

BCIT NRCan EVID Project Workshop Session 2: What is an EVEMS, and How Can it Help?

Janet So, BCIT Smart Microgrid Applied Research Team

Agenda:

- What is an EVEMS?
- How do they work?
- What are the different energy management approaches?
- What does this have to do with MURBs?
- Q&A



What is an EVEMS?

- Acronym for Electric Vehicle Energy Management System
- Sometimes known as
 - Demand charge controller for EV
 - Load managed EV chargers

A means used to control electric vehicle supply equipment loads through the process of connecting, disconnecting, increasing, or reducing power to the loads and consisting of any of the following: a monitor(s), communications equipment, a controller(s), a timer(s), and any other applicable device(s)



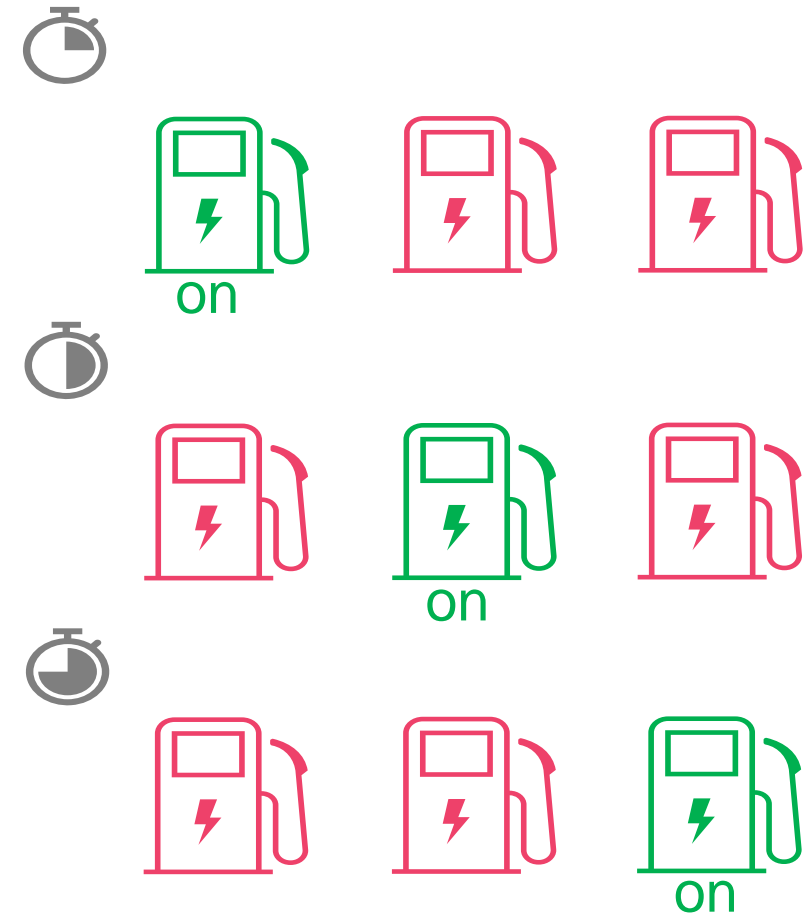
EV Energy Management System

- Allows Level 2 EV chargers to share power rather than be on a dedicated circuit each
- Various control schemes
 - Time Allocation vs Power Allocation
- Compromise between performance and cost



Time Allocation

- Rotational charging
- Assigns power to chargers based on time
- Can be used to schedule charging to avoid demand peaks and related costs



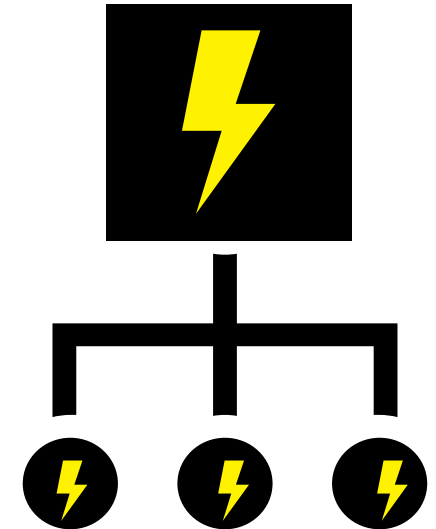
Time Allocation

- Simple and cheaper installation
- Increases use of power switching components, reducing operational life
- Not recommended as long term solution



