It’s Electric! EV Program Updates

Best Practices from Community EV Readiness Plans and Transit Agency Zero Emission Transition Plans

Jeff Owen, Mobility Project Manager

March 5, 2024

Best Practices

Community Planning:

- EV Readiness Plans:
  - Education and Awareness
  - Stakeholder Engagement
  - Vision and Goal Setting
  - Needs Assessment
  - Forecasting for EV Adoption Rates and Charging Needs
  - Charger Siting Criteria
  - Priority Near-Term Investments

Example Project: Atlanta, Georgia

Transit Agencies:

- Zero Emission Transition Plans:
  - Policy and Legislative Impacts
  - Fleet Transition Plan, Service Modeling, Phasing Approaches
  - Facility & Infrastructure Plan
  - Utility & Fuel Partnerships
  - Funding Plan
  - Workforce Transition Plan

Example Project: Tacoma, Washington

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Example Project: Atlanta, Georgia

The Promise of EVs…

EVs to surpass two-thirds of global car sales by 2030, putting at risk nearly half of oil demand, new research finds

Ford Surges to 20-Year High on Optimism Over Electric F-150

- Demand for electric cars 'is certainly there,' executive says

Home / News

Honda and GM Deepen Ties, Promise 'New Series' of Affordable EVs

The two automakers will co-develop compact-crossover models that will arrive in 2027 and could have new solid-state battery technology.

GM CEO Mary Barra Outlines Her Optimistic Vision for 2023

The industry crystal ball may be fuzzy, but GM CEO Mary Barra's future plans clearly include even more EVs and AVs.

Recent Hesitations…

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Rivian Is Burning Billions to Build the Ultimate EV Pickup

Rivian's goal to sell the ultimate electric pickup truck attracted a lot of investors when the company went public. But it's losing money on every EV it builds, raising questions about its future. WSJ reporter Sean McLain joins host Zoe Thomas to discuss Rivian's plans to bring costs down.

TECHNOLOGY | PERSONAL TECHNOLOGY: JOANNA STERN

I Visited Over 120 EV Chargers: Three Reasons Why So Many Were Broken

Our columnist's Los Angeles power struggle featured out-of-order signs, payment errors and connection problems

HOME > TRANSPORTATION

Ford is losing dealers' trust after a rocky year for the EV transition

Nora Naughton Nov 7, 2023, 3:13 PM EST

GENERAL MOTORS

Honda, General Motors end partnership to develop affordable EVs together

Jamie L. LaReau
Detroit Free Press

AUTOS

Ford will postpone about $12 billion in EV investment as buyers become more cautious

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'The early adopters have adopted': US carmakers slow their EV growth plans

Consumer appetite for battery-powered cars and trucks has fallen short of industry expectations

