ENERGY STAR® Certified Electric Vehicle Charging Stations

Peter Banwell, U.S. EPA
October 8, 2019

Best Practices for EV Charging in Commercial Buildings
## Electric Vehicle & Charging Basics

<table>
<thead>
<tr>
<th>Power Source</th>
<th>All-Electric Range*</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Plug-in hybrid electric vehicle (PHEV)</td>
<td>10-50+ miles</td>
<td>Chevy Volt</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BMW i8</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Prius Prime</td>
</tr>
<tr>
<td>All-electric or battery electric vehicle (BEV)</td>
<td>Up to 300+ miles</td>
<td>Tesla models</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Nissan Leaf</td>
</tr>
<tr>
<td></td>
<td></td>
<td>BMW i3</td>
</tr>
</tbody>
</table>

*as of September 2019
# Electric Vehicle & Charging Basics

<table>
<thead>
<tr>
<th>Electric Current</th>
<th>Charging Rate</th>
<th>Connector(s)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Level 1</strong></td>
<td>Alternating current (AC)</td>
<td>J1772</td>
</tr>
<tr>
<td>120 volt (V), 20 amp (A)</td>
<td>2 to 5 miles of range per hour of charging</td>
<td></td>
</tr>
<tr>
<td><strong>Level 2</strong></td>
<td>AC</td>
<td>J1772</td>
</tr>
<tr>
<td>208/240V, 30A</td>
<td>10 to 20 miles of range per hour of charging</td>
<td></td>
</tr>
<tr>
<td><strong>DC Fast</strong></td>
<td>Direct current (DC)</td>
<td>J1772 Combo (CCS)</td>
</tr>
<tr>
<td>208/480V, 80-200A (and higher)</td>
<td>60 to 80 miles of range per 20 minutes of charging (for 50kW)</td>
<td>CHAdeMO, Tesla</td>
</tr>
</tbody>
</table>
Electric Vehicle Market Indicators

EEI and IEI say nearly 19 million EVs on the road by 2030…

…and more than 9.5 million charge ports needed to support them.

Source: EEI and IEI, Electric Vehicle Sales Forecast and the Charging Infrastructure Required Through 2030, November 2018
Efficiency Opportunities in AC Charging

Level 2 EV chargers are 98%+ efficient during steady state charge

Efficiency Opportunities in AC Charging

Opportunity for energy savings in standby mode, when the vehicle is not actively charging
ENERGY STAR Version 1.0 Specification Today

Scope:
✓ AC Level 1
✓ AC Level 2
✓ AC Dual Input L1/L2

Key Features:
1. Energy Savings, 40% in Standby Modes
2. Safety
3. Open Communications

Communications Details:
- Grid Communications
- Open Access
- Consumer Override
ENERGY STAR Charging Partners

as of September 2019
Marketing Efforts

Increasing Brand Awareness + Visibility

- Label use by partners (e.g., Blink, ChargePoint, EVBox)
- Industry media (e.g., CHARGED Magazine)
- Conference, webinar participation (e.g., Roadmap, EPA State & Local)
- Materials development (e.g., EV-ready commercial buildings)
Partnerships & Collaborations

California Energy Commission (CEC)
- California Electric Vehicle Infrastructure Project (CAleVIP)

New York State Energy Research & Development Authority (NYSERDA)
- Charge Ready NY Program
Partnerships & Collaborations

• **State Agencies** (additional examples)

• **Utilities** (examples)
ENERGY STAR Version 1.1 Specification

• Key topics that will be addressed in the specification:
  – Criteria to recognize energy efficiency in DC EV charging stations:
    ✓ Active charging % efficiency
    ✓ Minimizing heating and cooling
    ✓ Standby losses – display, lighting, network

• Progress to date:
  – Final Draft Test Method released Sept 2019
Incorporate ENERGY STAR EV Chargers

• Learn more
  – Visit the ENERGY STAR EV Chargers webpage, https://www.energystar.gov/products/other/evse
• Select ENERGY STAR qualified products for workplace, fleet charging
  – Incorporate into procurement language, policies
Contact the ENERGY STAR Team with Questions

• Existing Partners: Reach out to your buildings account manager

• Questions related to ENERGY STAR EV charger efforts:
  – Peter Banwell: Banwell.Peter@epa.gov
  – Stacy Noblet: Stacy.Noblet@icf.com
The Electric Revolution Is Here.

