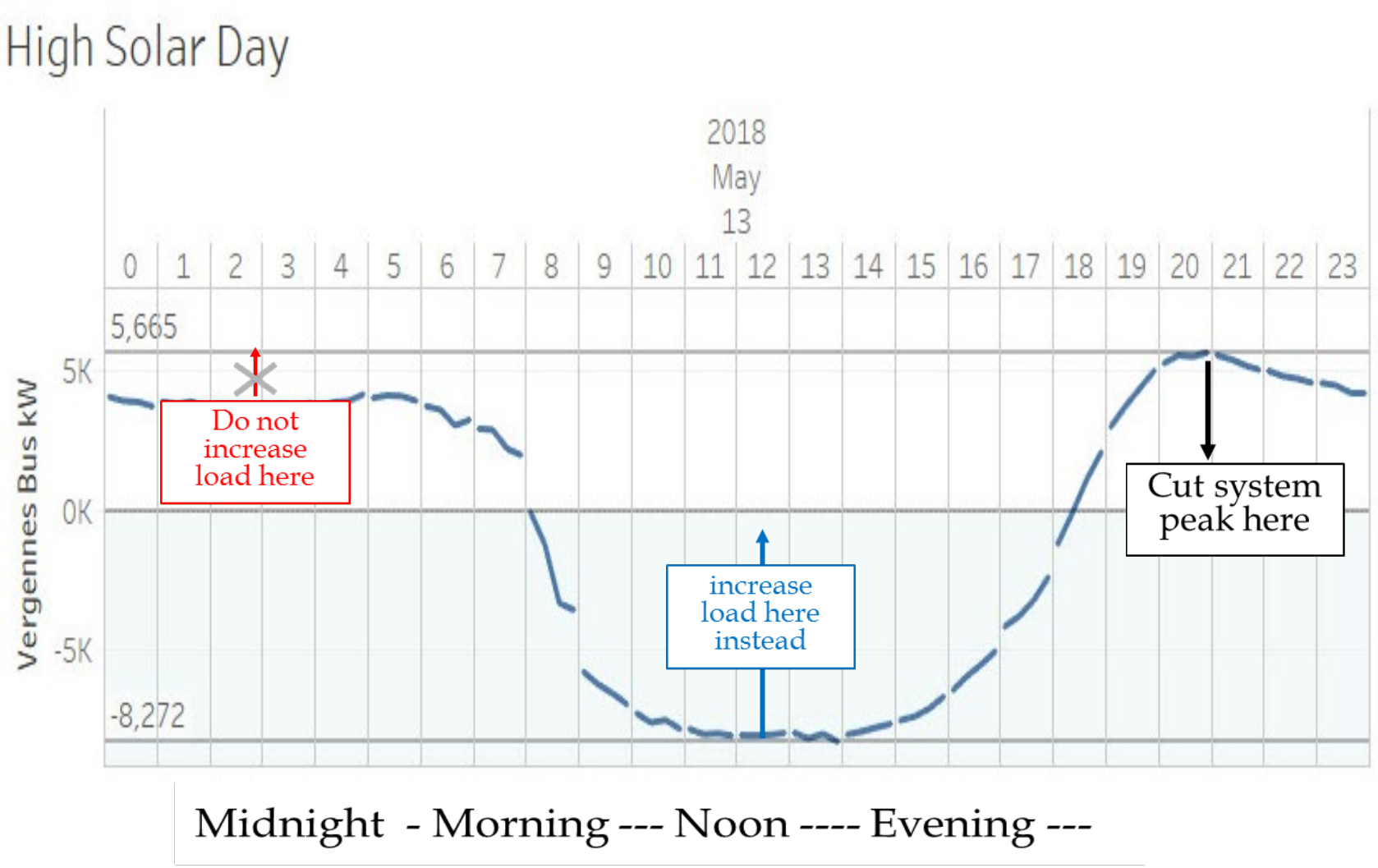
What are goals with Energy Control?

- Determine the best location for the grid to install Distributed Energy Resources (DERs) such as load with controls (i.e. water heaters), batteries (i.e. powerwalls), other technologies.

Why?

- To reduce the system peak charges & defer expensive T&D capacity related projects (capacity for DG or Load)
- To add further value to our customers & new revenue streams to utilities.

High Solar Day Example (May 13, 2018)



Planning and Problem Solving

What are we trying to do?

- Determine where we can install more solar or other DER
- Determine where we can install more load
- Determine where our substations are approaching an overload due to DER's

Why?

- To meet Vermont Renewable Energy Standard goals
- To help determine the best locations for more DER
- To identify substation/circuit capacity issues so we may plan for a least cost solution

Next Steps

Discussion