EV Charging

OMEGA

GPD GROUP®

Introductions

Brian Peterson, PE

- 20+ years of experience
- Serves as the Director of EV and Energy
- National Account Manager for private electric charging implementation
  - Design of more than 6,000 stalls at over 800 sites
  - Permitting and utility coordination
- Renewable Energy Lead
  - Interconnection consulting

Scott Jaffee, PE

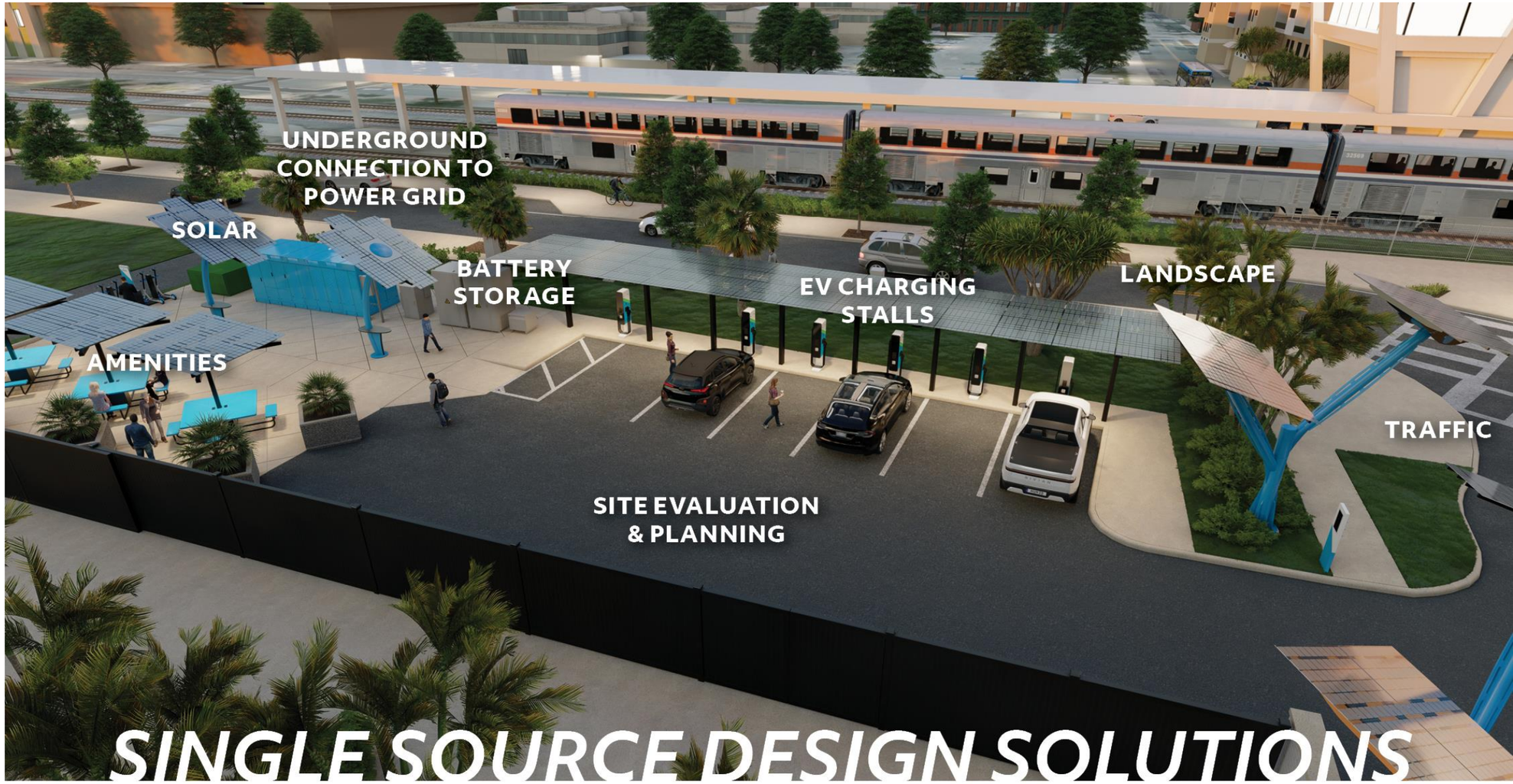
- 10+ years of experience
- Program Manager on the Smart Columbus Electrification Program
  - Coordinated with MPOs, IOUs, DOTs, cities, counties, consultants, MUDs, charging companies, etc.
  - Led design of 175+ Columbus fleet chargers
  - Helped navigate City permitting and zoning processes
  - Championed EV readiness design

EV Charging Experience

Design of EV charging stations in **all 50 states** since 2015

Design of more than **6,000 stalls** at over **800 sites**

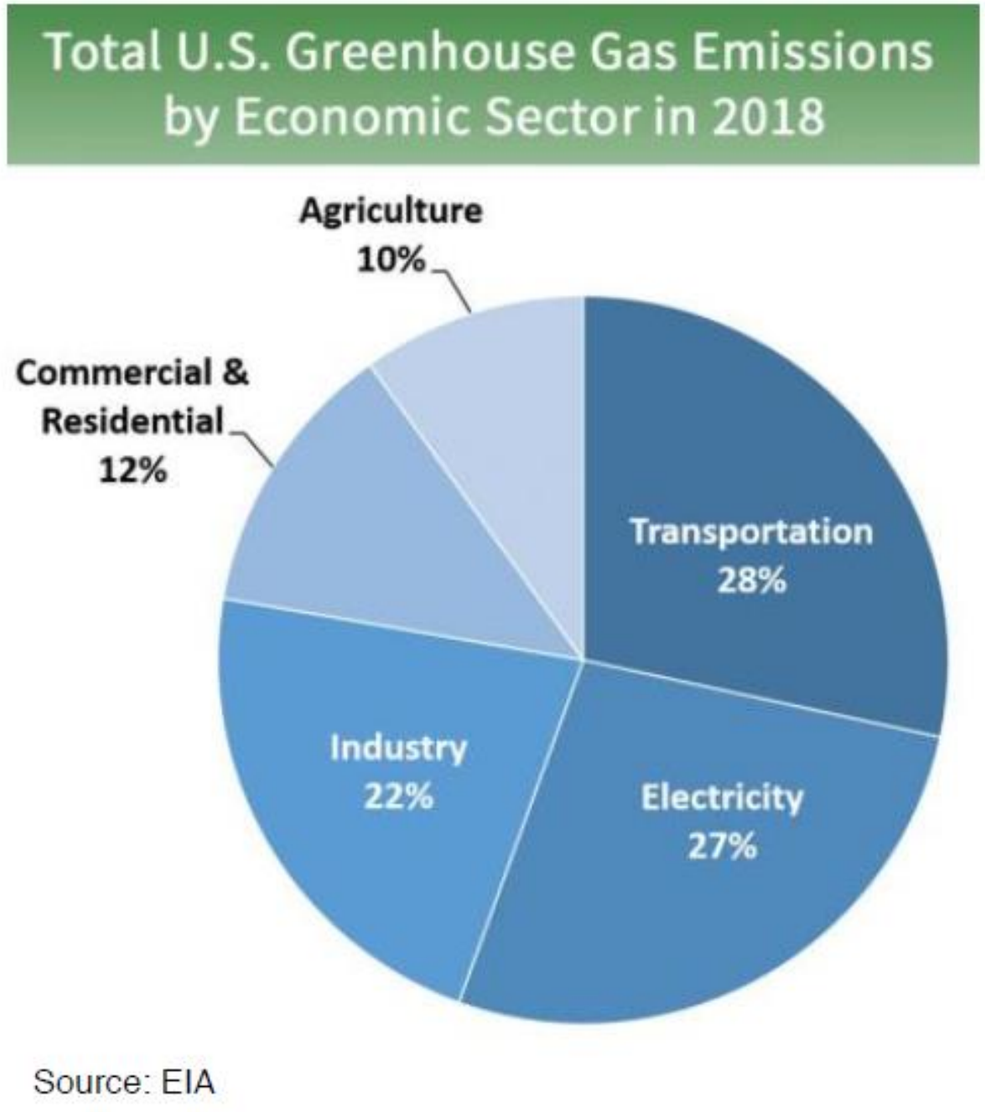
Manage a **$10M charging program** for one of the nation's leading EV OEMs, providing **design for over 525 sites** with anywhere from **8-60 spaces per site**