Our obsession? Making it easy.
EV Charging for Commercial Buildings

Mike Fogerty
Sr. Director, National Accounts
ChargePoint Teams with ENERGY STAR® on Efficient EV Charging Solutions

Anna Smart
Vice President, Public Policy
The automotive industry is moving to electric

**Tesla**
- Double Model 3 production and reveal the Model Y this year

**GM**
- 20 all-electric cars by 2023

**Ford**
- 16 fully electric vehicles and 40 electrified vehicles through 2022
- First all-electric compact SUV (Macan) and third EV after Taycan and Cross Turismo (planned for 2019, 2020)

**Audi**
- 30 BEV and PHEV models by 2025
- Every Jaguar and Land Rover launched from 2020 will be electrified

**Hyundai Motor Group**
- 44 electrified Hyundai/Kia/Genesis models by 2025
- Almost 70 new electric models by 2028
- 50% of Volvo Cars’ sales volume to be fully electric by 2025 and plans a hybrid or full-electric powertrain for all models

10+ new all-electric vehicles by 2022 and plans to electrify entire Mercedes-Benz portfolio

Almost 70 new electric models by 2028

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More drivers are choosing electric

**US Plug-in Vehicle Sales**

- **Cumulative EV Sales (000s)**
- **Actual Annual EV Sales (000s)**
- **Forecast Annual EV Sales (000s)**

40%+ YoY Growth

Source: EVvolumes.com

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Global Passenger to EV Projections

Global long-term passenger vehicle sales by drivetrain

Source: BloombergNEF
Commercial charging is big and growing

- 4,000+ Businesses
- 500,000+ EV Drivers
- 50% YoY Growth
- 40%+ Adoption

FORTUNE 500
Employees want to charge at work

Workplace Charging:

- 2nd most frequently used charging location
- 32-39% of employees use workplace charging in addition to home (INL study)
- Doubles the electric range for most drivers
- Primary charging source for many drivers
Contributing to your sustainability initiative

- Each EV driver contributes .5 to .75 MT of CO$_2$e reduction per year
- At scale, EV charging can reduce a company’s global commute emissions by as much as 3%
- ChargePoint charging stations are designed to be energy efficient and reduce energy consumption **ENERGY STAR**
- Networked stations offer advanced Power Management capabilities
- Adding EV charging to commercial building contributes to LEED points
3 Considerations and Best Practices

1. Plan ahead
1. Plan ahead

### Reduce Expenses

<table>
<thead>
<tr>
<th>Cost difference between New Construction and Retrofit</th>
<th>Location location location</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Cost of Civil work - Trench length, asphalt and concrete repair</td>
<td>+ Price per foot</td>
</tr>
</tbody>
</table>

**Compliance Regulation – ADA, Building Codes**
- Adds considerations such as parking count, path of travel, etc.
- Such adjustments in a retrofit can be very costly – see Civil Work calculations
- Many municipalities are adding building codes such as make-ready

**Utility Coordination (if needed)**
- Easier to include EV load or potential load into initial Utility calculations
- Utilities are usually not allowed to upsize services unless there’s stated demand

**Electrical Distribution**
- The location of the electrical panel should be located as close as possible to reduce costs
- Plan ahead with your EC & EVSE for potential service panel upgrades
- Choose switchgear that allows for expansion