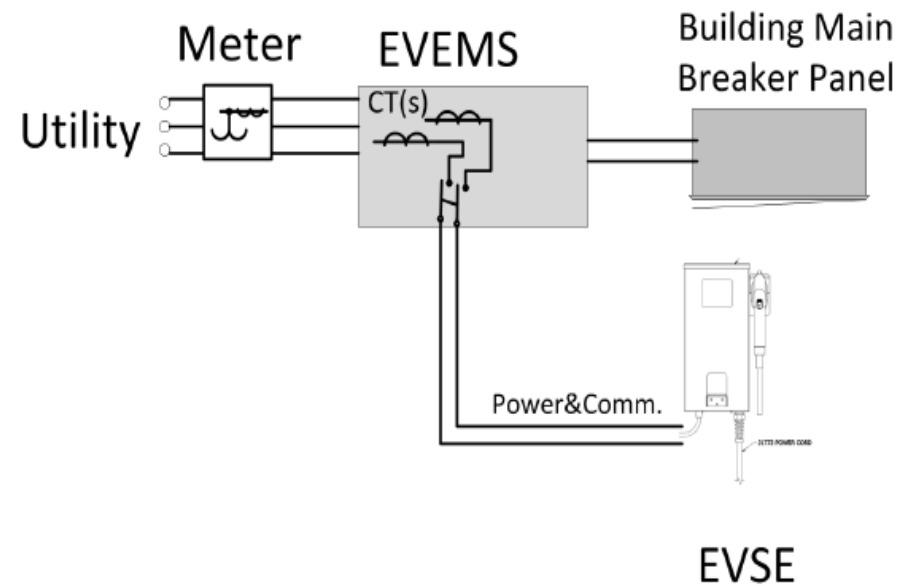
Power Allocation

- Uses various methods to limit or stop power flow to chargers
 - Load switching
 - Load sharing
 - Load management with or without monitoring



Load Switching

- Uses current transformers (CTs) to read real-time consumption of panel
- De-energize EVSE when consumption reaches threshold
- Re-energize EVSE when consumption falls below threshold after set period of time



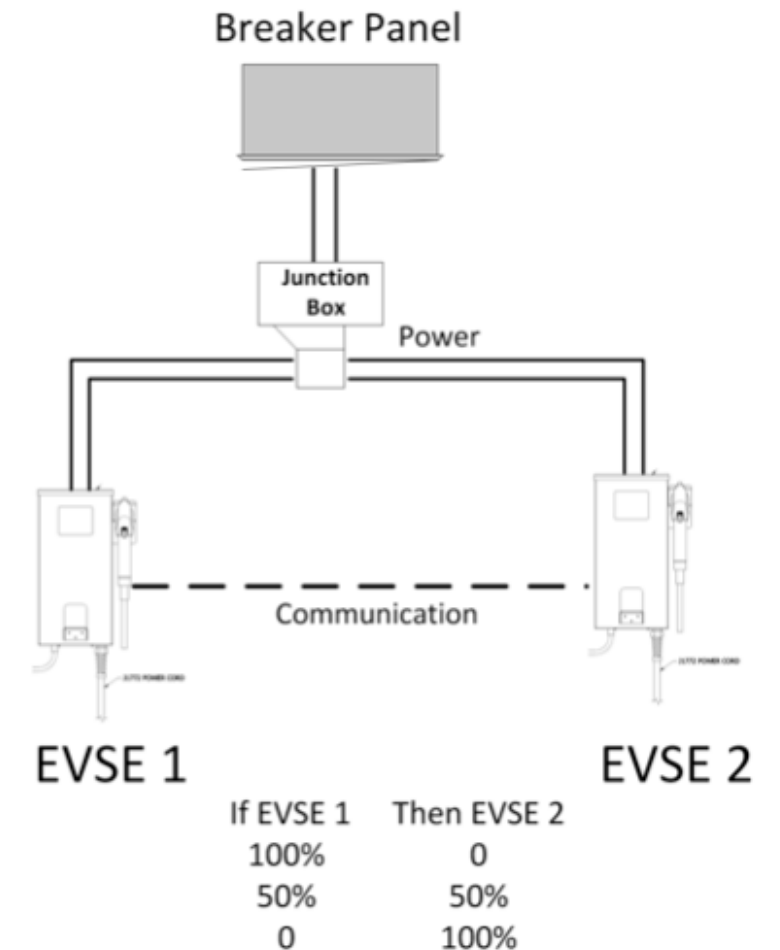
Load Switching

- Simple installation
- Not scalable - only one EVSE per electrical panel
- EVSE will turn off often if panel is close to its limits
- Increases use of power switching components



Load Sharing

- Allocates equal power across all EV chargers that are connected to a circuit
- Simple installation for small-scale deployments of EVSEs
- May not fully utilize available electrical capacity



