

# OUC Emerging Technologies Update

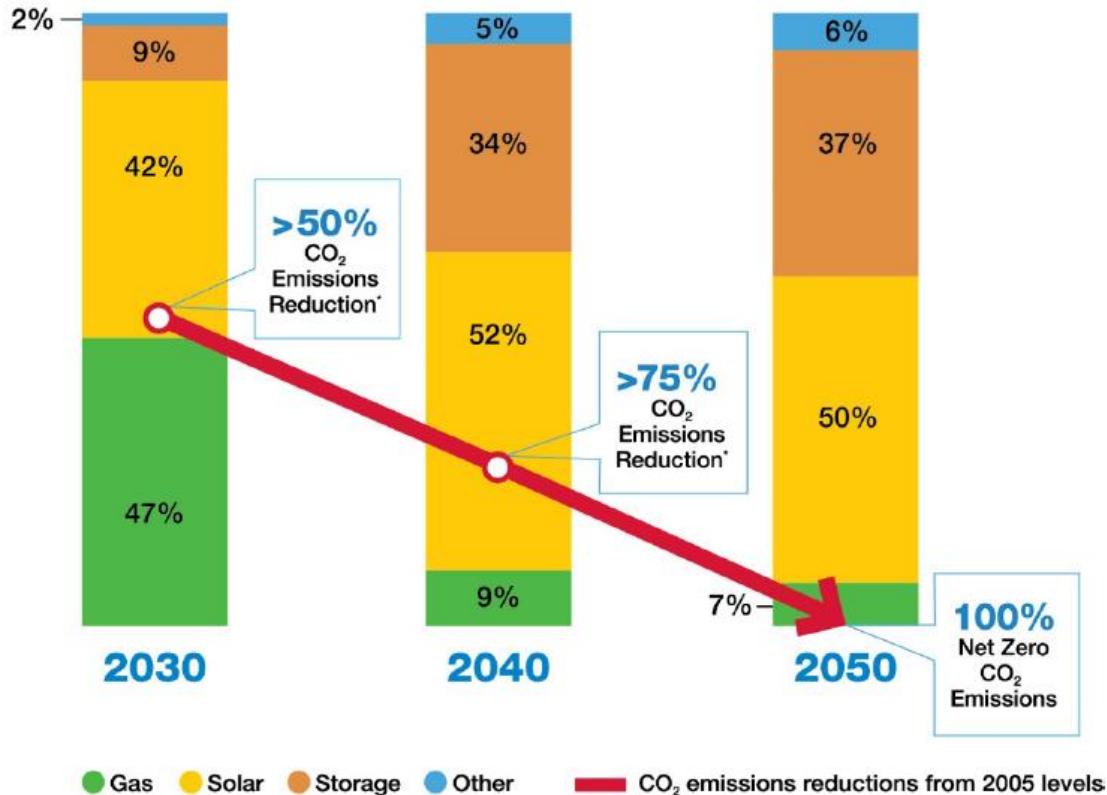
**OUC100**

*A Century of Reliability*

FSEC Advisory Board Meeting

April 25, 2024

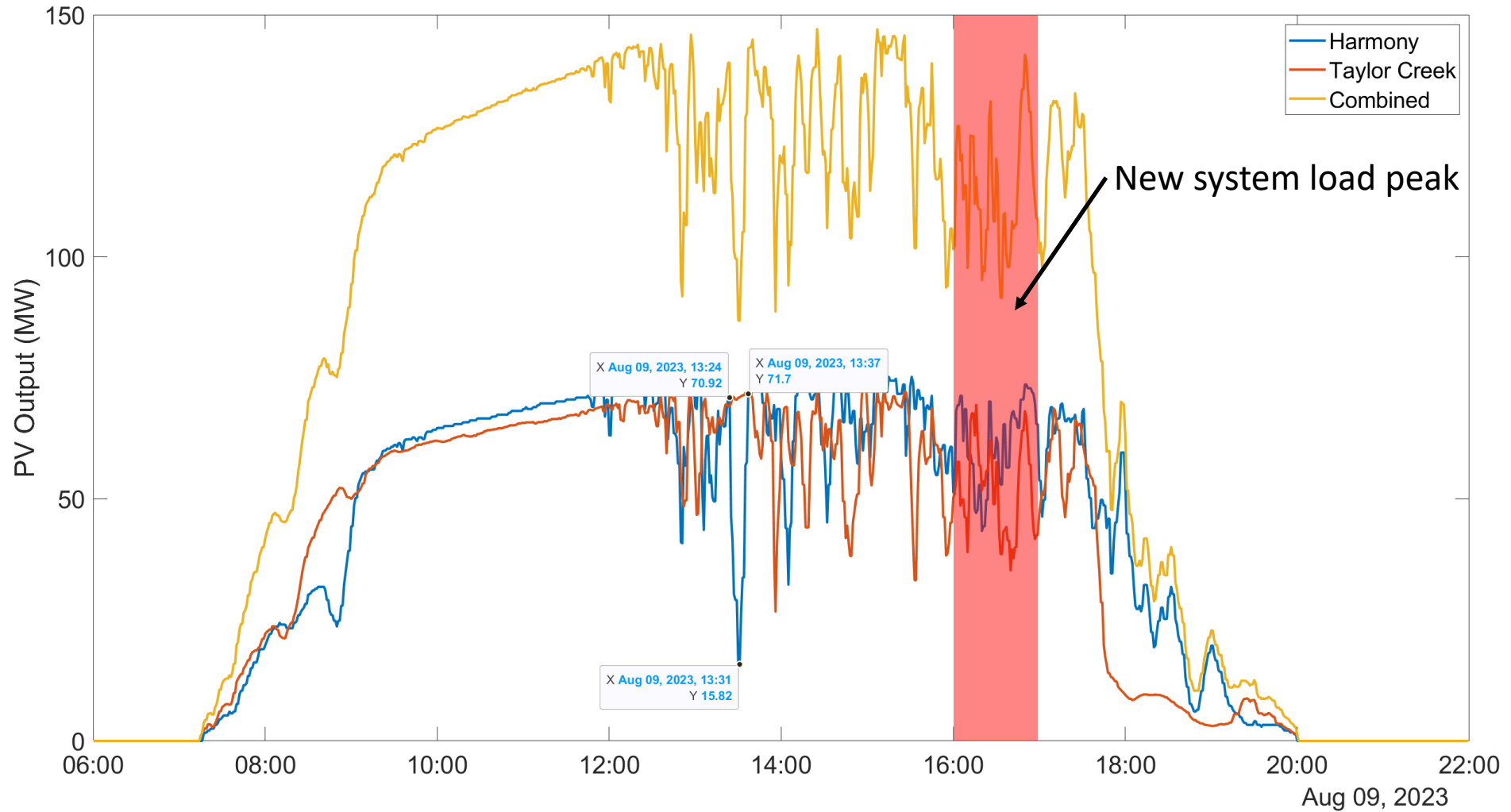
## Resource Portfolio to Reach Net Zero CO<sub>2</sub> Emissions