**Permitting**
- Permitting fees easily wrapped into original project with new construction
- Permitting can range from a few hundred to thousands just for a single EV charger
- As part of a large project, the EV component will not be as scrutinized – 1 electrical single line diagram, signage, structural, planning etc. - Saves Time and Money
3 Considerations and Best Practices

1. Plan ahead
2. Consider the driver experience
2. Consider the driver experience

Know your audience and plan a solution that will **scale with you**

<table>
<thead>
<tr>
<th>Define your users</th>
<th>Tailor the Experience</th>
<th>Understand User Requirements</th>
</tr>
</thead>
<tbody>
<tr>
<td>+ Employees, VIP, Guests, Customers, Contractors, etc.</td>
<td>+ Access rights</td>
<td>+ Access and availability</td>
</tr>
<tr>
<td>+ Internal fleets (if appropriate)</td>
<td>+ Pricing policies</td>
<td>+ Cost and convenience</td>
</tr>
<tr>
<td></td>
<td>+ Waitlist</td>
<td>+ Predictability and consistency</td>
</tr>
<tr>
<td></td>
<td>+ Valet services</td>
<td></td>
</tr>
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2. Consider the driver experience

Is faster always better?

**Level 2**
AC Charging
7 kW
25 mile RPH

- Ideal for workplace charging (2-3 hours of charging)
- Used in 90+% of workplace environments today
- Most efficient for cost and power output

**Level 3**
DC Charging
62 kW
250 mile RPH

- Accommodates need for rapid charging
- Ideal for unplanned driver scenarios
- Pairs well with valet services
- Used as a bridge to longer term expansion
- Self-service requires policies to drive higher turnover
3 Considerations and Best Practices

1. Plan ahead
2. Consider the driver experience
3. Use resources and reduce cost
3. Use resources and reduce cost

Most sites require prep (make-ready) before installing EV chargers

Diagram showing:
- Utility distribution network
- Utility pad mounted transformer
- Meter
- Panel
- EV charger
- Electric vehicle
3. Use resources and reduce cost

Make-ready expense is lowest during new construction

New Construction

• $500 to $900 per parking space
• 1/5 the cost of post construction (or less)

Post Construction

• $2,500 to $4,500 per parking space
• 5X the cost of pre-construction (or more)
3. Use resources and reduce cost

Make-ready expense is lowest during new construction

New Construction
- Establish standards to prepare 10% of parking spaces for EVs
- Build for future

Post Construction
- Consider EVSE incentive programs if available
- Build for future
3. Use resources and reduce cost

Number of EVSE incentive programs by State

Today
69 Active EVSE Programs
(State or Utility sponsored)

Track All Grants & Utility Incentives:
https://www.chargepoint.com/incentives/home/
3. Use resources and reduce cost

Engage ChargePoint Early
- Will help with site planning for this feature
- Will configure power management post station activation
- Will help with electrical contractors

Resources
- NEC and CEC code changes
- UL Listing
- Site Specific Cut Sheets
- Solutions engineering support

ChargePoint Solutions Engineering team will work with you to create a site specific cut sheet
Class A+ Residential

Private Resident Library with Terrace
Spa-Quality Fitness Center & Studio
Two Rooftop Lounges w/ Spectacular Views
360-degree Skytrack Perimeter Rooftop Walking

Landscaped Rooftop w/Pool
7 x 24 Valet Service
Concierge, Pet Services, Event Planning
Chef Service, Observation Deck, etc.
Lessons Learned- the tactical story

+ 373 Luxury Units Parked 1:1 7x24 valet service
+ (3) Floors of underground parking (75,000 SF)
+ (6) charging stations spec’d by the architect…?!
+ CP has now quoted (6) CT 4Ks

Issues:
+ Charger ratio 1:62- Way Low based on likely expectations
+ Locations random- over (3) floors. No additional make-ready
+ Power (not enough)- wired for only 20 amps. Will impact user experience
+ Post-deployment operational plans/policy??

Lesson- Lack of pre development planning impacting $$/time/expectations
Why companies are investing in EV charging

“It’s not only good for the employees, it’s actually good for our customers. They want to see a company that is focused on sustainability.”

