Considerations for Charging Infrastructure

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Everything you need to know about EV Charging – in 15 minutes

1. Charging 101
2. Planning questions to ask and answer for fleet and workplace
3. Connected or disconnected charging
4. Case Study
5. Conclusions

Charging 101 – Charging Speed

Charge Level	Level 1	Level 2	Level 3
			
kW	1.4	3.5-19	25-250+
100 miles of range	20 hours	2-10 hours	30 minutes
AC/DC	AC 110 V 20 Amp	AC 208-240 V 40-80 Amp	DC 200-600V 400 Amp 1 or 3 phase

Charging 101 – Connector Types

Standard	A/C J1772	DC CHAdeMO	SAE Combo CCS	Tesla
				
Vehicle Types	Most vehicles have a J1772 port	Japanese Vehicles	Non-Japanese, Non-Tesla vehicles	Tesla
Key Facts	Universal, but 20 kW max	Nissan, Honda	Will this standard overtake CHAdeMO?	Tesla can convert to J1772

How much Charging (workplace)

- Workplace
  - Questions to answer
    - How long is the average commute to work?
    - Do you want employees to leave work to move their car?
    - Do you want to support visitor charging to show off your green?
    - How many vehicles do you want to support?
    - What growth rate should you plan for?
    - Should you put in a mix of level 1, level 2 and level 3 charging?
    - How much space do I want dedicate to EVs?
    - Should they be the closest spots to support EV charging?
    - How much room is there in my current electrical infrastructure

Fleet Charging

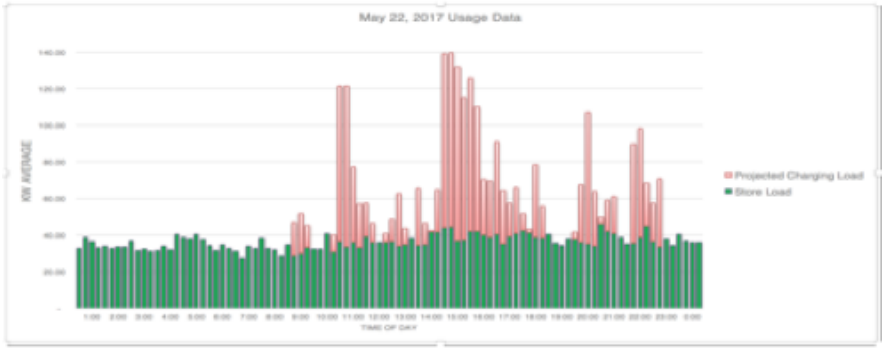
- Fleet charging under corporate control
- How many vehicles in the next N(5?) years?
- How many miles and therefore how many kWh will I need to provide every day?
- How much charging is required during the day, versus overnight charging.
- Where will the vehicles be housed? Do employees take them home and should I consider home charging?
- What will be the impact on the electrical infrastructure of the home base?
- Do I want a separate service or add it into the building meter

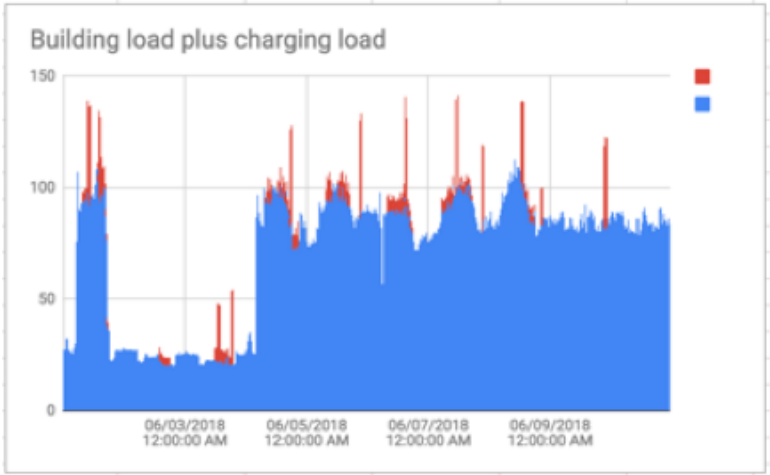
Connected or Dumb Charging ?