State of the EV Environment

The Auto Industry is Shifting

- Cost parity anticipated by 2025 (ICCT)

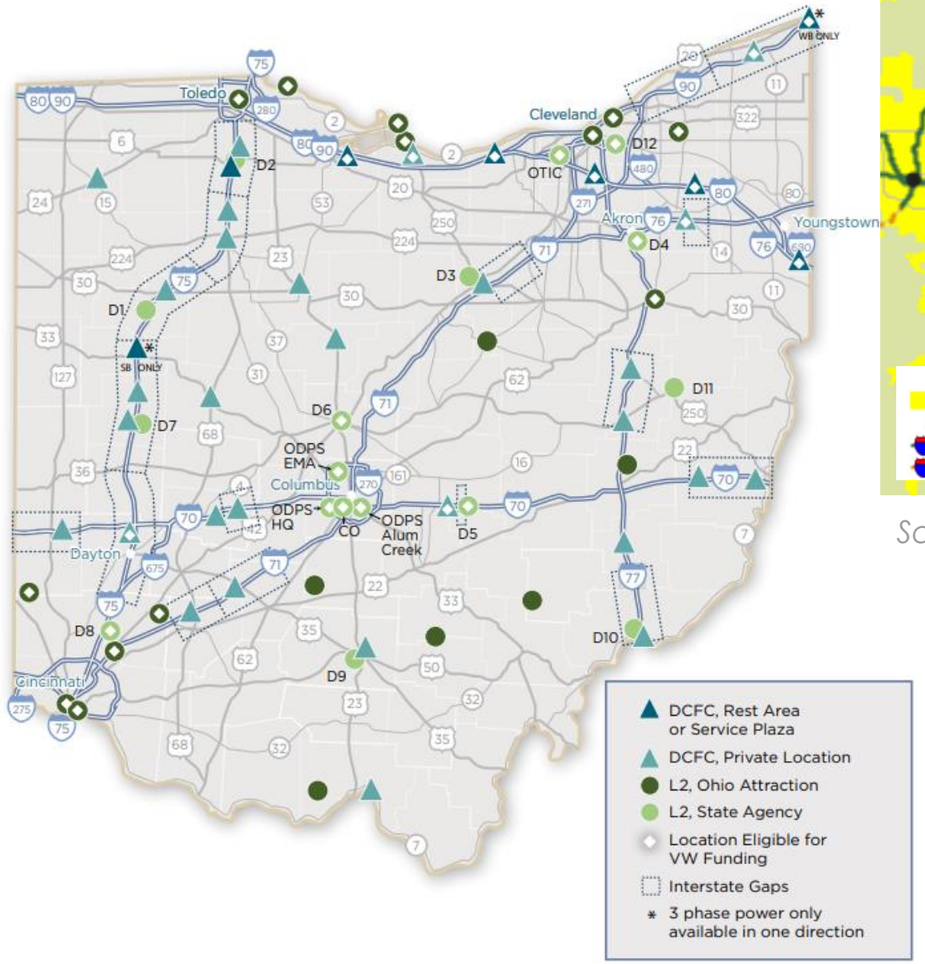


Federal and State Push

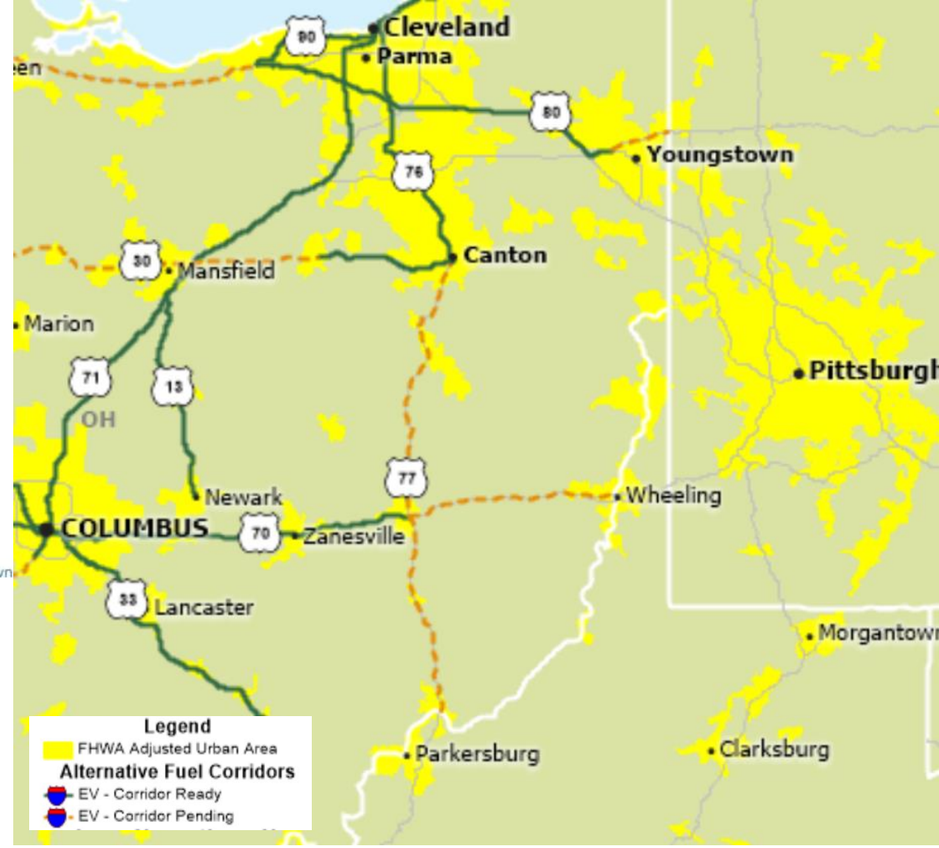
- Charging Infrastructure / Range Anxiety
- Fleet EV Conversion
- Consumer Adoption
- Climate Resiliency (GHG Emissions)
- Workforce Development
- e-Mobility / Active Transportation
- Safety

ALL DRIVE NEW INNOVATION

Figure ES-2: Recommendations for Direct Current Fast Charging and Level 2 Charging