Load Management without Monitoring

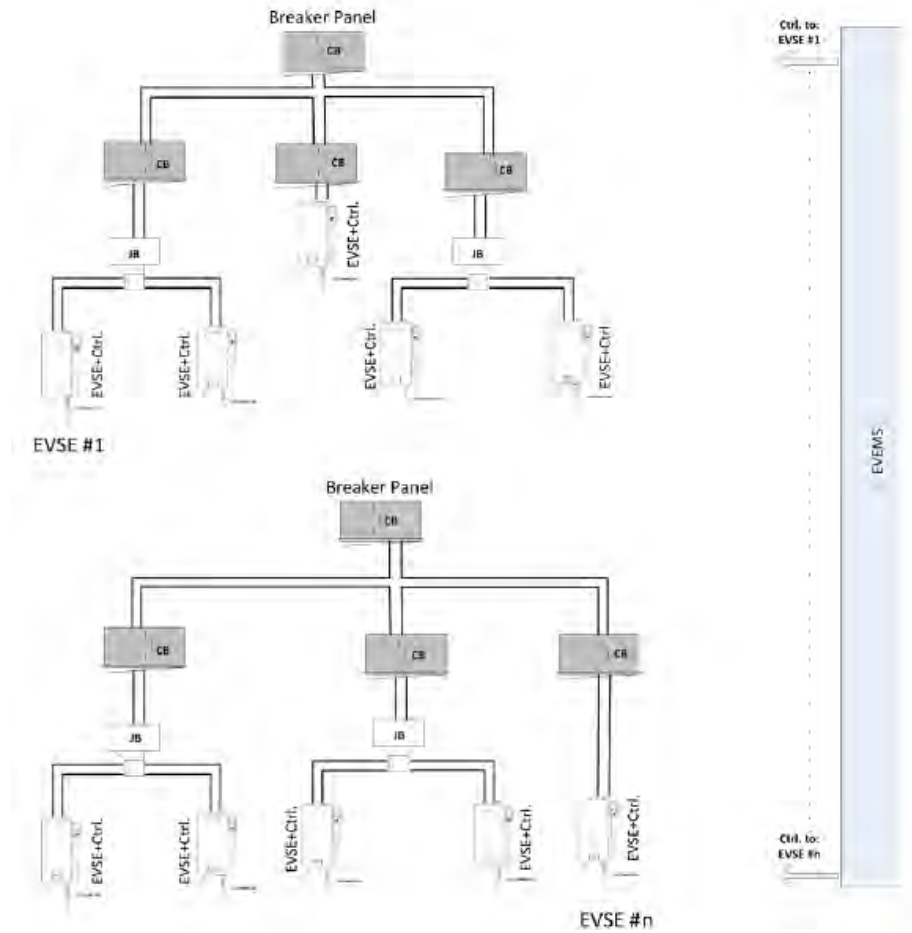
- Delivers power proportional to the actual requirements of an EV
- EVs with lower charging requirement (ex. plug-in hybrid) receive smaller percentage of overall charging capacity