…But 2023 was still a record year

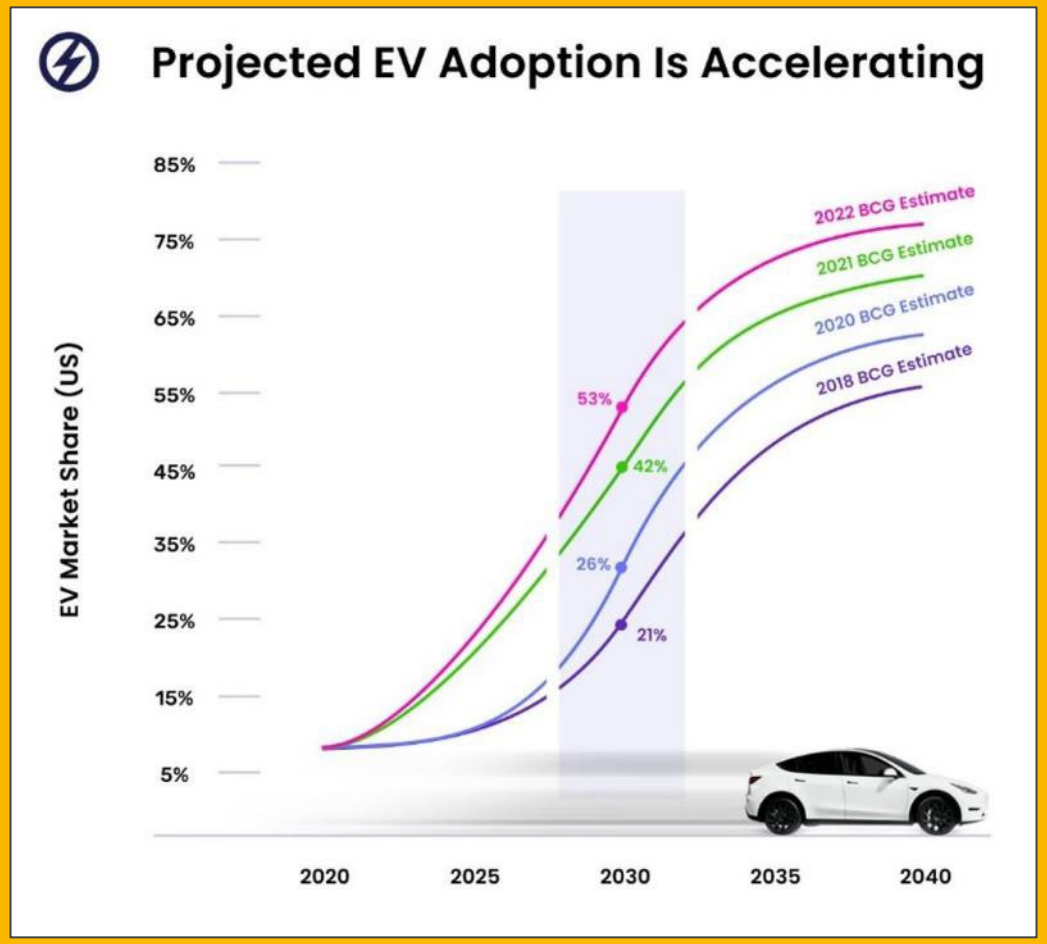
Data Point

A Record 1.2 Million EVs Were Sold in the U.S. in 2023, According to Estimates from Kelley Blue Book

Tuesday January 9, 2024

Private Adoption of EVs are Forecasted to Grow Exponentially

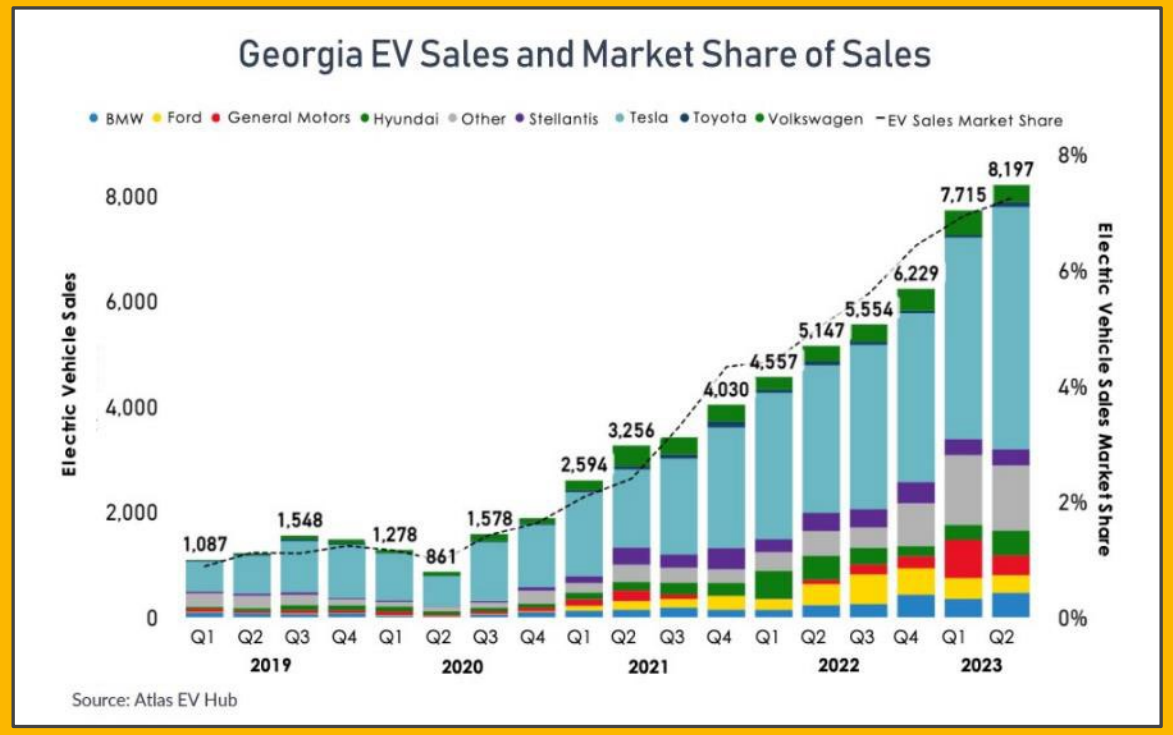
- EV adoption tends to accelerate when EVs represent 5% of new vehicle sales in a market.
- The S-Curve approach is utilized by Boston Consulting Group, Rocky Mountain Institute, and the International Energy Agency to model EV growth.