+ Benefits of offline charging
  - Cheaper equipment (typically the same high infrastructure costs for connected)
  - No monthly fee
+ Benefits of connected charging
  - Can influence charging behavior through targeted pricing
  - Can manage wait lists and queueing
  - Gather information regarding charging behavior, vehicle types and drivers
  - Can shift charging to reduce cost and potentially limit infrastructure needs
  - Ensure only authorized users charge at the charging stations
  - System dashboard shows real-time charging activity
  - Can interact with building load for the benefit of the host site

Adding Charging to existing loads

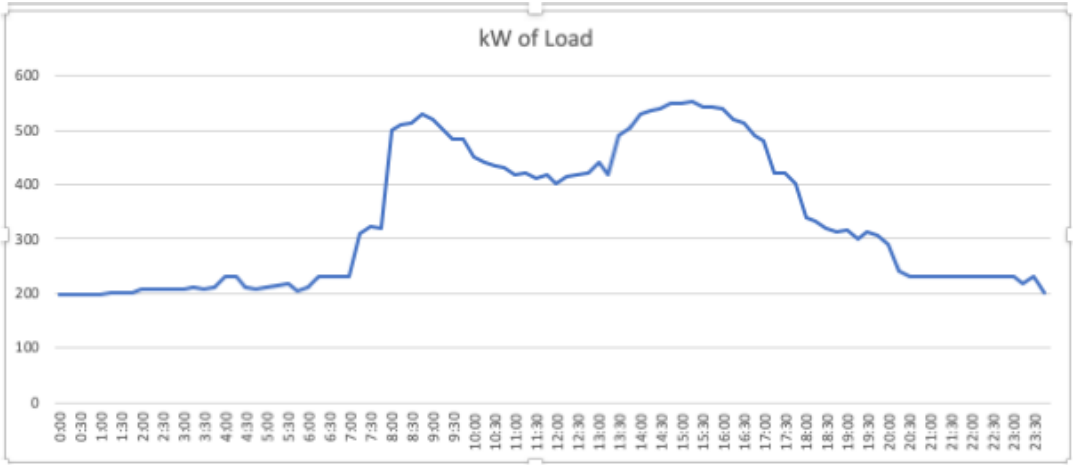
+ There are pluses and minuses for separating EV charging loads
+ Some utilities have special tariffs for EV charging.
+ Some base loads are peaky, some are smooth
+ Solar can be a factor





Case Study - baseline

- Site has 1 MW of electrical capacity at site
- Load Characteristics
  - Peak-Peak in year is 850 kW
  - Typical peak is 550 kW
  - Peak is from 8:00-10”00 as day starts and then again at 14:00 as air conditioning load is highest.



Case Study - Strategies

- Desire to add charging for 50 vehicles
- At level 2, 40 Amps, that would be 50 X 8 kW = 400 kW of charging
- Since the peak peak is 850 and there is 400 kW of charging potential, you must have software to read the meter and restrict the load when the peak is over 600 kW.
- Must install connected charging to support energy management
- Could install a few level 3 for fast charging of 100 kW. Should create rules ensuring that consumers only charge for 30-45 minutes. Recommend dual hose on charger for both CCS and CHAdeMO.
- Depending on the tariff, the load shape supports managed charging into the valleys of the building load peak

Conclusions

- Managed Charging supports a variety of strategies
- Level 2 charging supports casual charging of most vehicles
- Understand local tariffs; they can drive infrastructure decisions
- Construction and installation costs are typically much higher than the charging equipment purchase. Plan carefully for growth when embarking on an infrastructure project
- Understand the needs of your fleet. How far, how many kWs, when will they be parked?
- Consult an expert to support the planning process. (paul.lipkin@chargepoint.com)