Source: DriveOhio EV Charger Siting Study – June 2020



Source: Federal Highway Administration

Local Push

Program Kick-Off Meeting

Launched the Ride & Drive Roadshow

AEP Ohio launched their EV Charging Station Incentive Program

AUGUST 2016 Program Begins

Electrification Plan Approved, Implementation Begins

APRIL 2017

Launched the MUD Charging Program

Launched the Acceleration Partners Program

Launched the Smart Columbus Electrified Dealer Program

APRIL 2018

Yellow Cab of Columbus purchased 10 Chevy Bolt EVs

Central Ohio reaches 2.34% EV adoption rate

JANUARY 2019

City of Columbus purchased an additional 66 fleet EVs

Columbus Division of Power begins Smart Street Light Project

Presented at EVS32 in Lyon, France

Smart Columbus reaches goal of 3,200 EVs sold

46 charging ports installed for City of Columbus Phase 3 Fleet EV Chargers

APRIL 2020 Program Ends

PHASE 1 | PHASE 2 | PHASE 3 | PHASE 4

Q1 Q2 Q3 Q4 Q5 Q6 Q7 Q8 Q9 Q10 Q11 Q12

Smart Columbus Electrification Plan Workshops

AEP Ohio begins installing AMI meters

City of Columbus purchased 93 public fleet EVs

Navigant Baseline Survey Published

Experience Center Grand Opening

Presented at EVS31 in Kobe, Japan

Columbus Police Department deployed six e-bikes

86 charging ports installed for City of Columbus Phase 1 Fleet EV Chargers

8 charging ports installed for City of Columbus Phase 2 Fleet EV Chargers

AEP Ohio launched the CES program

Yellow Cab of Columbus purchased 10 Tesla Model 3's

Opening of the DC Fast Chargers on Fulton Street

Managed the Smart Columbus Electrification Program

Level 1

- 110/120V at up to 16A
- 20-40 miles of range per night
- Best suited for PHEV or smaller capacity BEV vehicles where a power upgrade is not required

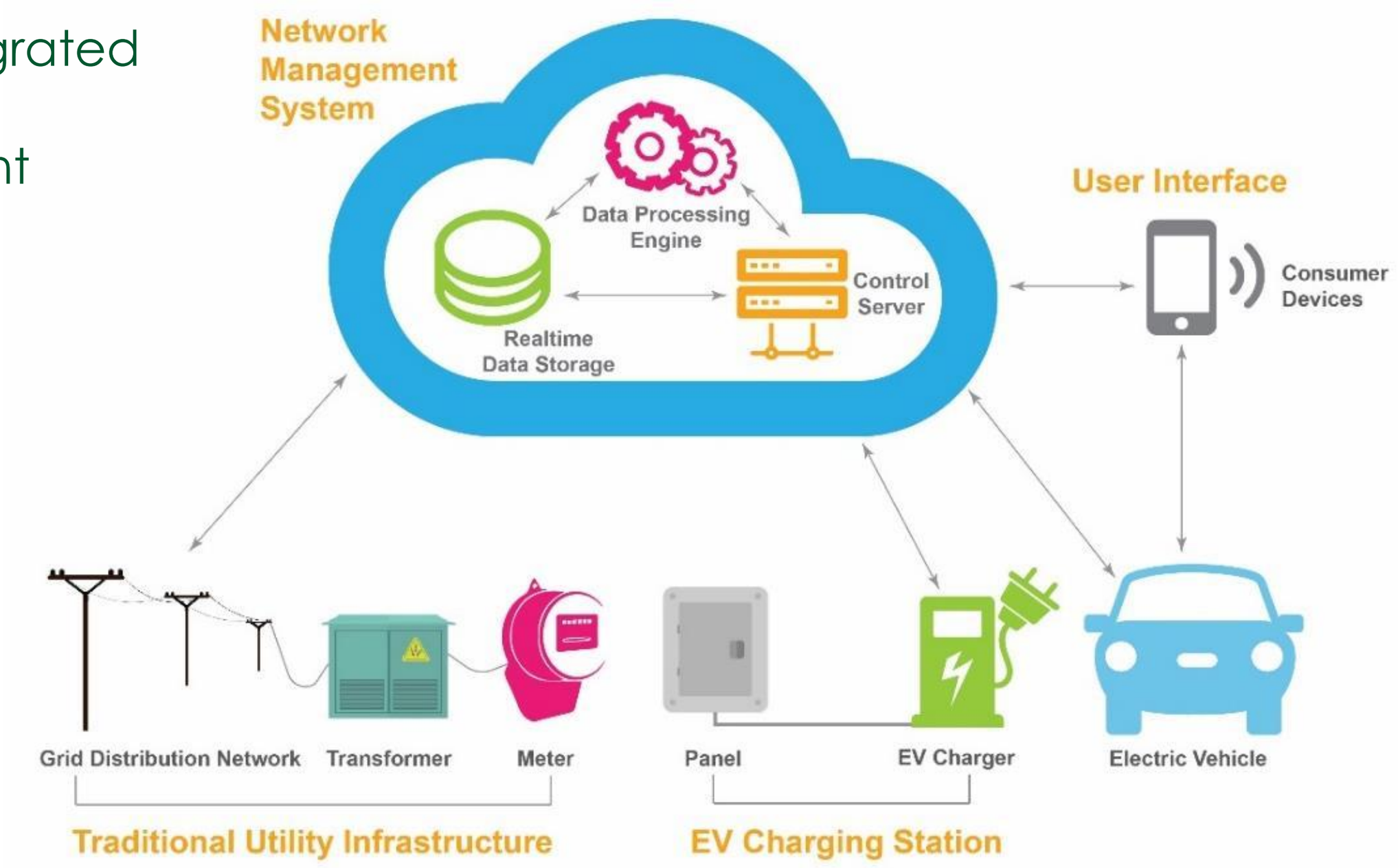
Level 2

- Public charging in locations where an existing panel has capacity
- Up to 80 amp, 240V – AC current.
- Hard wired or plugged into a typical NEMA 14-50 outlet. Ideal for:
  - Overnight fleet
  - 2-8 hour or overnight parking (can generate 65 miles of range)
  - ROW
  - Parking garages
- Free to customer or charge as desired by Owner
- Load management is available if power service is limited
- Power your home in event of a power outage
- Minimal permitting and engineering required for small applications