Sources: Alliance for Automotive Innovation, Boston Consulting Group

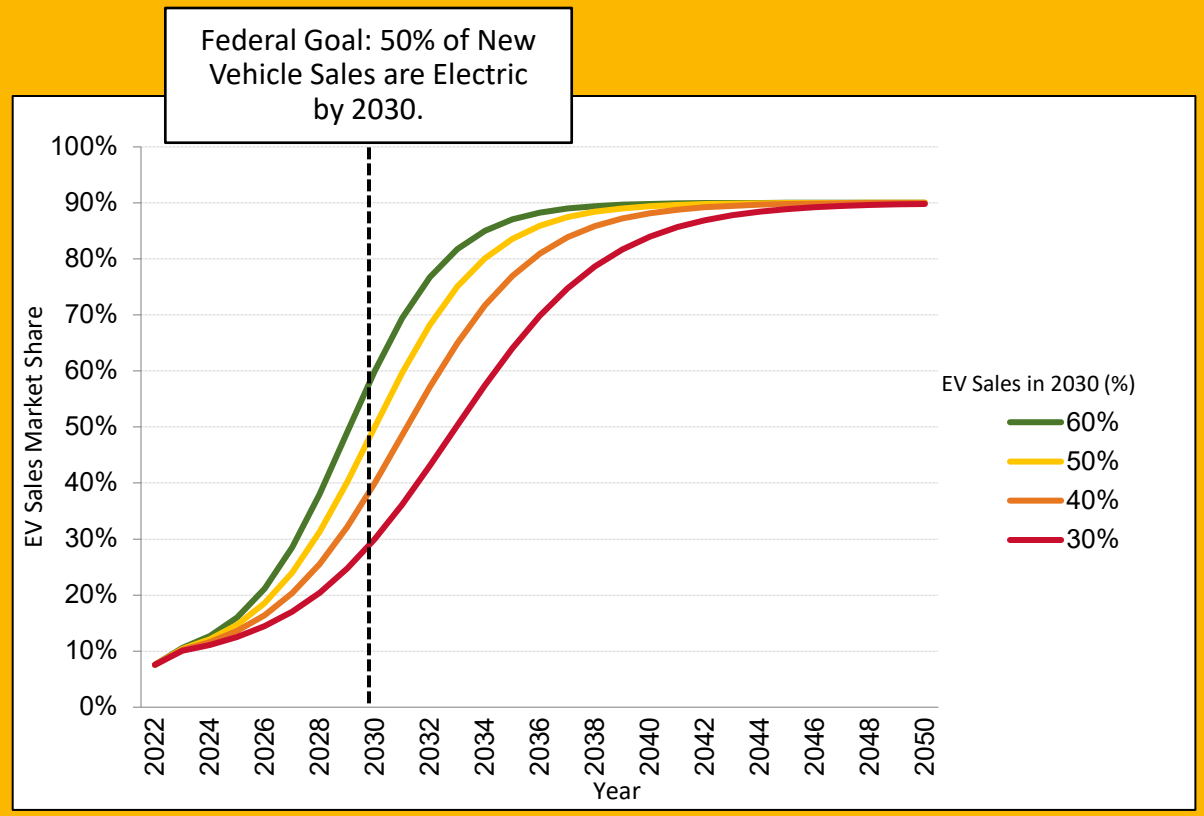
Current State of EVs in Georgia and the ARC region

- EV Market Share in Georgia mirrors U.S. trends
- 84% of registered EVs in Georgia are in the ARC region. Internal forecast results should align closely with statewide projections.
- 2023 Metro Atlanta Speaks: 1 in 3 respondents plan to buy an EV in the next 5 years.



