Flexible Load Management Pilot

FLM 1.0 Results and FLM 2.0 Plans

Rate Design Initiative

May 21, 2020

MAXIMIZING AVAILABLE RESOURCES

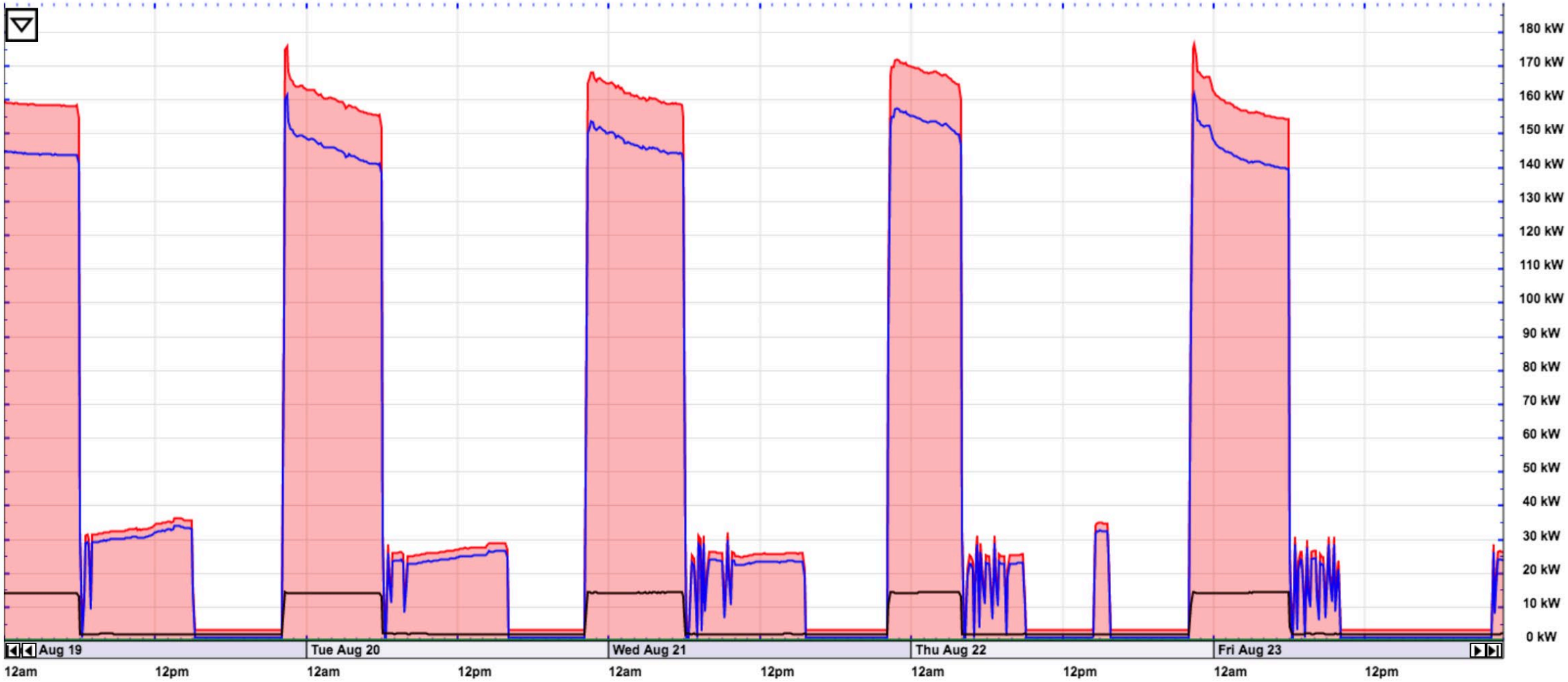
- How to unlock behind the meter resources that could be leveraged for DR, but don't have a tariff that allows for operation?
  - Refrigeration
  - Air and water cooling and heating
  - Industrial processes
  - Building envelopes
- Innovative Pilot structure enables experiments in advance of tariff
- GMP/EVT/Dynamic Organics Collaboration
  - Ice Storage at the Brattleboro Retreat as a demonstration model

DEMONSTRATING FLEXIBLE LOADS

- Pilot commenced in December 2018
- Flexible Load Management Pilot Goals
  - Demonstrate distributed, flexible load management using RNS and FCM values to monetize performance
  - Communicate events, data, and rationale to customers
  - Establish measurement and verification tools that feed upstream operations and accounting systems at the DU – metering and baselining are key
  - **Compensate customers for their contribution to demand reduction coincident with the monthly and annual peak hour**