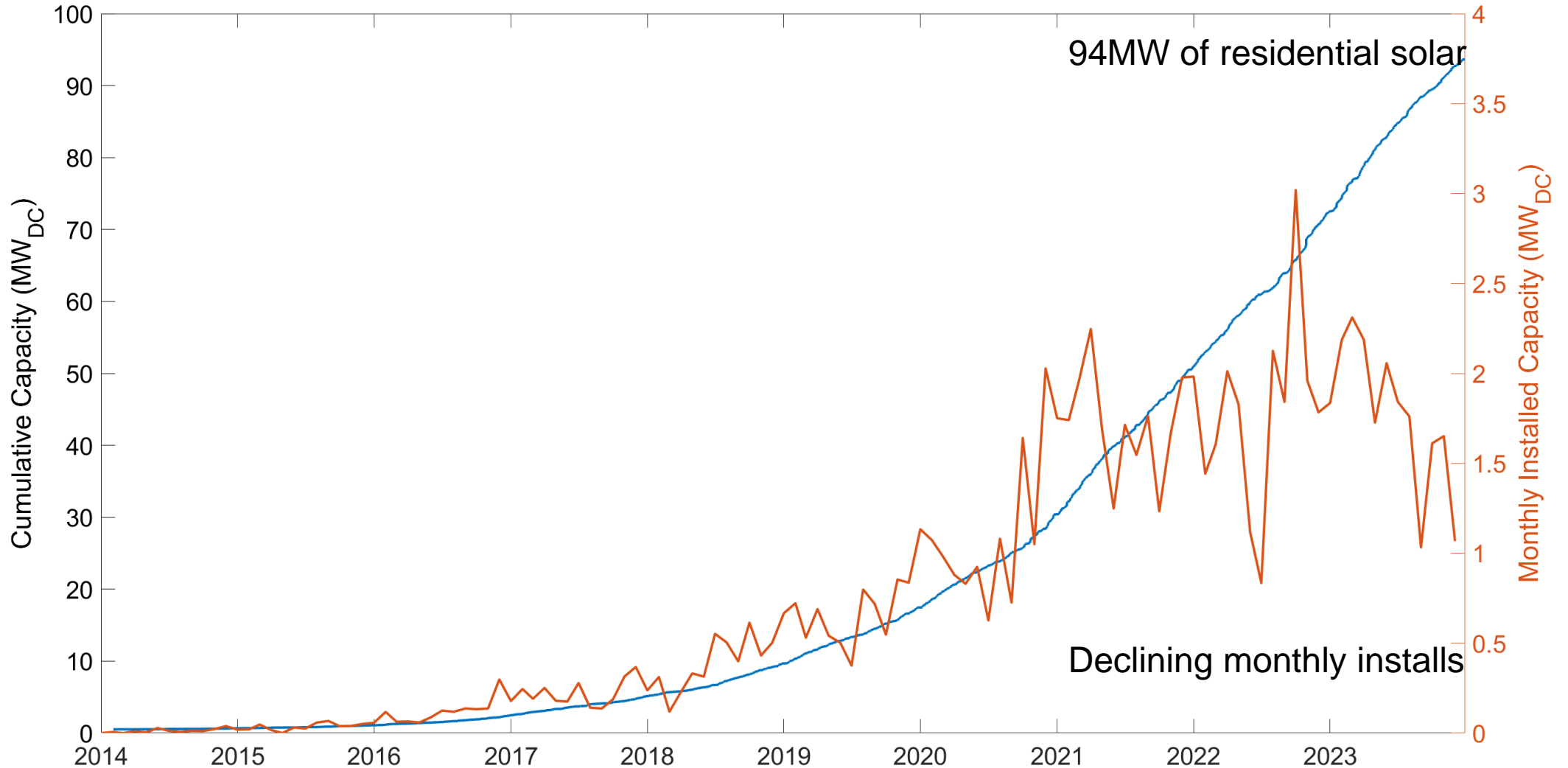
- Investing in new technologies
  - Solar PV since 2007
  - EV charging since 2008
- EIRP plans for significant investment in solar and storage
  - 2x74.5MW arrays in construction
  - 350MW storage by 2030
  - Electric vehicles part of the mix

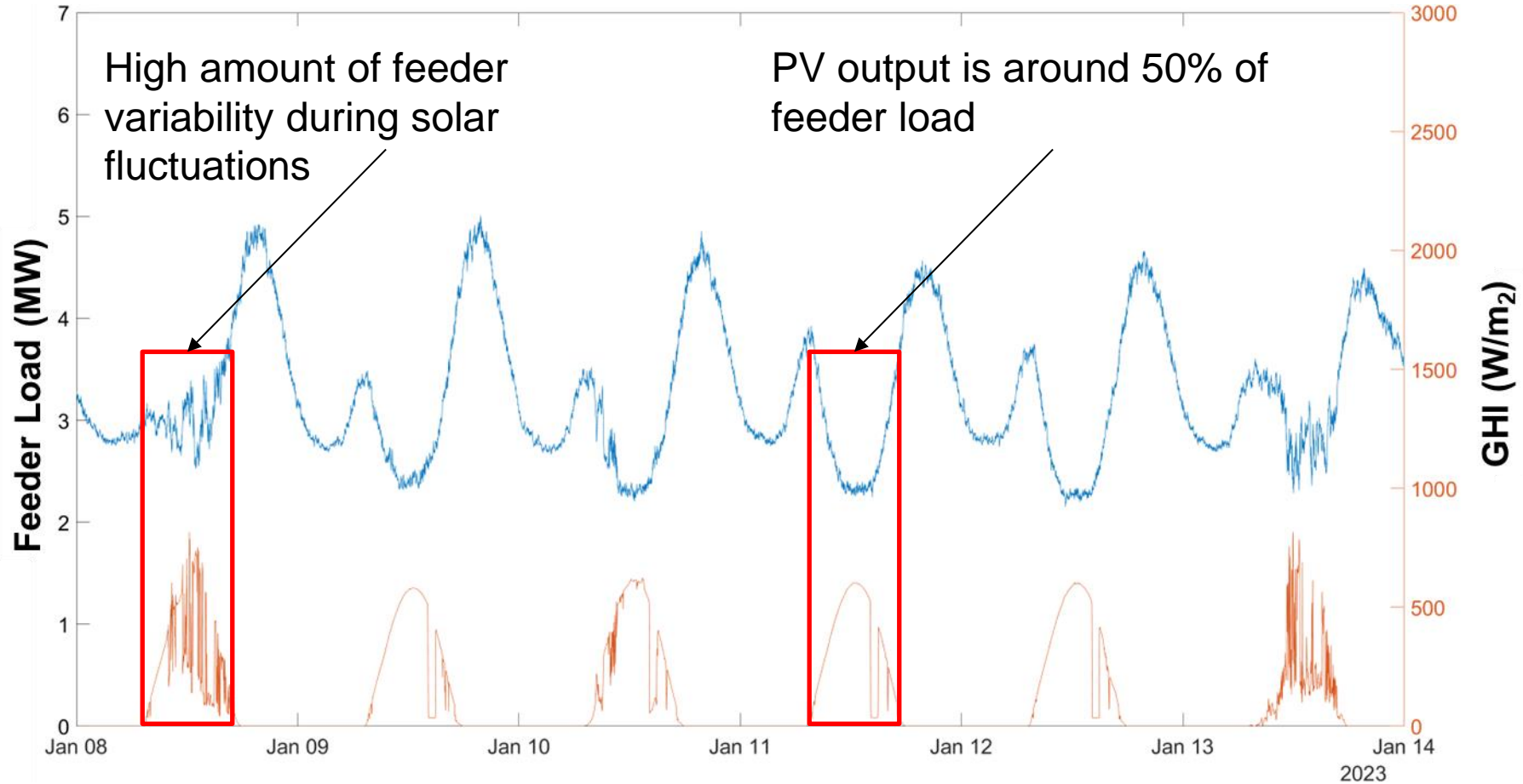
\*Emissions reductions based on 2005 base levels  
Other includes nuclear, wind

