



# HNEI Bidirectional EV Charging Demonstration Project



This demonstration project tests HNEI GridSTART's novel system to manage the operation of shared fleet electric vehicles (EV) via smart control of bidirectional EV chargers, co-optimizing transport needs with campus power/energy cost and benefits

## Summary

- ◆ Support sustainability via fleet vehicle electrification
- ◆ Develop and test an advanced EV car share model
- ◆ Maximize the value of on-campus renewable energy production
- ◆ Reduce the total cost of energy to supply campus building and transportation needs

## Value Proposition

- ◆ A technology that allows both EV charging (energy flow from the power grid to the EV battery) and discharging (drawing electricity from the EV battery) to meet campus or power grid needs
- ◆ EV batteries can supply user energy needs and perform grid services, such as storing renewable energy for later use and demand/supply balancing

## Vehicle-to-Grid (V2G) Technology

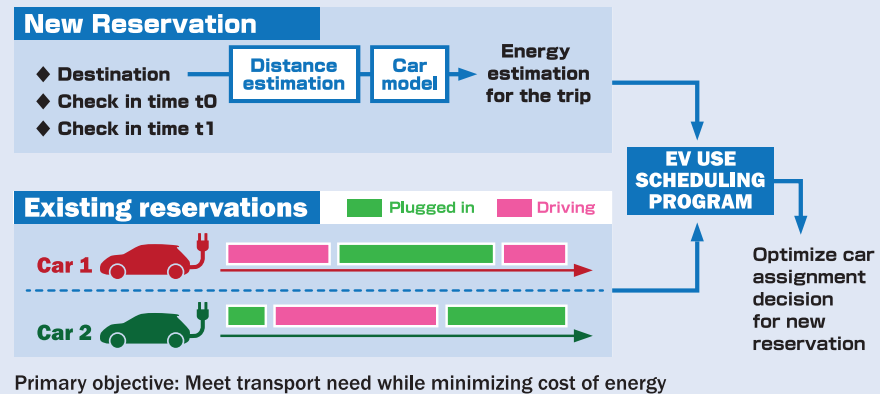
- ◆ EV Use Scheduling: economically efficient assignment of EVs to users based on required distance, time of use, EV availability and battery state of charge
- ◆ Charge/Discharge Optimization: recurrent optimization of EV charge/discharge schedules based on assigned EV use and energy cost reduction
- ◆ Load and Solar PV Forecasting Integration: building energy demand and forecasts of campus PV generation inform EV Use Scheduling and Charge/Discharge Optimization

## GridSTART Algorithms

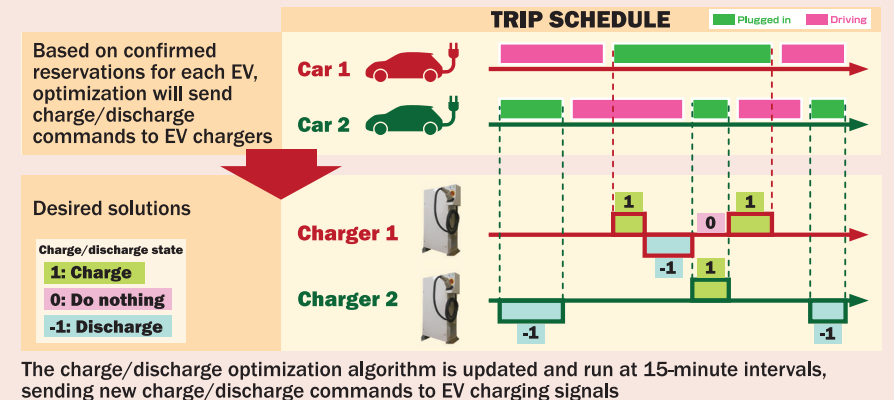


## GridSTART Algorithms

### ◆ EV Use Scheduling

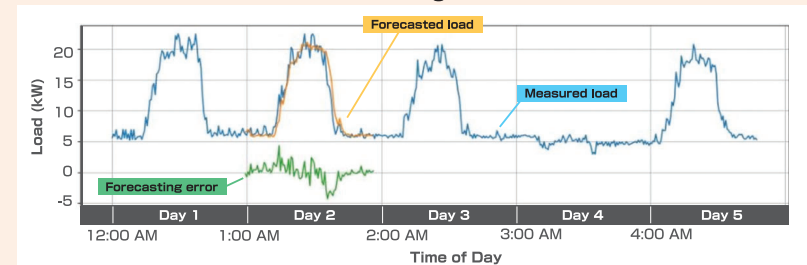


### ◆ Charge/Discharge Optimization



### ◆ Load Forecasting

Results for 24 hours ahead load forecasting:



### ◆ Solar PV Forecasting

HNEI Solar Forecasting System monitors solar irradiance in near real-time, generating PV power forecasts from minutes to day ahead