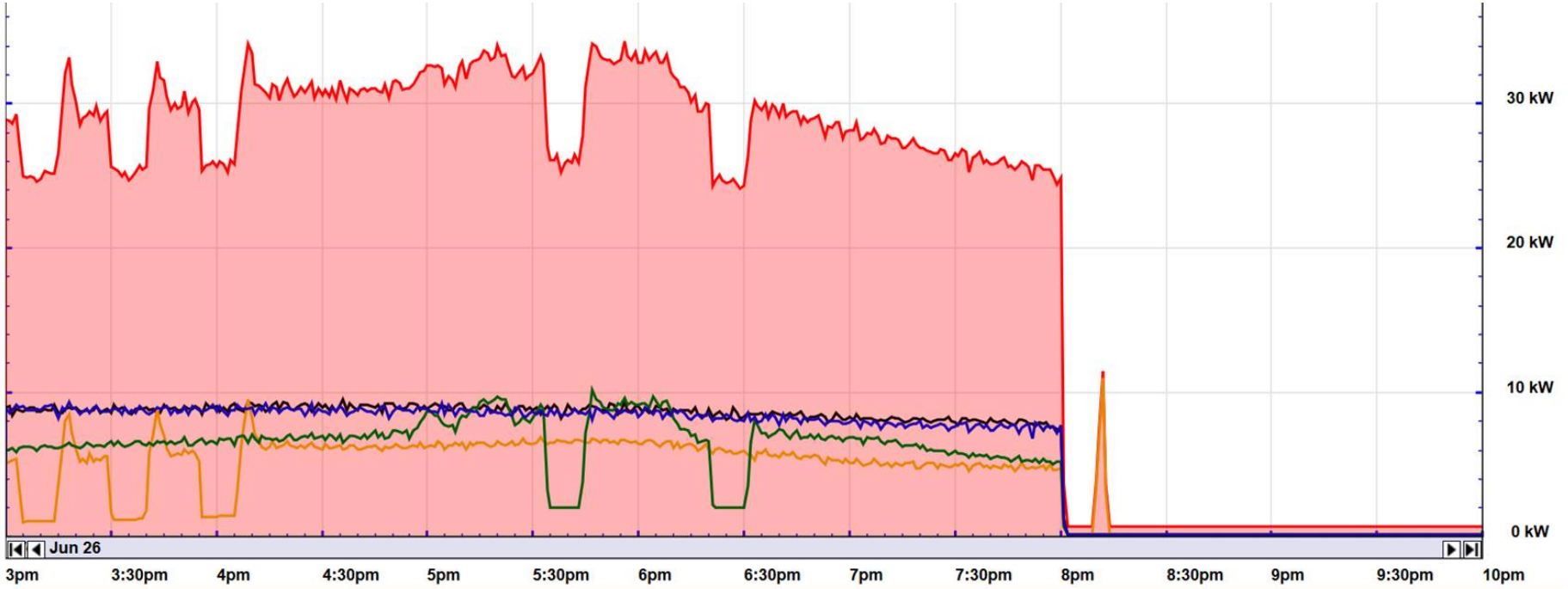
PILOT PARTICIPANTS

AUGUST 19-24, 2019 – BRATTLEBORO RETREAT ICE STORAGE SYSTEM LOAD

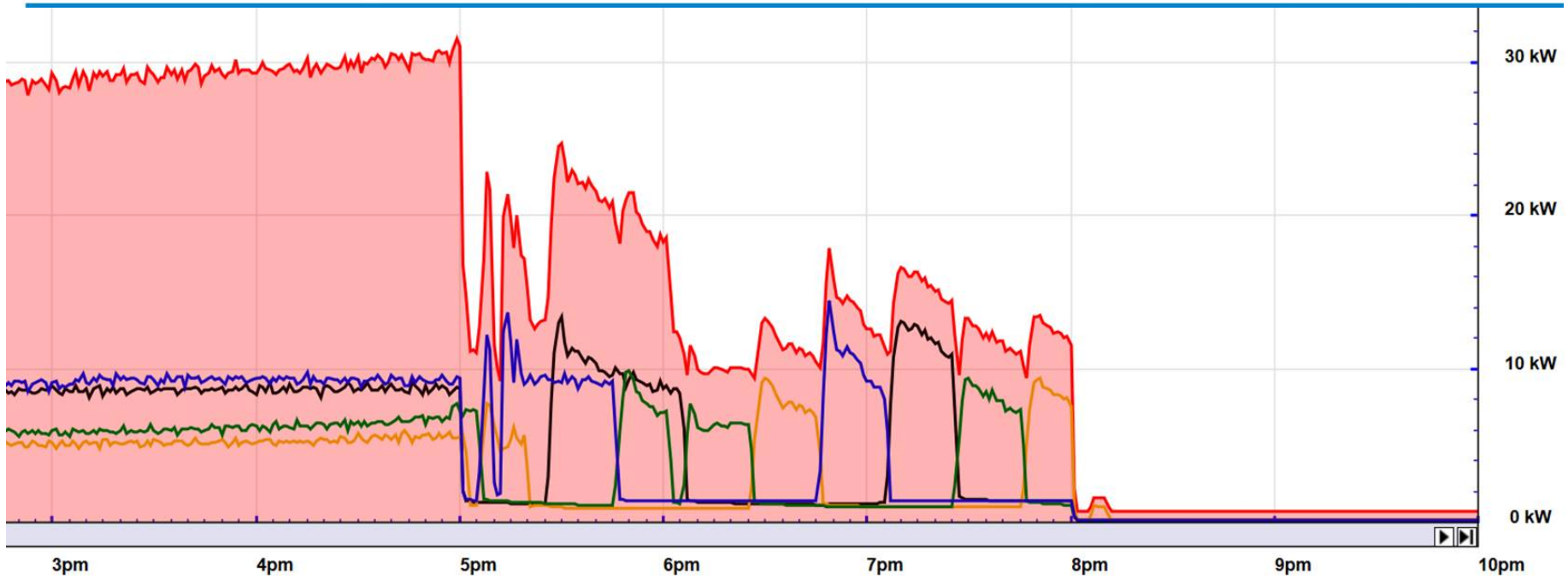


Landmark College
STEM BUILDING: 4 RTU

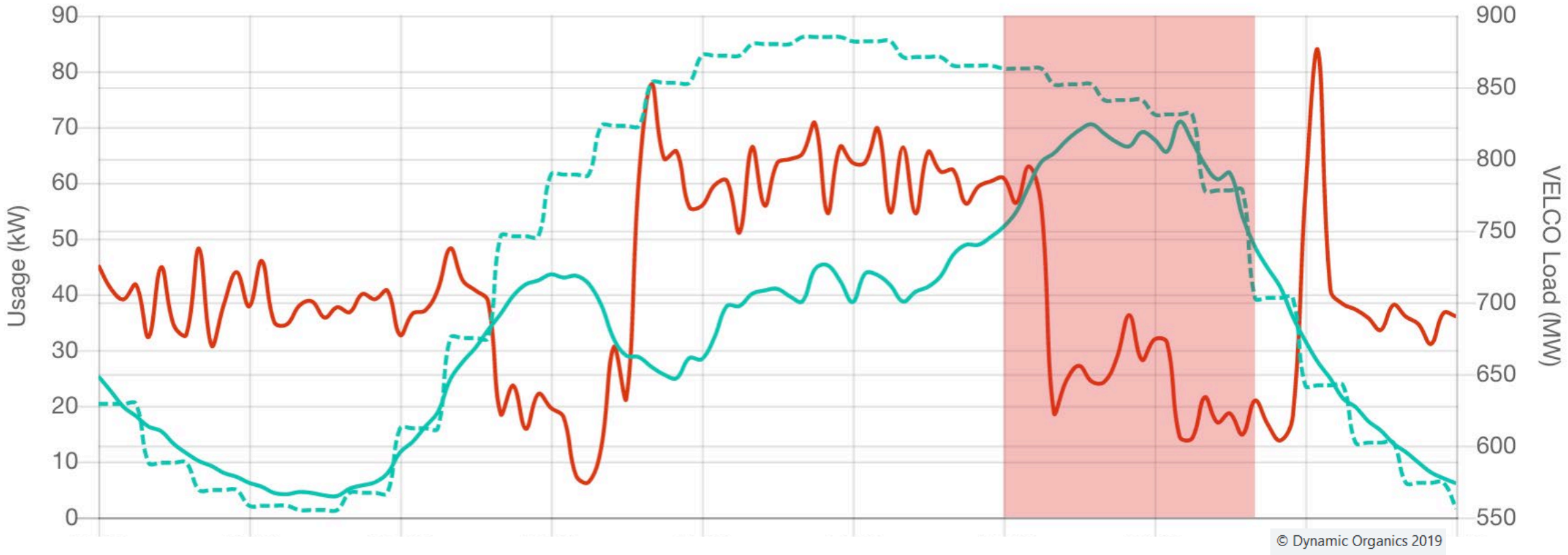
JUNE 26, 2019:
Uncontrolled



JUNE 27, 2019:
Flexibly controlled



AUGUST 19, 2019 – LANDMARK COLLEGE FLEXIBLE HVAC (CAMPUS WIDE)



VELCO 5-Minute Preliminary System Load (MW)

VELCO Day-Ahead Forecast Load (MW)