# Front-of-the Meter PV: Variability



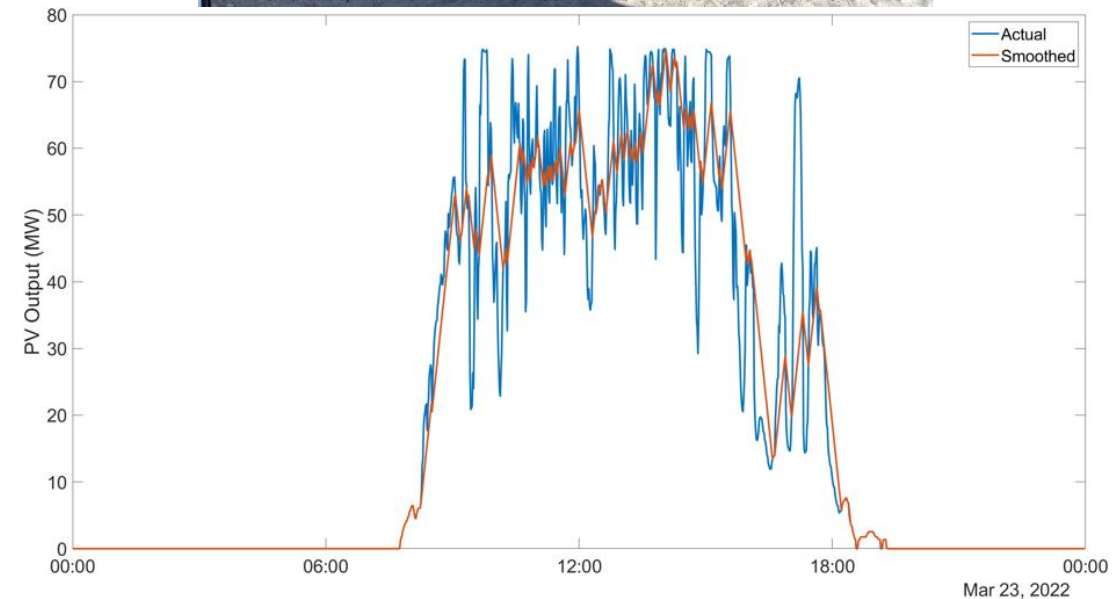
# Behind-the-Meter PV: Adoption





- Substation Battery Project
- 2MW Floating Solar Project
- Electric Vehicles
  - Public charging
  - Robinson Hub
  - LYNX
- GFM inverter testing at Grid Integration Lab
- Hydrogen Project

- 4MW/8MWh LFP battery
- Located near substation that is connected to Harmony Solar
- Commissioning ongoing
- Primary dispatch considerations
  - Solar smoothing
  - Peak load support
  - Volt/VAR support

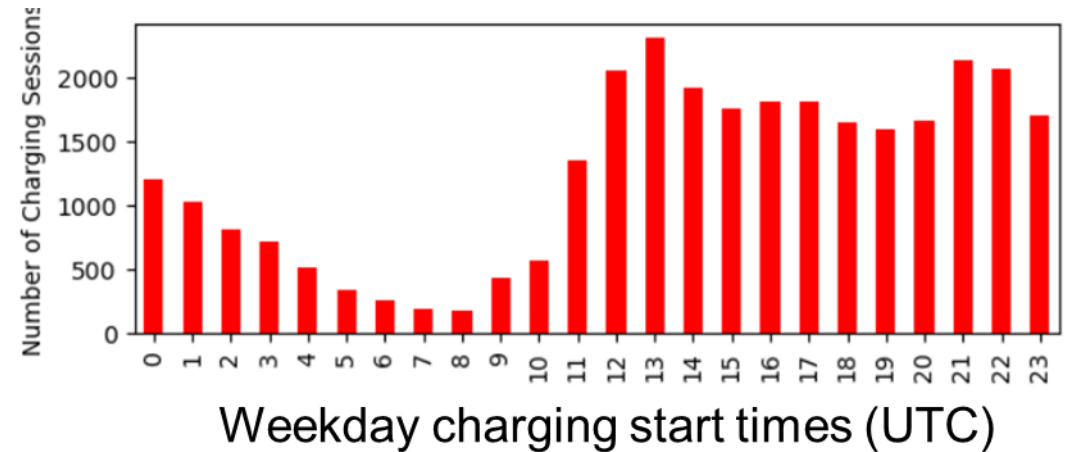
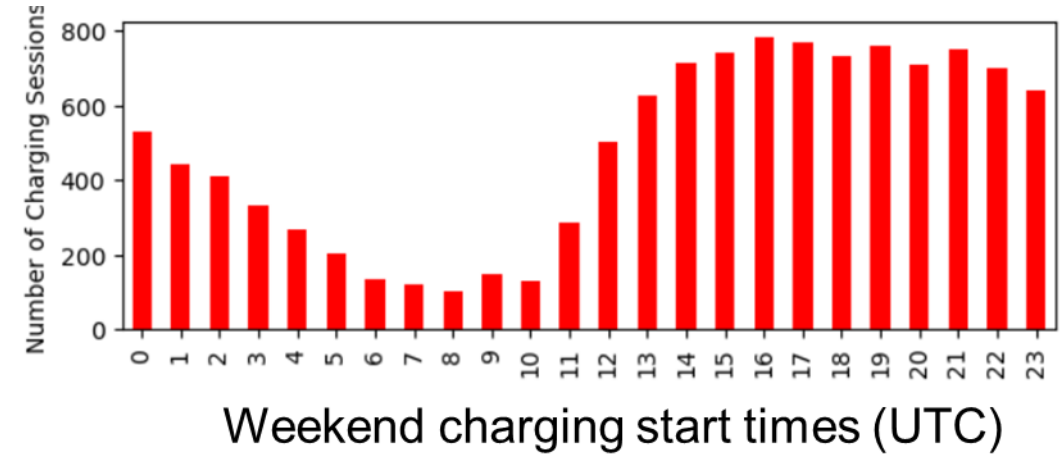


- Land-use considerations creates conflict for ground-mount PV
- Retention ponds in Florida can be used for floating PV arrays
  - Approximately 5GW of potential within OUC's territory
- Piloting 2MW FPV array on FDOT pond
  - Two orientations for the arrays