“When you pull in, you see 12 charging spots in front. This shows people we’re a company that cares about the environment.”

“…It also helped us achieve our LEED certifications and enhance our green image.”

“Employees are thrilled about workplace charging and it’s been a selling point during interviews.”

“…But the biggest surprise was how it helped us attract and retain talent … It really helped us recruit good candidates and keep them happy.”
EV Charging at Verizon

Best practices and lessons learned

Michael Sandford, Verizon Global Real Estate
10/2019
Verizon has a long history of promoting EVs

Program history:

• **2011**: Verizon installs first stations with early focus on fleet vehicle charging

• **2013**: Verizon joins the “Workplace Charging Challenge”

• **2017**: Sets public goal of installing stations at 75 locations company-wide by 2020

• **2019**: Total of 65 sites with charging infrastructure in place, 176 total stations as of 10/19
EV Charging program ownership

**Sustainability**
- BAU program management
- Internal communications
- Employee onboarding

**Real Estate (Energy team)**
- New site selection
- Funding new stations
- Coordinating technical support

**Real Estate (Operations)**
- Day-to-day technical support
- Installation support and project management

**Account Management, Driver Helpdesk**
- Strategic vendor, technical support, platform and payment management
Verizon’s process of installing new stations

Site Selection:
• Predict demand across company-wide portfolio based on employee population and geography.
• Assess needs of buildings upon request.
• Compare to Verizon GRE standards.
• Determine feasibility
  • Landlord approval
  • Physical parking layout
  • Electrical capacity
  • Local zoning compliance

Installation:
• Provide Scope of Work Template to site project manager
• Solicit multiple bids for electrical work
• Ensure proper signage and ADA compliance
• Complete ChargePoint “Site Readiness Certificate”
• ChargePoint performs final installation

Expansion:
• Monitor utilization data to assess need for expansion
Site selection lessons learned

- Take advantage of all available state, local, and utility rebate programs. Most need applications prior to starting work
- Check with landlord prior to any work
- For large installations, check with utility for feeder capacity
- Predict demand based on local EV penetration rate
- Add to solar installations where available

Locations of Verizon’s installed EVCS infrastructure
Installation lessons learned

- Oversize all conduits to allow for future expansion
- Utilize dual-port stations
- Ensure proper electrical due diligence
- Verify contractors follow all local codes/apply for all necessary permits
- Put new EVCS adjacent to existing HC parking
- Install bollards for station protection
- Minimize distance to electrical infrastructure
- Check for local ADA req.

Example EVCS plan at Verizon location
Expansion lessons learned

- Increase existing asset utilization by permitting only active charging
- Set nominal fee when plugged in to encourage only active charging (increase utilization)
- Develop process for enforcement of non-compliance
- Expand on existing infrastructure when utilization is maximized
Program Management lessons learned

• Generate excitement through routine communications/new station announcements
• Establish clear rules for the program and get buy-in prior to signing drivers up
• Work with security to establish process for enforcement
• Promote EV charging along with other “Green Commuting” options
• Be thoughtful with incentives (free charging, “VIP parking”, etc)

Announcement of new stations on internal news feed
Trends

- More requests for stations at smaller locations (Pull vs. Push)
- 37% growth in number of unique charging sessions
- 20% growth in charging station utilization
- Increased employee demand for enforcement of program rules
- Wider variety of EV models and price points available
- Avg. session length increased 16 min. YOY (3:45 vs. 3:29)

**Charging Sessions**

- Unique charging sessions over time

**YOY Station Utilization Trend**

- Station utilization trend by year
Summary of lessons learned

• Determine a mission for the program
• Think long term
• Leave room for expansion
• Involve multiple organizations
• Leverage partnerships
• Set public goals
• Communicate!

Verizon’s newest EV stations in El Paso, TX, turned up 10/2/19
Q&A