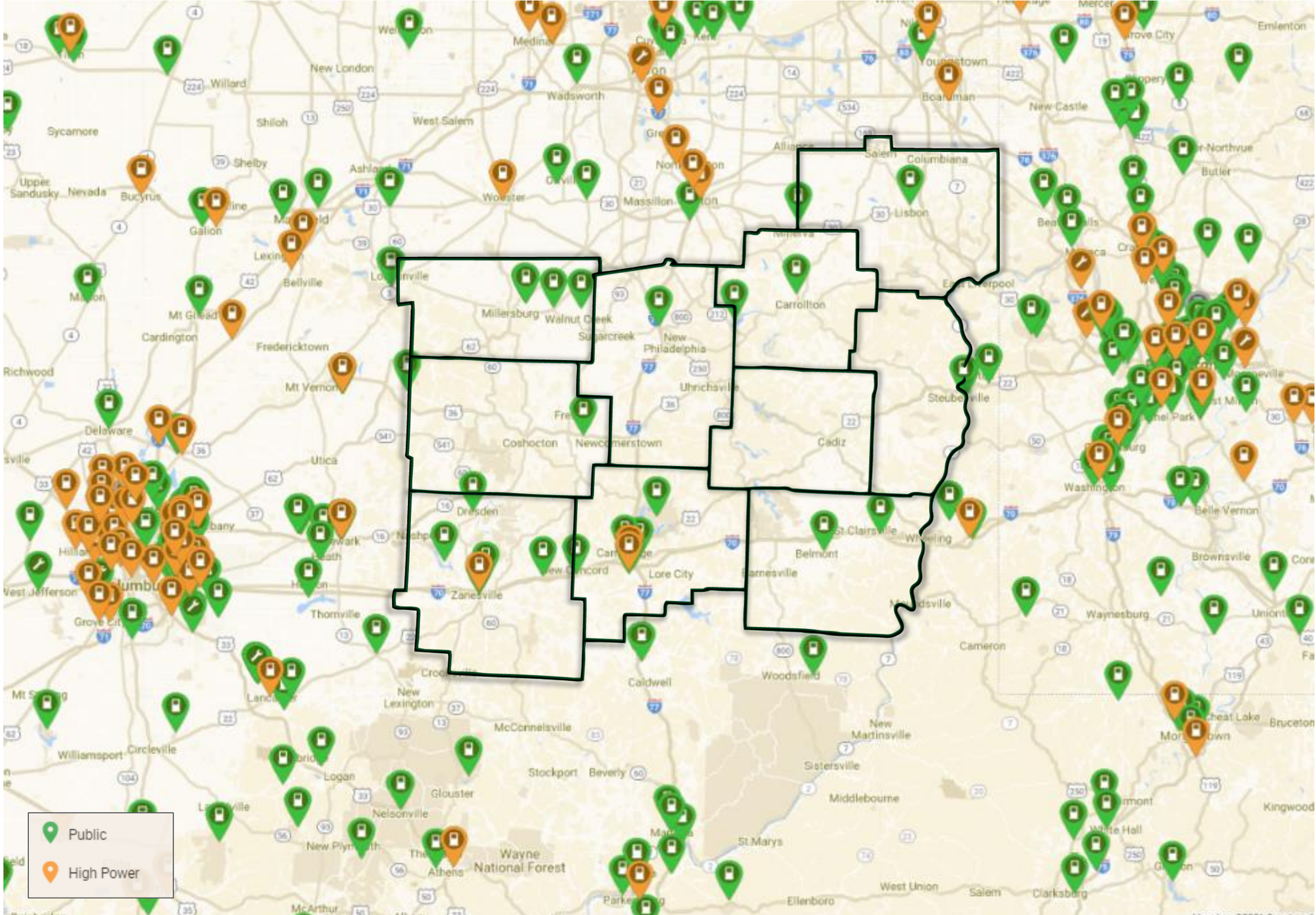
DCFC

- Sites looking for gas station experience
  - 25 min charge to get 200+ miles of range
  - Convenience stores
  - Big box
  - Grocery stores
- 480V input service
- Output is 50kw to 350kw
- Typically, 6 to 16 stalls with additional area required for equipment and transformers (10’x20’)
- Utility coordination required
- Need is growing as more EV drivers hit the road

