Electric Vehicle Charging
Perspectives from Texas A&M’s Transportation Services
Let’s define some terms

What is a kWh?

- 33.7 kWh of electricity = 1 gallon of gas

What is MPGe?

- 33.7 kWh of electricity = 1 gallon of gas
- MPGe is the distance a car would travel on 33.7 kWh of energy
- Look also at kWh’s per 100 miles

![Diagram showing 10 100-Watt Light Bulbs + 60 Minutes = 1 kWh](image-url)
Charging Levels Explained

Level 1:
• 120V AC outlet
• Power range of 1kW to 1.8kW
• 1.8kW at max would roughly provide 7 miles per hour of charge

Level 2:
• 208-240V AC outlet
• Power range of 3kW to 19.2kW*
• 7.7kW at max would roughly provide 25 miles per hour of charge

Level 3:
• 480V AC/DC Conversion
• Power range of 30kW to 360kW
• 60kW at max would roughly provide 240 miles per hour of charge

* To go beyond 7.7kW in a level 2 configuration requires 3 phase wiring
<table>
<thead>
<tr>
<th>Car</th>
<th>Architecture</th>
<th>Battery Capacity</th>
<th>DC Uptake</th>
<th>Range per Hour of Charge</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Nissan Leaf</strong></td>
<td>400V</td>
<td>40kWh</td>
<td>46kW</td>
<td>140 miles</td>
</tr>
<tr>
<td><strong>Tesla model 3</strong></td>
<td>400V</td>
<td>60kWh</td>
<td>170kW</td>
<td>390 miles</td>
</tr>
<tr>
<td><strong>Porsche Taycan</strong></td>
<td>800V</td>
<td>80kWh</td>
<td>223kW</td>
<td>630 miles</td>
</tr>
</tbody>
</table>

*Due to different systems, there is no consistent way to say exactly how many miles of range a given charger can deliver per hour of charging time.
A brief history of Charging on Campus

The 1st Level 2 was placed on lot 41 at the George Bush Presidential Library in 2012

By 2015 all 5 campus garages had at least one level 2 EV charger
• Central, South, West, North, University

2016 added Cain Garage and three chargers

We’ve seen multiple providers
Each had their own set of issues
• Reliability
• Hardware problems
• Credit card reader malfunctions
• Unfulfilled service requests
A New Service

August of 2021, installation of six new Level 2 chargers in Polo Rd Garage

We chose a new offering with several advantages:
• Dashboard Control
• No need to run comms line to chargers
• No individual credit card readers
• Switchgear, metering & network all in one unit
After 4 months of testing, refit of all garages
- Stallings by end of 2021
- North, West, University, South in 2022
- Central Campus Garage in February 2023

Level 2 Charger Expansion complete

All now offer at least four Level 2 chargers
- 30 chargers across 7 garages using Hydra controllers
- 33 total with two at RELLIS and one at George Bush Library
Trends on Campus

EV adoption on campus has grown exponentially
• Currently 211 permitted Tesla vehicles
• Soon to have a visual on all EV’s registered

Tracking the use of EV chargers
• December, January, February- Northside Garage highest use
  • Longer duration charges with multiple sessions per user indicates likely a northside dorm resident
• During Football Season- Stallings and Polo Road Garage saw the highest use
Community Trends

ChargePoint Superchargers at Brookshire Brothers
• 2 stations providing up to 50kW

Tesla Superchargers at Holleman HEB
• 8 stations providing up to 250kW
Industry Moves

Acceleration of available Level 3 Chargers
- Alternative Fuel Corridor Designation Rounds 1-6
- NEVI- National Electric Vehicle Infrastructure

Tesla still superior at Level 3
- Saturating the US with more available chargers than any competitor
- Europe now requires Tesla to open network
- State level discussions in California
- National level discussions

Not just a few players anymore
- PlugShare is an open network, listing multiple vendors
- Chargepoint, Blink, Tesla, more to come...
Future Funding Opportunities


https://afdc.energy.gov/laws/fed_summary?technologies=ELEC

Questions/ Comments

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