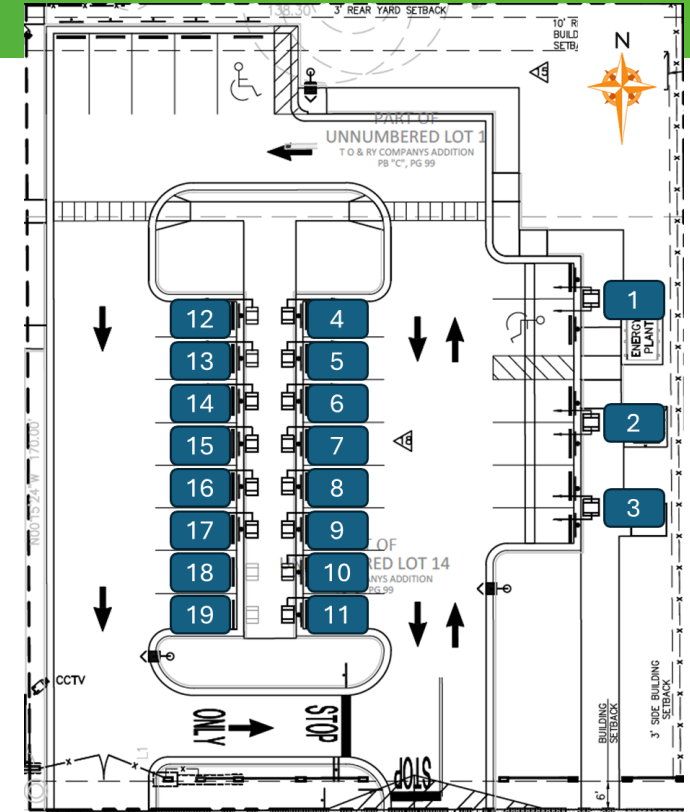




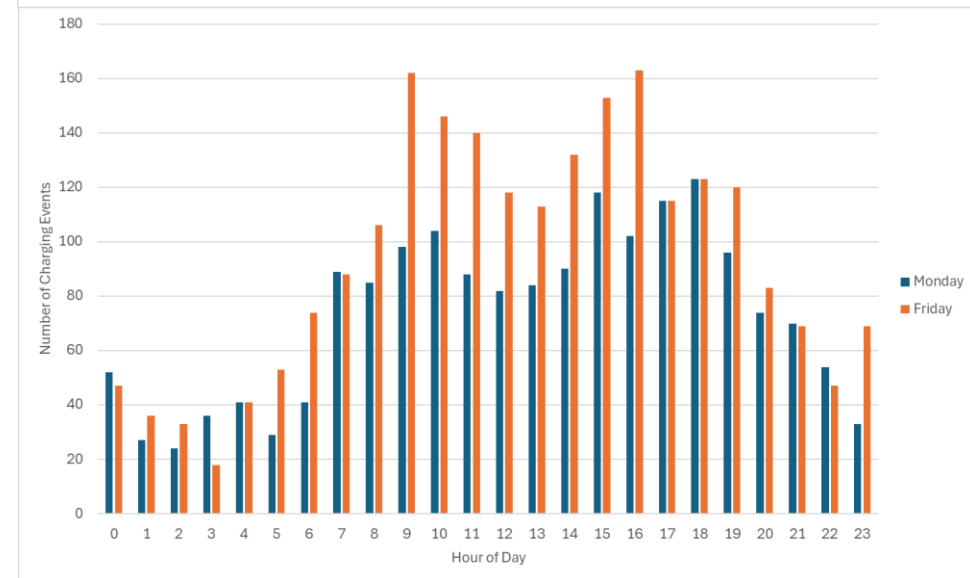
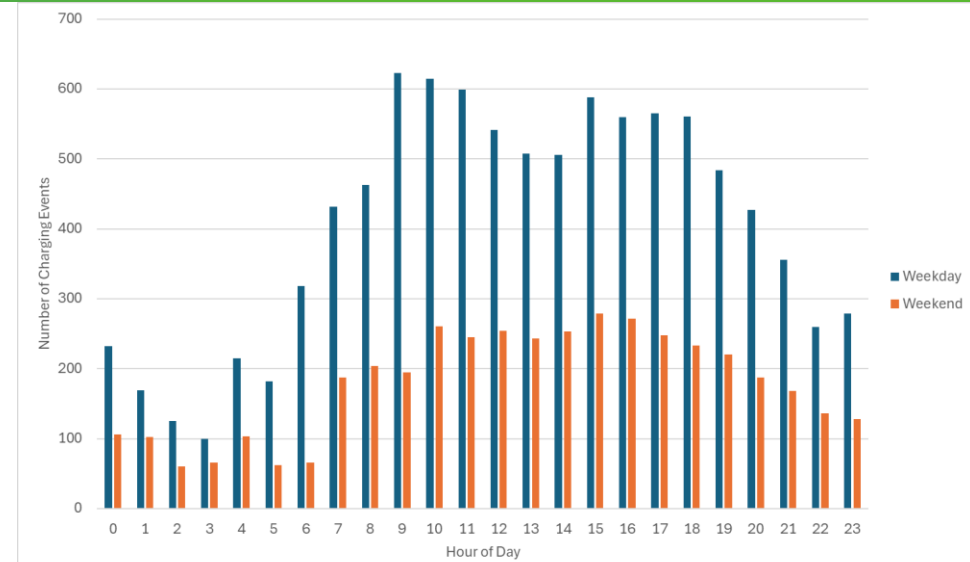
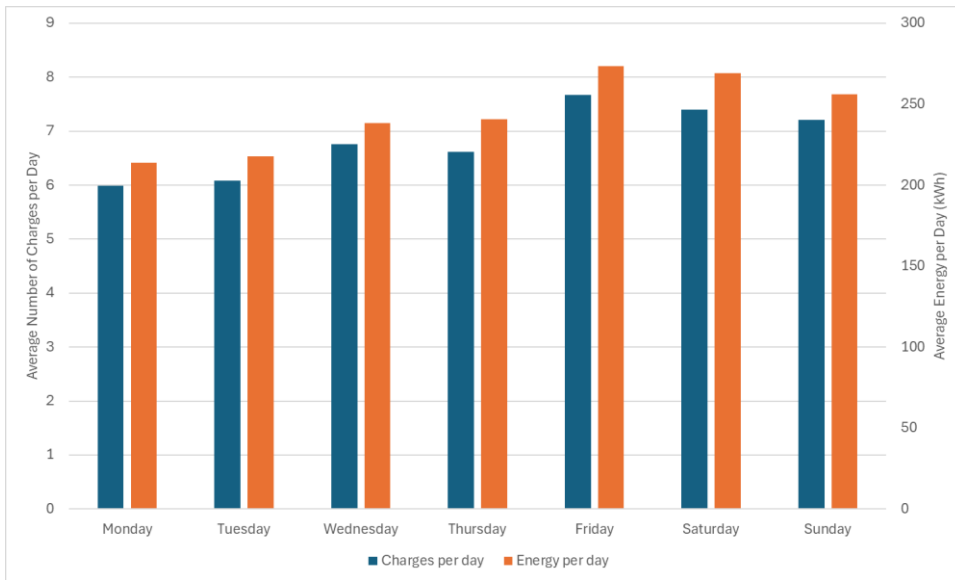
- Over 200 public charging stations
  - AC Level 2 (7kW)
  - DCFC (240kW)
- Analyzing data to identify EV charging behaviors
  - Improve load forecasting and planning
- Residential charge analysis is ongoing