Grid Integrated Charging Equipment

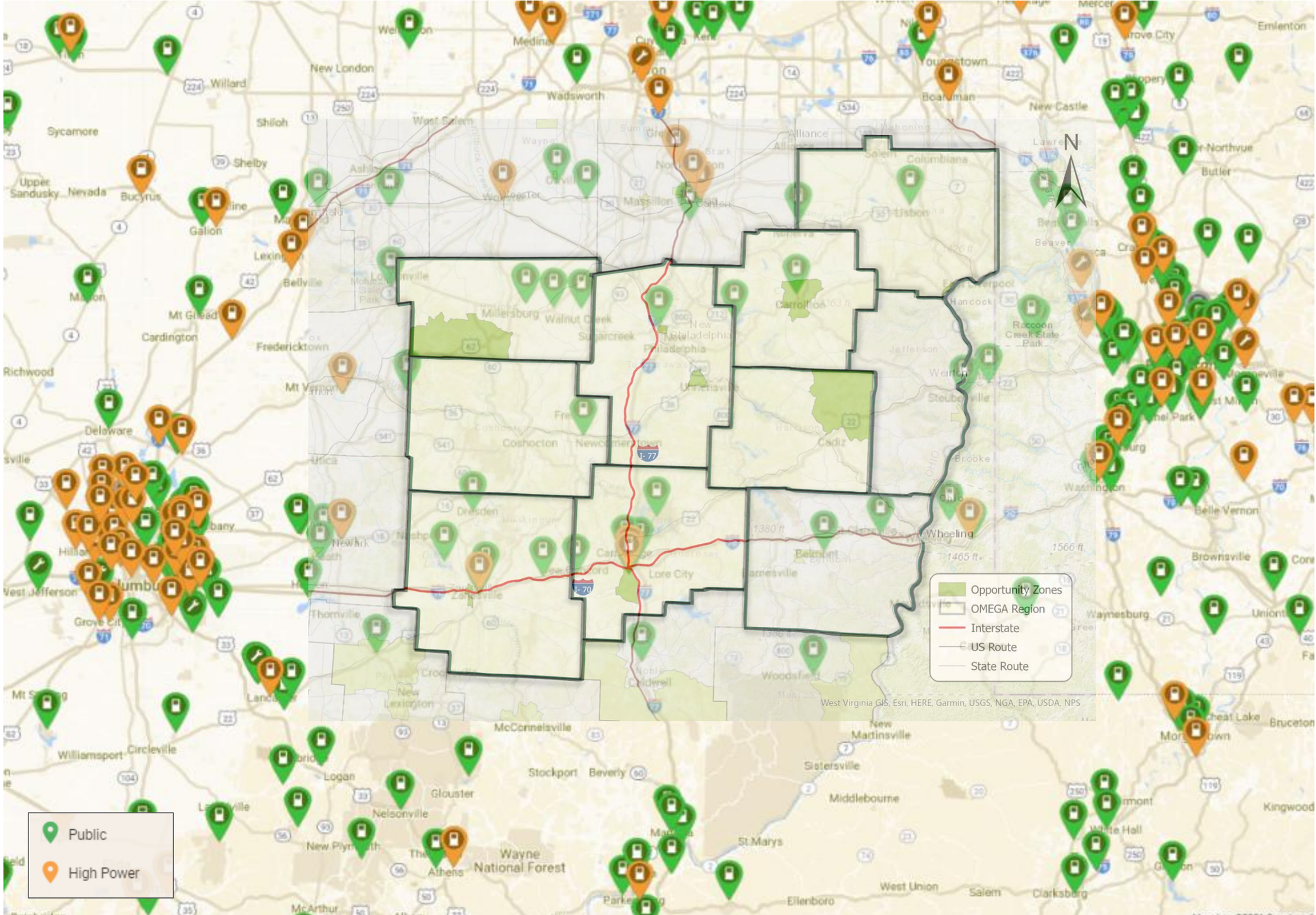


State of the OMEGA region



Source: PlugShare

State of the OMEGA region

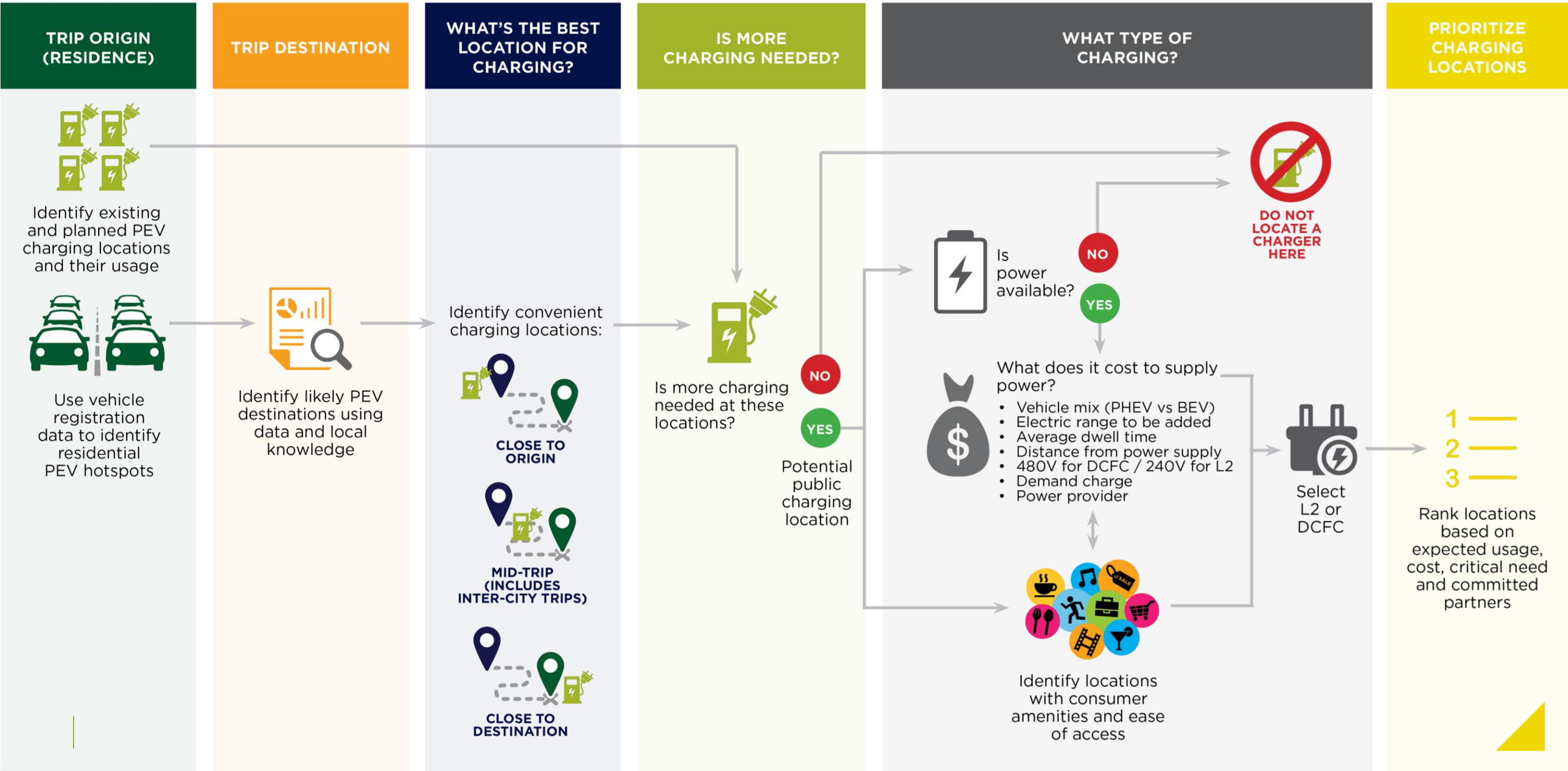


Source: PlugShare

Key Considerations

1. Technology Trends
2. Process for Identifying Charging Locations
3. EV Site Development Process
4. Policy Updates
5. Permitting
6. Funding / Rebates
7. Ownership, Maintenance & Operation
8. Fleet Conversion
9. Signage
10. Construction
11. Designating EV Champion
12. Building EV Connections

Process for Identifying Charging Locations



EV Site Development Process

Concept Design
Define the user experience, design the site and building based on key amenities, including customer services, charging stations and solar power.

Site Criteria Definition
Define the criteria and development site requirements package to support real estate site selection and an exceptional customer experience.

Site Assessment
Gain a complete understanding of the physical site conditions including boundaries, easements, geotechnical, and environmental. Confirm traffic, parking, lighting and site power requirements and utility availability.

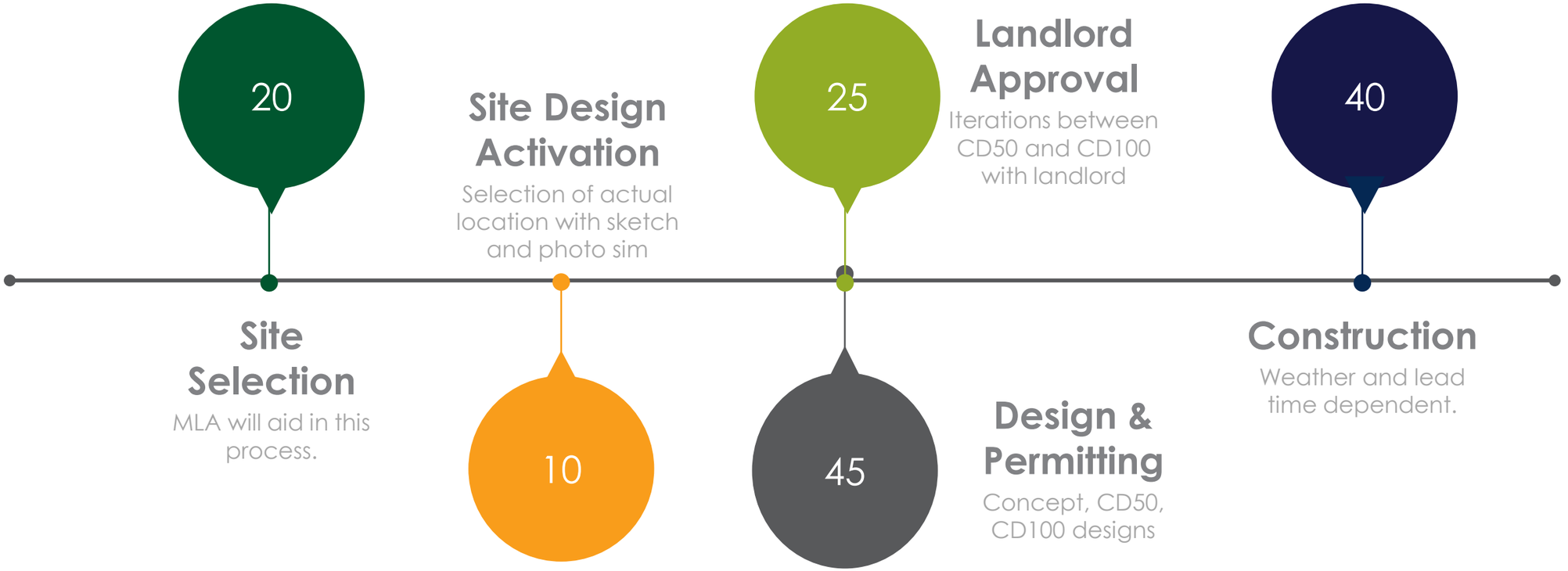
Due Diligence
Meet with local governing agencies and utilities to determine approval process, requirements, fees, and schedule for building and site development.

Construction Documentation & Permit Approvals
Create site specific construction documents (civil, architectural, engineering) for the site, building and charging stations. Submit client approved plans to AHJ for review and approvals.