Capacity Allocation

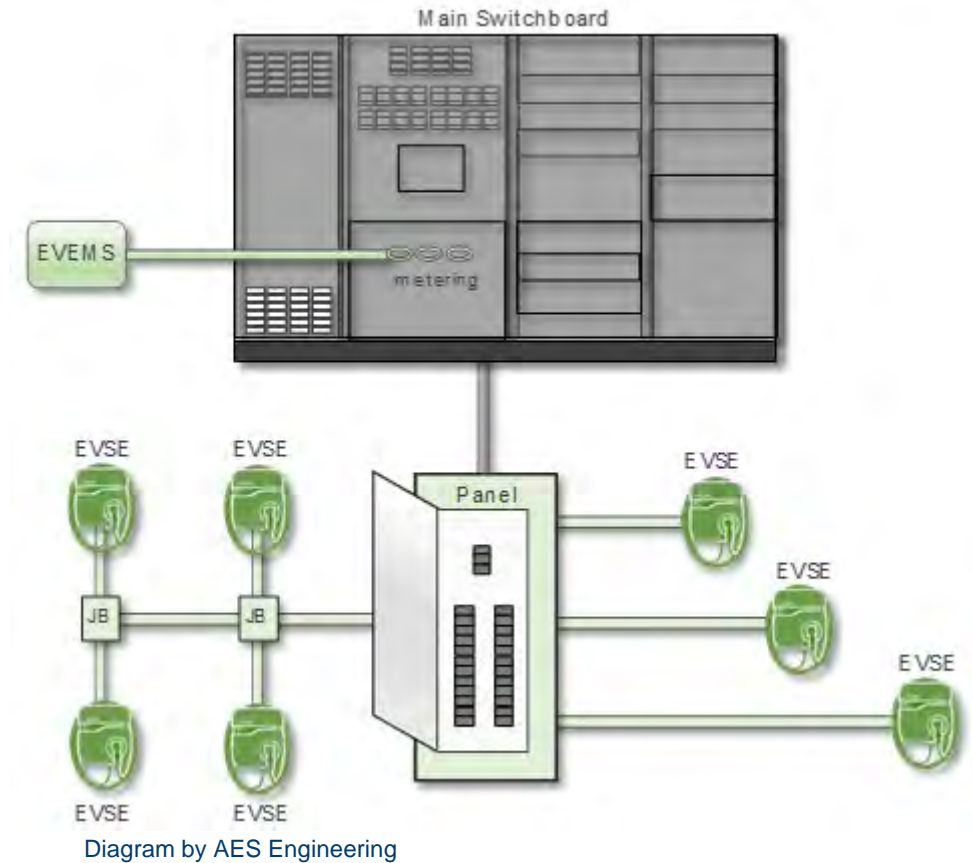
Load Management without Monitoring

- Relatively inexpensive solution for charging large fleet of vehicle in building with limited capacity
- Requires information on EV
- Some inefficiencies when battery becomes full and EV reduces charge rate



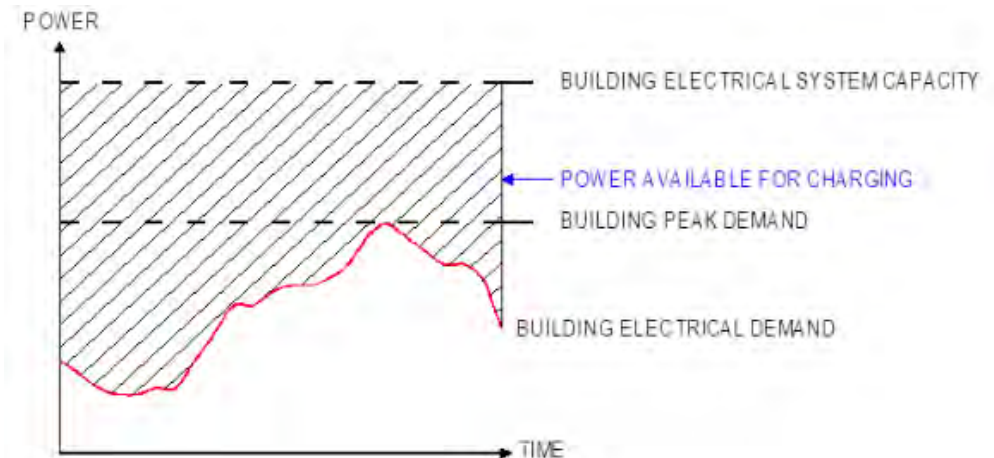
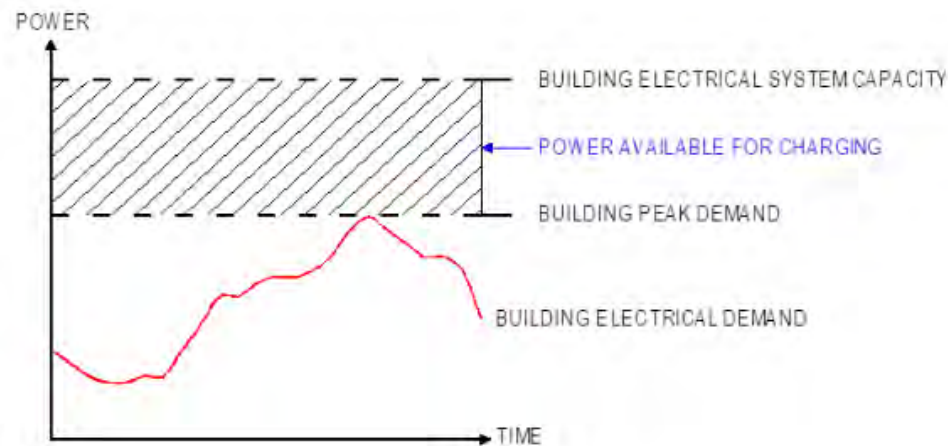
Load Management with Monitoring

- Controls charging based on available capacity and the demand request of each EVSE
- Monitors real-time power consumption of each charger and dynamically allocate power to them



Load Management with Monitoring

- Monitors external power use by installing CTs upstream
- Best able to maximize usage efficiency of building electrical system capacity



Load Management with Monitoring

- Maximizes power delivery
- Can accommodate higher number of EV chargers
- Higher costs, may have service fees
- More complex setup / configuration
- Reduced charging performance



This Photo by Unknown Author is licensed under [CC BY](#)

Safety Considerations and Standard

- Fail-safe mode to prevent panel or circuit overloads
- EVEMS enabled in 2018 CE Code
- Adopted as B.C. Electrical Code in 2020
- CSA Group developing a standard (C22.2 No. 343), used as basis for certification



EVEMS in MURBs

- Maximizes the utilization of existing electrical infrastructure capacity
- Accommodates greater amount of EV charging
- Avoids prohibitive costs needed for capacity upgrades
- Can respond to demand charges, dynamic rates, DR events



Q&A on EVEMS