- DC Fast Charging Hub with 17 active stations
- In operation since June 2023
  - 14,000 charging events
  - 501 MWh delivered
  - ~2 million miles @ 4mi/kWh
  - 66k gallons gasoline @ 30MPG



- Utilization at the site varies by day and hour
- Additional analysis around charge duration, dwell time, etc. ongoing



# EVs: LYNX eBus Project



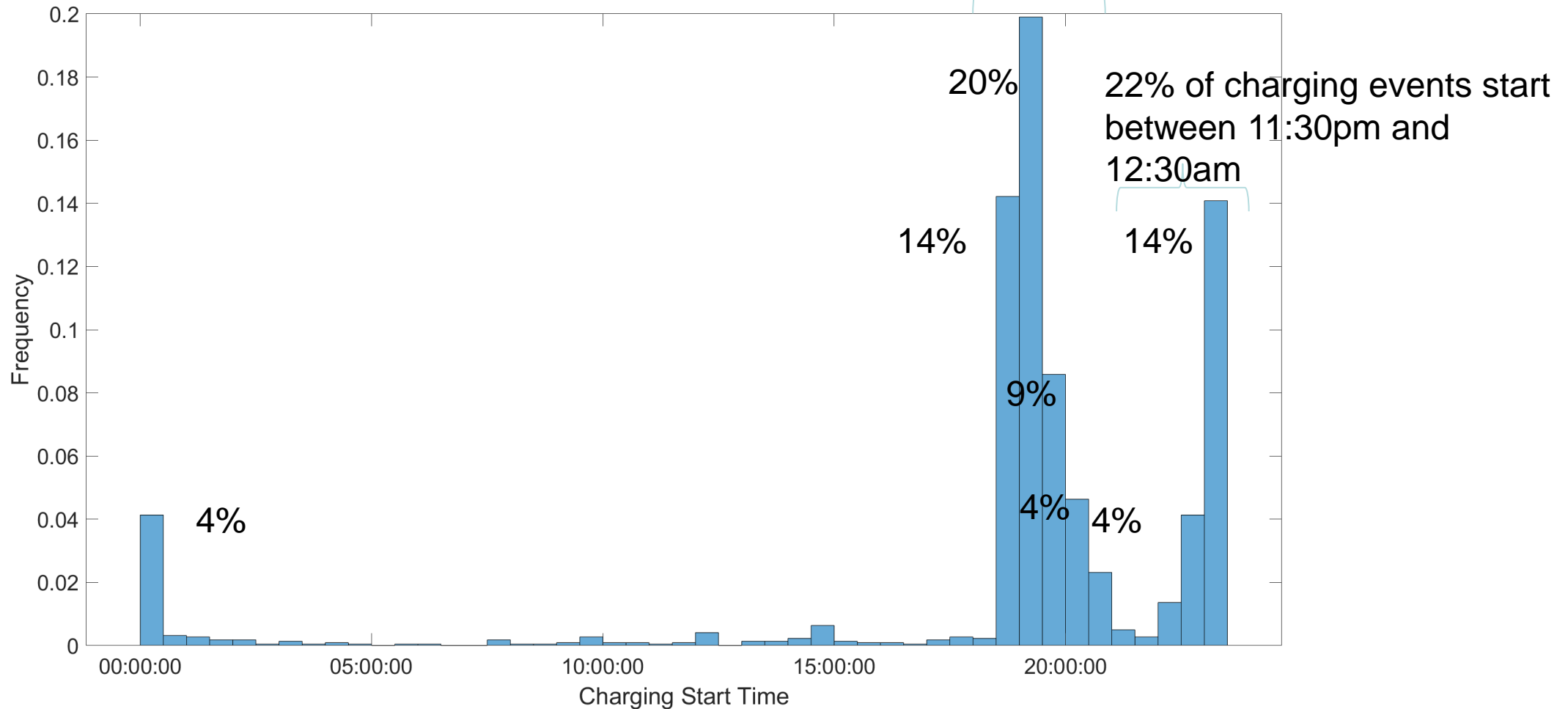
- 8 Dispensers supporting 14 buses as of 2024
- Over 920MWh delivered since Jan 2022
  - ~5000 charging events @ 188kWh/event
  - ~406k miles @ 2.27 kWh/mi
  - ~119k gal gasoline @ 3.4 mi/gal gasoline