Construction Administration
Support contractor bidding, shop drawing reviews, address RFI's, and conduct site observations including final punch walk and closeout.

Prototype / Design Standards Agreement
Document site and building design standards. Perform periodic updates as needed to document design enhancements and options.

Private Development Project Timeline



Policy Updates

- EV Readiness
  - Job hubs and opportunity zones
- Zoning / parking codes
  - Cross-jurisdictional relationships
- Standards
  - Regional benefit of specifications
- Permitting

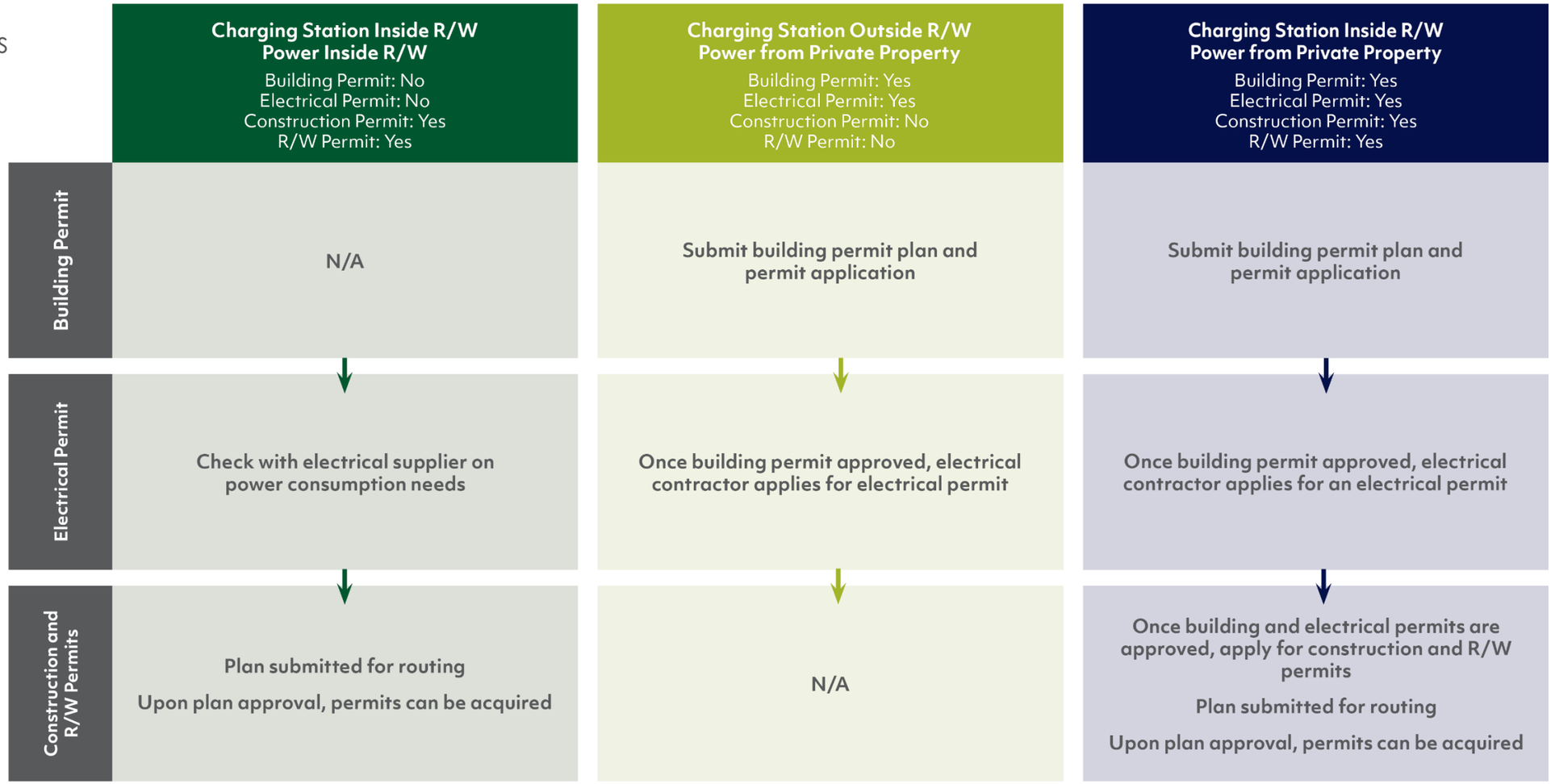
3. Electric Vehicle Supply Equipment Standards

Minimum standards or required design of charging equipment or charging station infrastructure. These standards are often combined with minimum requirements for EV charging installations (see best practice #5).

Typical Ordinance Includes Specification:	**Language Example** City, State:	Text:
May require that EVSE meet standards found in the National Electric Code.	Atlanta, GA	"Installation of EVSE shall meet National Electric Code article 625…"
Often specifies that EVSE must be mounted. • May specify on what EVSE should be mounted. • Often specify at what height EVSE should be mounted. • Often specify that EVSE should be installed so as not to be a tripping hazard. • May require a retraction device or place to mount cords. • May specify that cords should not cross walkways.	Montgomery County, MD	"Battery charging station outlets and connector devices shall be no less than 36 inches and no higher than 48 inches from the surface where mounted."
	Chelan, WA	"Equipment mounted on pedestals, lighting posts, bollards, or other devices for on-street charging station shall be designed and located as to not impede pedestrian travel or create trip hazards within the right-of-way"
	New Orleans, LA	"Cords shall be retractable or have a place to hang the connector and cord sufficiently above the pedestrian surface. Any cords connecting the charger to a vehicle shall be configured so that they do not cross a driveway, sidewalk, or passenger unloading area."
May specify other standards that EVSE should comply with.	St. Louis Park, MN	"EVCS pedestals shall be designed to minimize potential damage by accidents,

Permitting Considerations

- Permits needed
- Length of permit reviews
- Application process
- Annual fees
- Cross-Jurisdictional