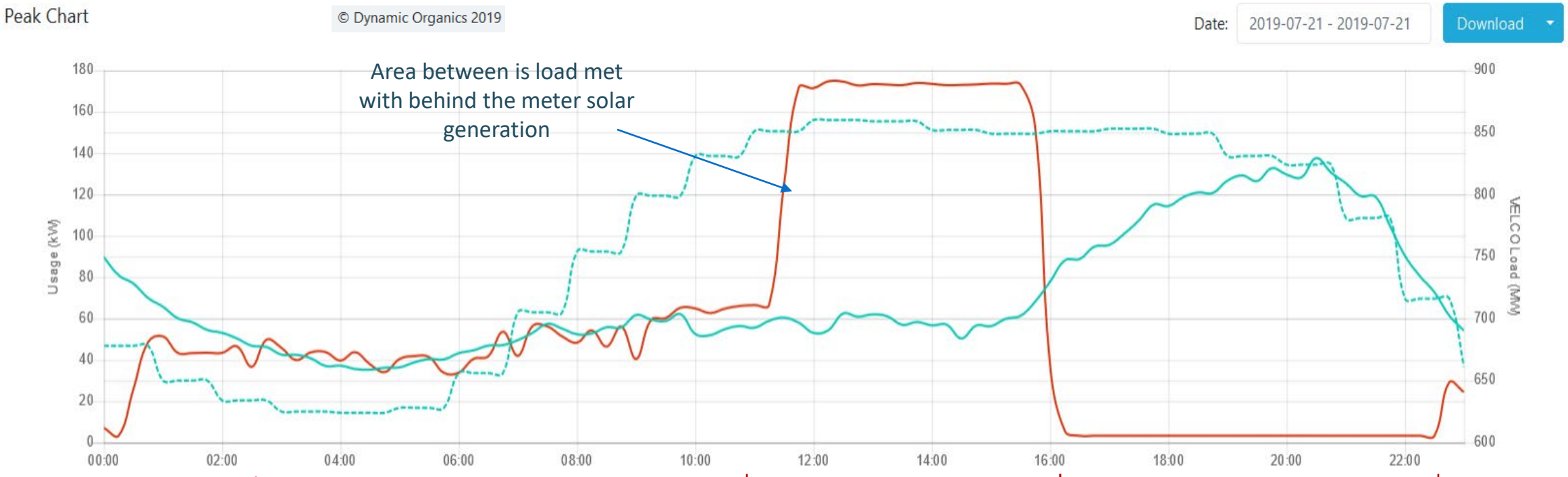
Landmark Flexible Load (kW)

SOLAR POWERED COOLING

Forecast gross Vermont electric load

Actual Vermont electric load

Retreat chiller system power



Normal mode
40 – 60 kW

Ice making mode
~175 kW

Ice use mode
~3 kW

WHAT WE LEARNED

- Customers are willing and interested in participating
- Some customers will pay attention to signals and dashboards, but automation is better
- Baselining is key – diversity in customer applications drives complexity
- Weather is driving undifferentiated peaks – evolving our DR strategy
  - Load management is increasingly load shape management
- Orchestration of DR resources is key to success –
  - EV Charging, Batteries, CLR, CPP, Hydro, and FLM all have different properties and need to be coordinated
- **Key Take-Away - Targeting FLM participants at single peak hours for compensation is contrary to load management strategy – doesn't work for the DU, nor for the customer**

- **… With this learning, FLM 1.0 was discontinued and we began to develop FLM 2.0**

February 2020 Top 10 hours

Date	Hour	MWh
02/15/2020	18	606.712
02/20/2020	19	606.618
02/15/2020	19	605.946
02/20/2020	20	602.058
02/08/2020	19	601.804
02/20/2020	18	600.420
02/19/2020	19	600.365
02/15/2020	20	600.279
02/14/2020	19	597.133
02/14/2020	18	596.035

Std Dev – 3.74
Top 2 hours within 90kW
Top 5 hours are within 5MW

FLM 2.0 – APPLYING THE LESSONS…

- Asset types – Systems that can accommodate more frequent load shifting
  - HVAC, ice making (ice rinks), ice storage, digesters at wastewater treatment facility, kilns, industrial processes that can take advantage of pre-heating/cooling
- Most FLM 1.0 candidates will be a good fit for FLM 2.0
- Customers can make load available at a committed kW level – FLM 1.0 showed that they are willing to do so
- GMP, EVT, and DO will collaborate on control and signaling strategies
- One possibility: Compensation based on delivery of committed loads when called by GMP
  - A portion of compensation delivered as an up-front credit
  - Remainder of compensation paid out monthly based on asset availability at committed levels
- Measured by metering
- Performance calculated by baselining
- Demonstrate an additional revenue stream based on flexibility
  - Considering flexing under solar curve
- Time frame – In development now. Current plan is to launch in January 2021