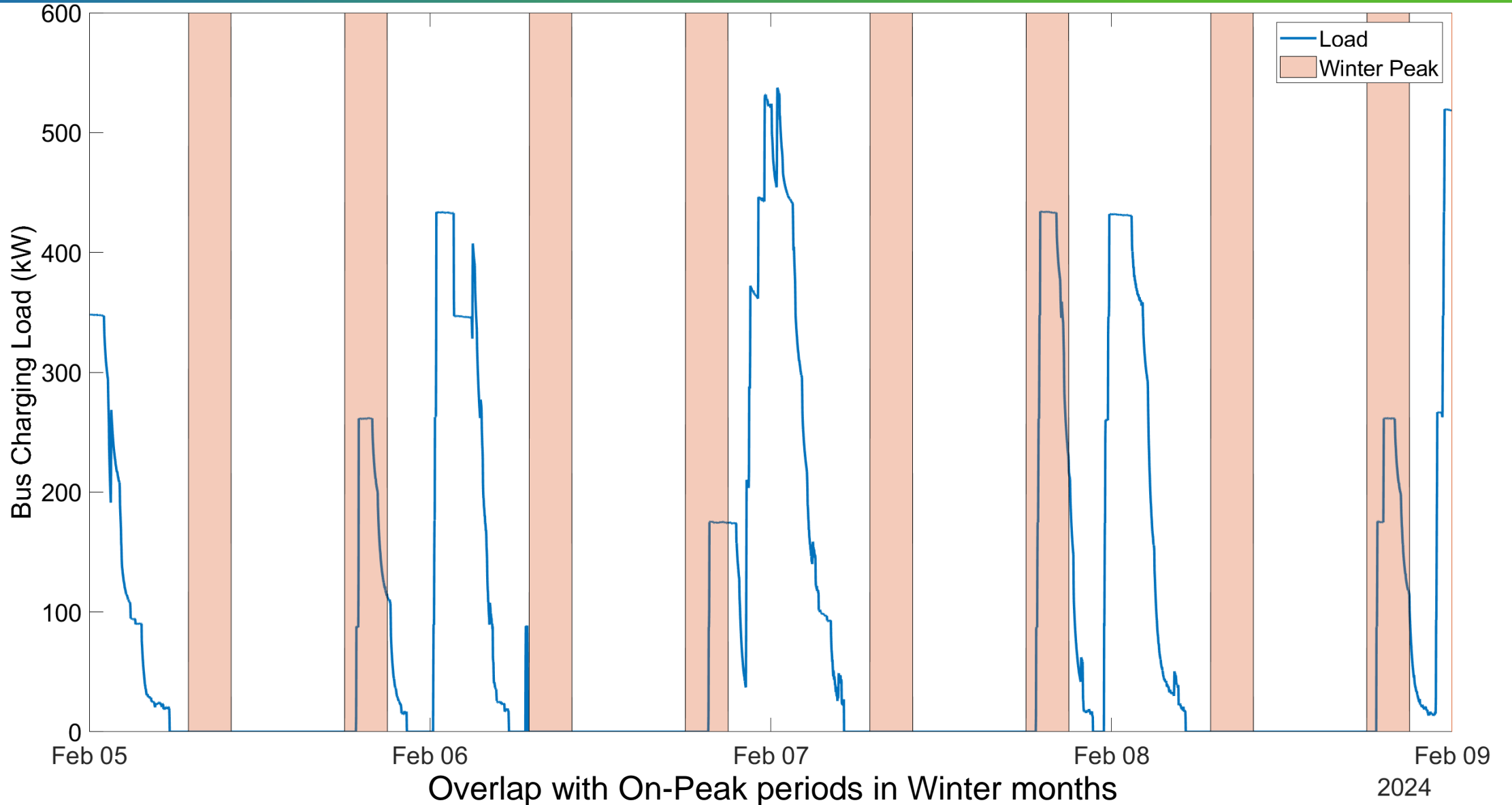
# EVs: LYNX eBus Project

Charging Start Times: 8 buses in 2022

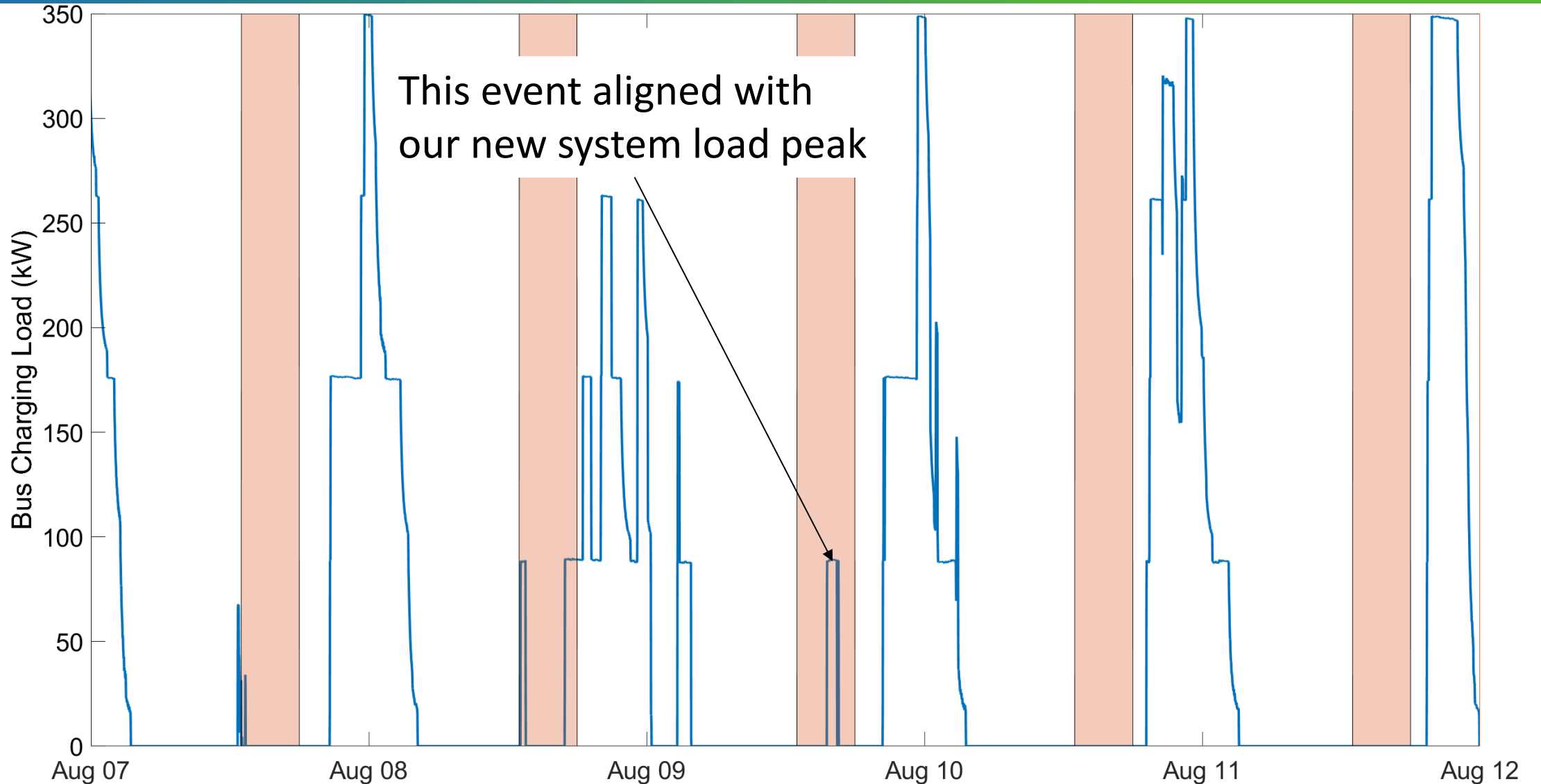
47% of charging events start between 6:30 and 8pm