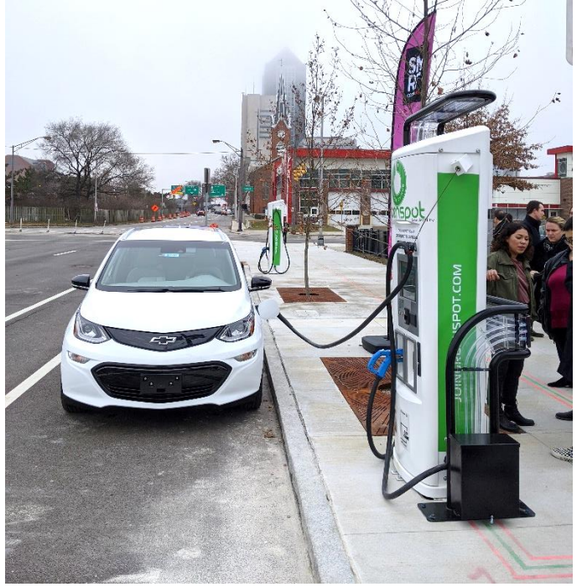


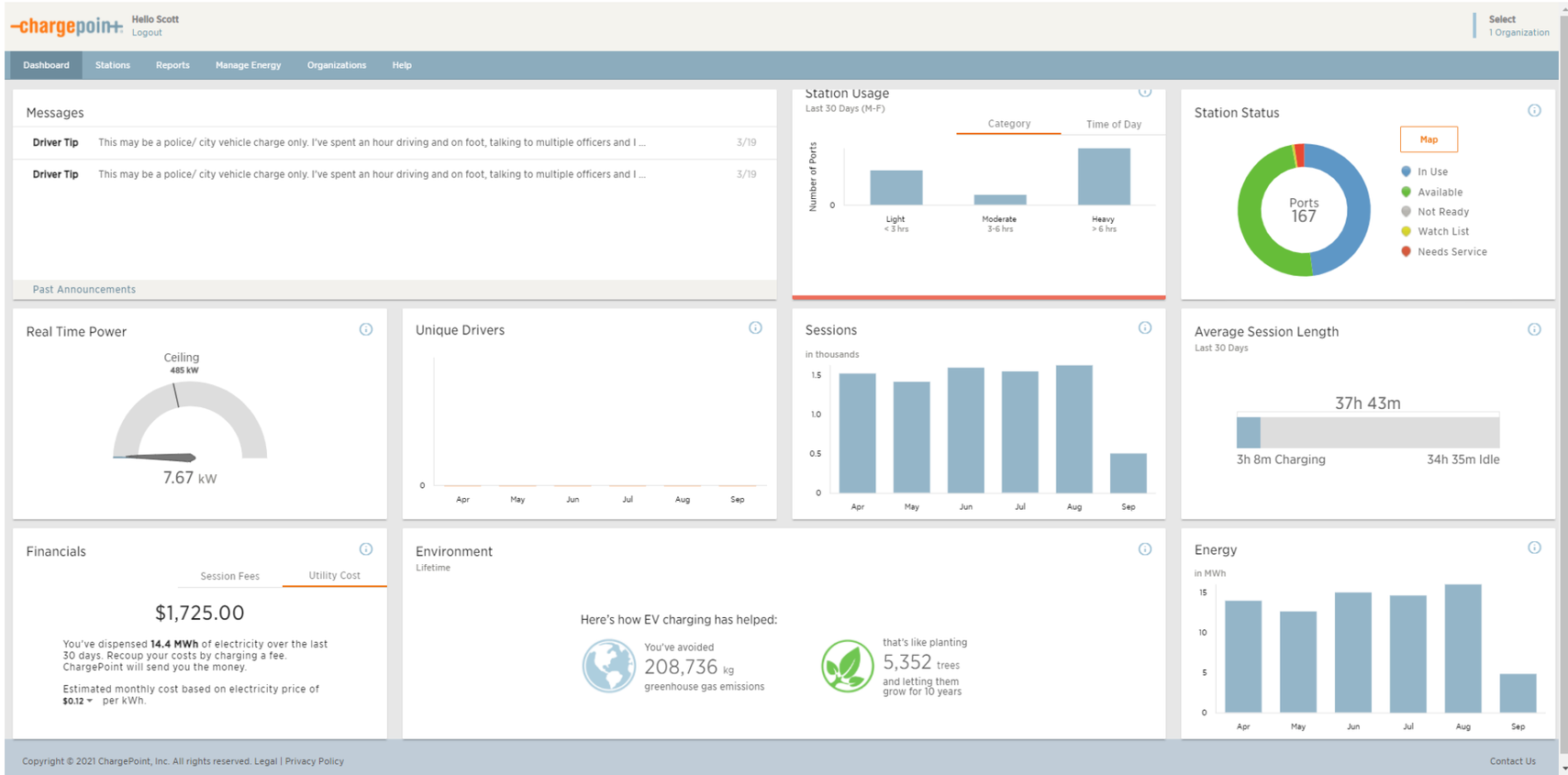
Funding / Rebates

- OEPA - VW Settlement funds
- US Infrastructure Bill
- US Department of Energy
- Utility programs
- Private grant programs
- Appalachian Regional Commission (ARC) – Workforce Opportunity, Area Development Program

Ownership, Maintenance and Operation

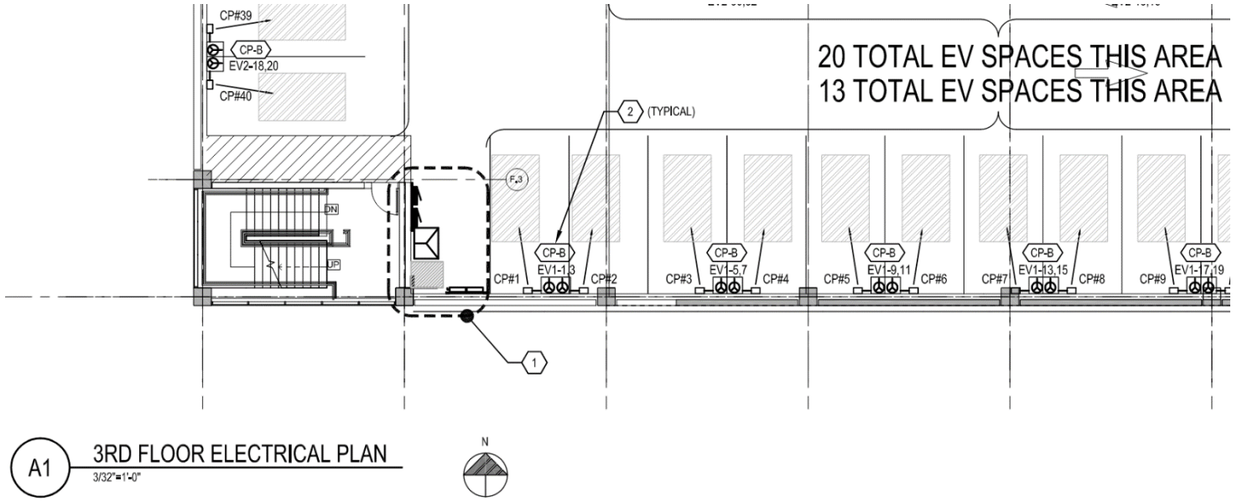
- Who owns public charging?
- Who is paying for the power?
- Who is enforcing regulations of site?
- Who reviews charging data, utility bills, etc.?

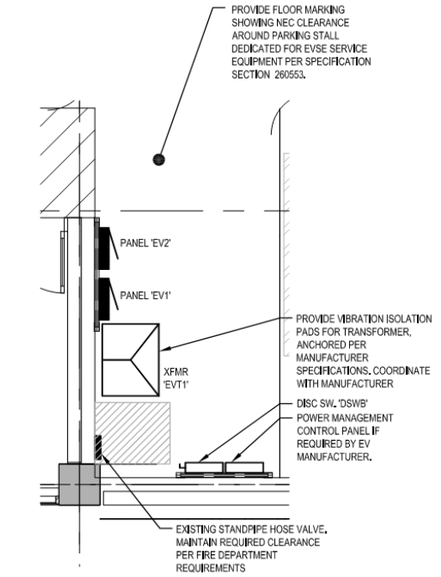




Fleet Conversion

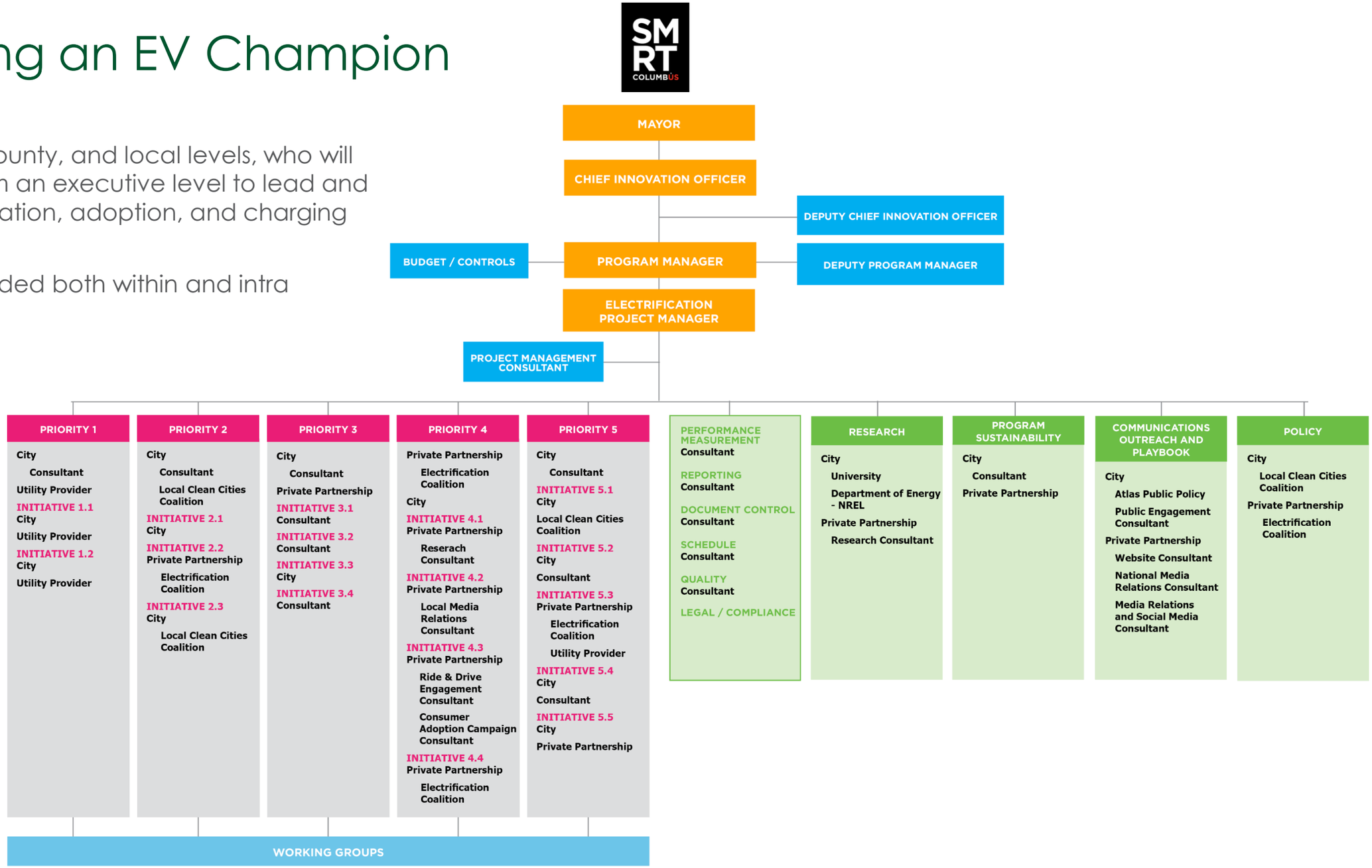
- Total cost of ownership
- Current fleet status
- Electric vehicle model availability
- Purchasing options
- Vehicle maintenance
- Charging





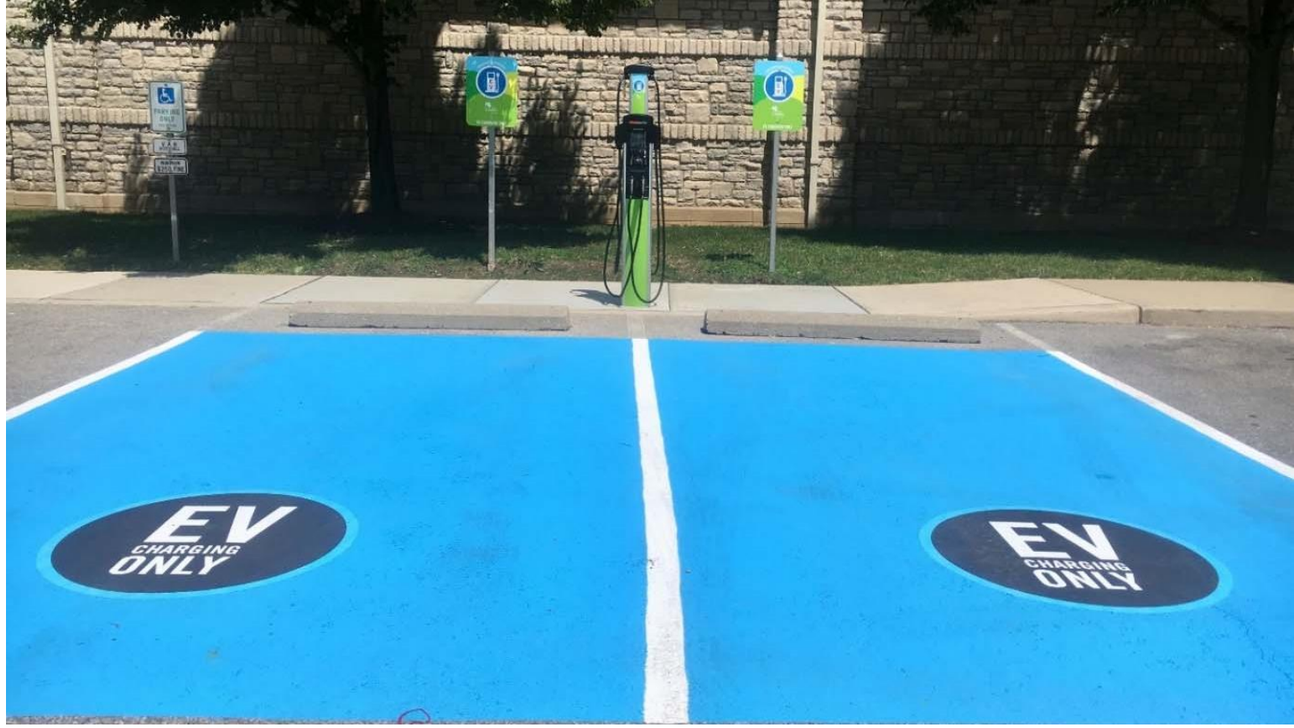
Designating an EV Champion

- At the regional, county, and local levels, who will be supported from an executive level to lead and manage EV education, adoption, and charging efforts?
- Coordination needed both within and intra organization



Construction Lessons Learned

- Attention to detail in the design phase
- Inspection changes and requests
- Construction staging area identified
- MOT
- Signage
- Coordinating utility & transformer
- Coordinating energization



Signage and Route Planning

SERVICES FOR ROUTE PLANNING AND PAYMENT

- USDOE – Alternative Fuels Data Center
- Plug Share
- ChargePoint Network
- Charge Hub
- Waze and Google Maps

AS CARS GO ELECTRIC, CHARGING NAVIGATION IS BUILT INTO THE VEHICLE SOFTWARE

TRADITIONAL SIGNAGE UPDATES

- Gas exits identified on interstates
- Do new signs show type of charging (L2 or DCFC) or just that charging exists

Building EV Connections

DriveOhio
The Future of Smart Mobility

Questions & Answers