# EVs: LYNX eBus Project



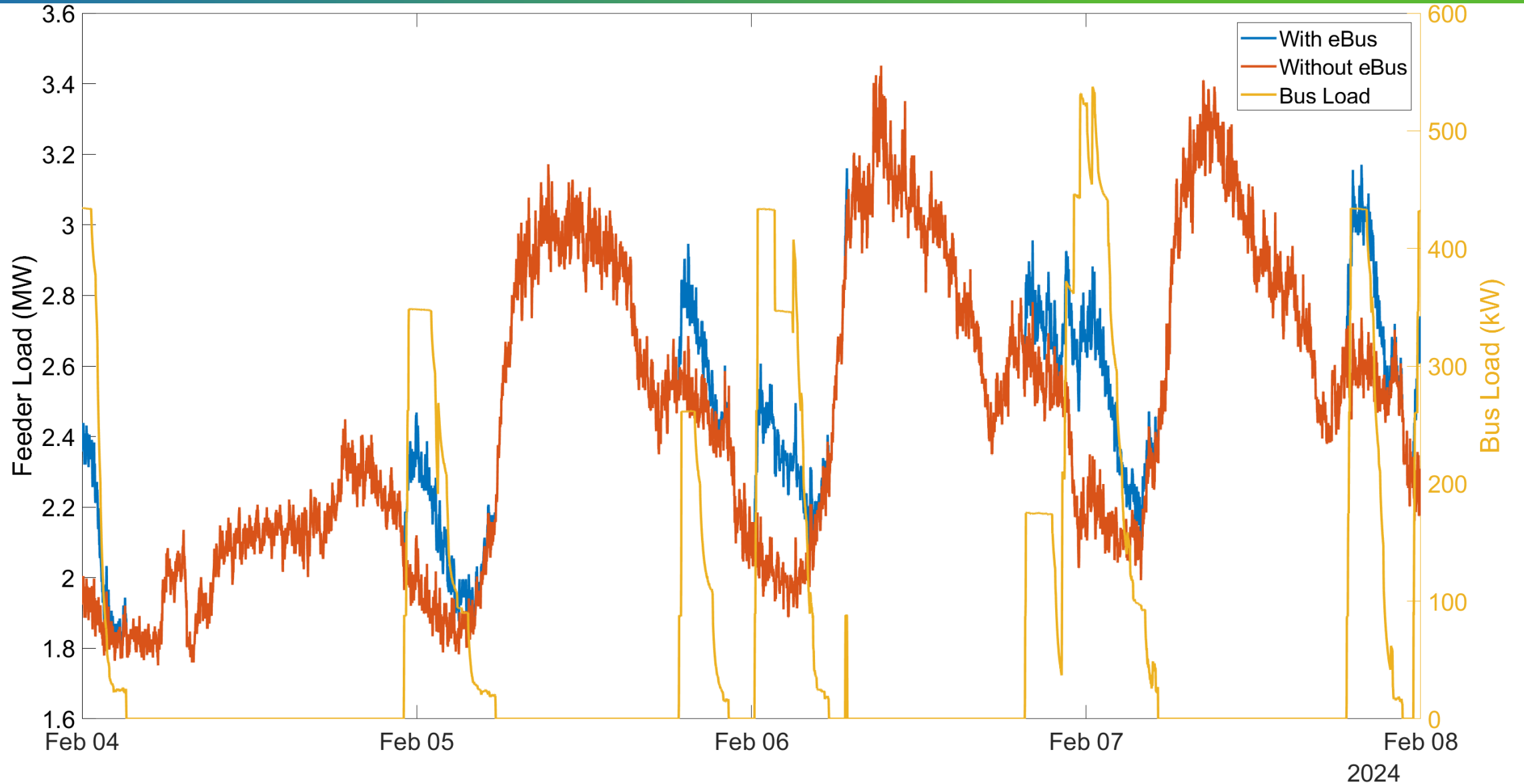
# EVs: LYNX eBus Project



Occasional overlap with On-Peak periods in Summer months, but will overlap with Shoulder period (6-8pm)

2023

# EVs: LYNX eBus Project







Flow  
Battery



Bifacial/Carport  
Solar



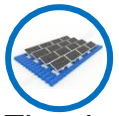
Hydrogen  
Pilot



Flywheels



EV  
Charging



Floating  
Solar

Floating PV-1: 31kWDC with string inverter  
Floating PV-2: 35kWDC with micro-inverters

Site controller and  
Data Logging

20kW/80kWh Flow Batteries

15kW V2G

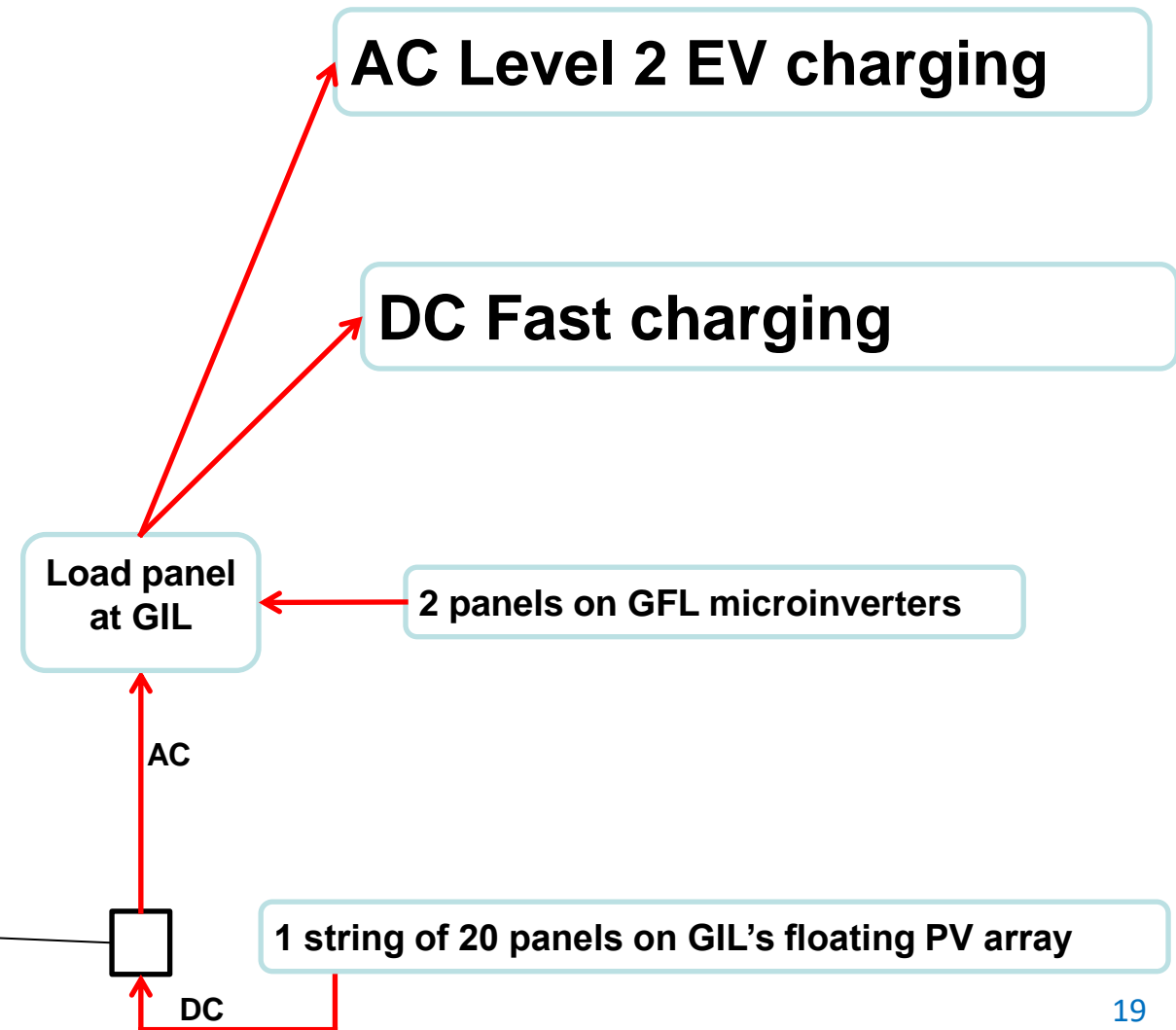
120kW DCFC

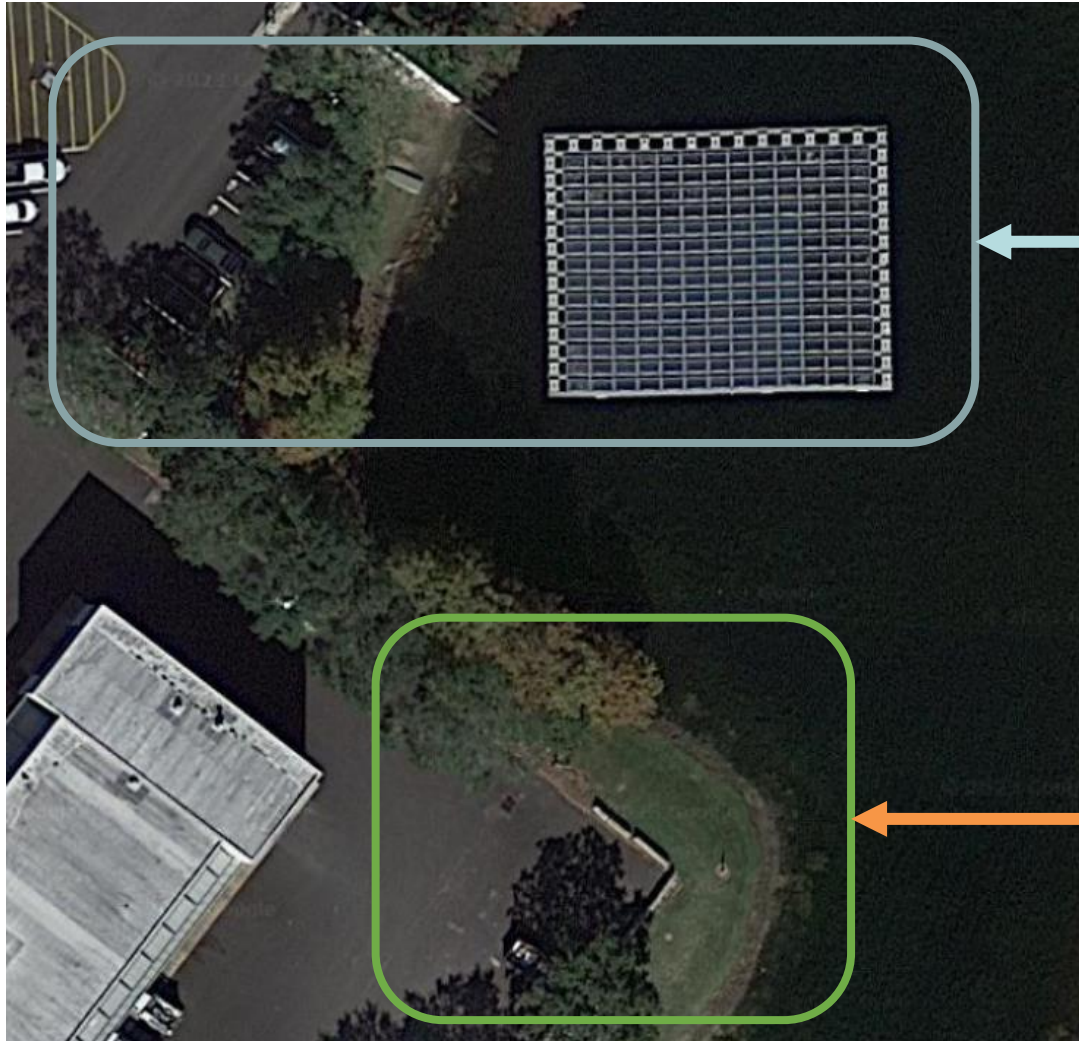
4x7kW AC chargers

16kW/64kWh Flywheels

Real-time communication with each device at GIL via Modbus-TCP and cellular  
Additional data collection includes 10-second weather and load data from adjacent office and warehouse buildings

- Demonstrate grid-forming inverter operations at GIL
- Solar-only EV charging
- 60% GFM and 40% GFL PV



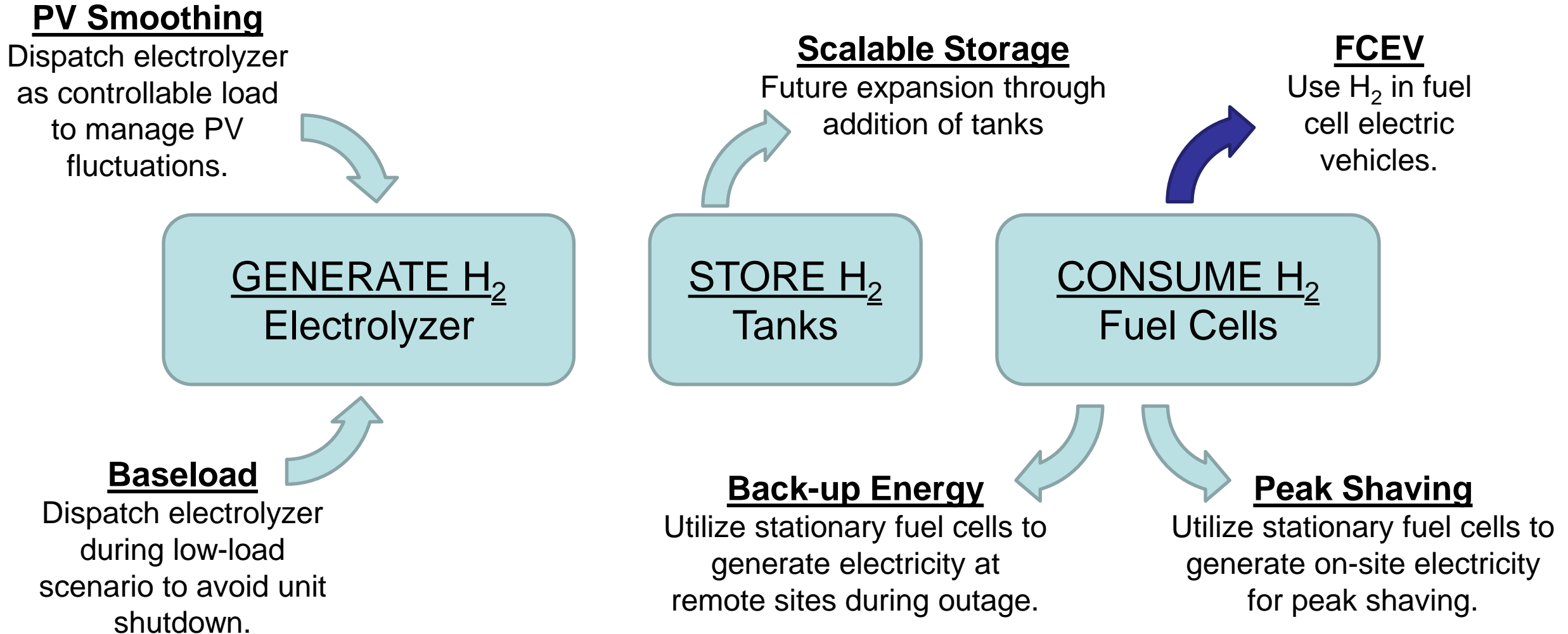


## Existing Grid Integration Laboratory (GIL)

- 60kW floating PV
- 4x7kW EV charging
- 50kW DCFC EV charging
- 15kW V2G
- 16kW/64kWh flywheels
- 20kW/80kWh flow batteries
- Site controller with dispatch algorithms

## Hydrogen Project

- 250kW electrolyzer
- 900bar compression and storage
- 700bar dispensing to FCEV bucket truck
- 160kW mobile fuel cell
- Incorporate into GIL site controller



- Clean energy adoption is occurring FTM and BTM
- Management of DER is challenging
  - Manage customer expectations and operational requirements
- Multiple technologies will be needed to support OUC's clean energy goals
  - Emerging Technologies at OUC is evaluating integration, communications, and controls needed for successful large-scale deployment



6MW<sub>DC</sub> 1-axis tracking PV array

5.4MW<sub>DC</sub> PV array

900MW Nat. Gas plant

1030MW Coal plant

6.4MW<sub>DC</sub> PV array