ARC EV Adoption Model

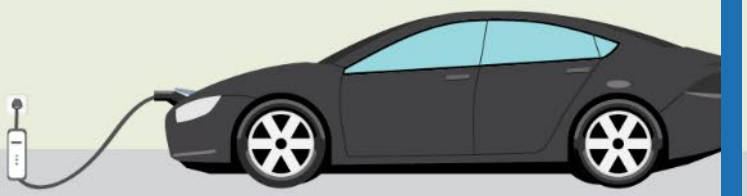
- EV Market Share is the % of new vehicle sales that are EVs.
- Benchmark year is 2030, in alignment with federal goals and private industry sales targets.
- Four scenarios:
  - 30% EV Market Share by 2030
  - 40% EV Market Share by 2030
  - 50% EV Market Share by 2030
  - 60% EV Market Share by 2030



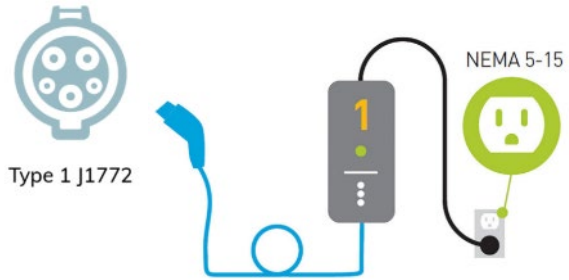
EV Charging Stations

Image Source: www.carolinacountry.com

AC Level One

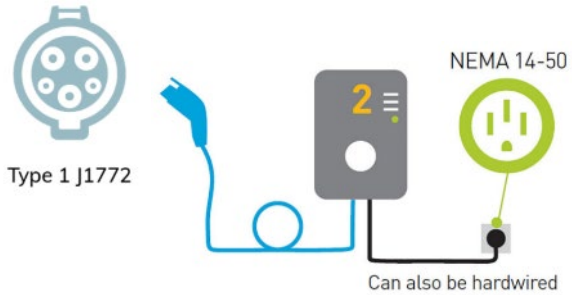


- *1.9kW Maximum*
- Standard Outlet
- Slowest Charging
- 250 miles in 48-72 hrs

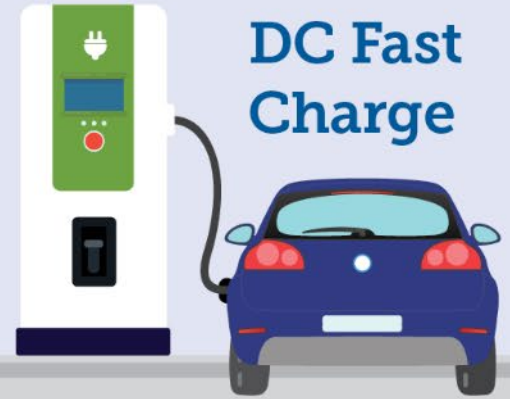


AC Level Two

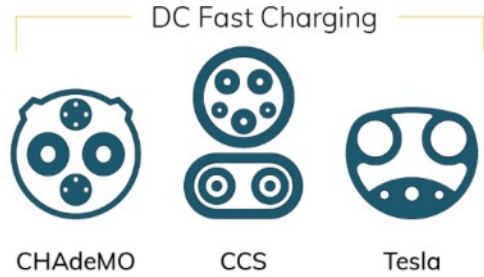
- *19kW Maximum*
- "Dryer Outlet"
- Slow Charging
- 250 miles in 10 hours



DC Fast Charge



- *50-350kW*
- Direct Current Fast Charging
- Fastest Charging
- 250 miles in +/- 20 minutes



Level 2 Chargers

DCFC (Level 3) Chargers

Project Vision Statement

Establish a Regional EV Ecosystem

Lead the southeast in the electrification of our transportation sector by creating a robust and widespread regional EV ecosystem. Our approach will accelerate the equitable adoption of EVs and inform regional EV infrastructure investments to guide the region and meet the needs of the future.

Project Goal Areas

1 Coordinate Infrastructure Investments

Coordinate regional infrastructure investments to advance and maximize growth of the EV ecosystem for all modes of transportation, reduce transportation-related greenhouse gas emissions, support long term sustainability, and create a resilient and actionable planning tool to advance EV adoption.

2 Accelerate Equitable Adoption

Promote the equitable adoption of EVs and ensure equitable outcomes through robust partner engagement and measurable investments in historically disadvantaged communities.

3 Expand Access and Reduce Barriers

Reduce barriers to accessing e-mobility options and EV charging, incentivize EV use and adoption growth, and prioritize policy actions that share the benefits of electrification with those who need the most assistance.

4 Rapidly Boost Workforce Development and Economic Competitiveness

Position the region's workforce to leverage economic investments in EV related industries, expand career path opportunities, and support a prosperous region for coming generations.

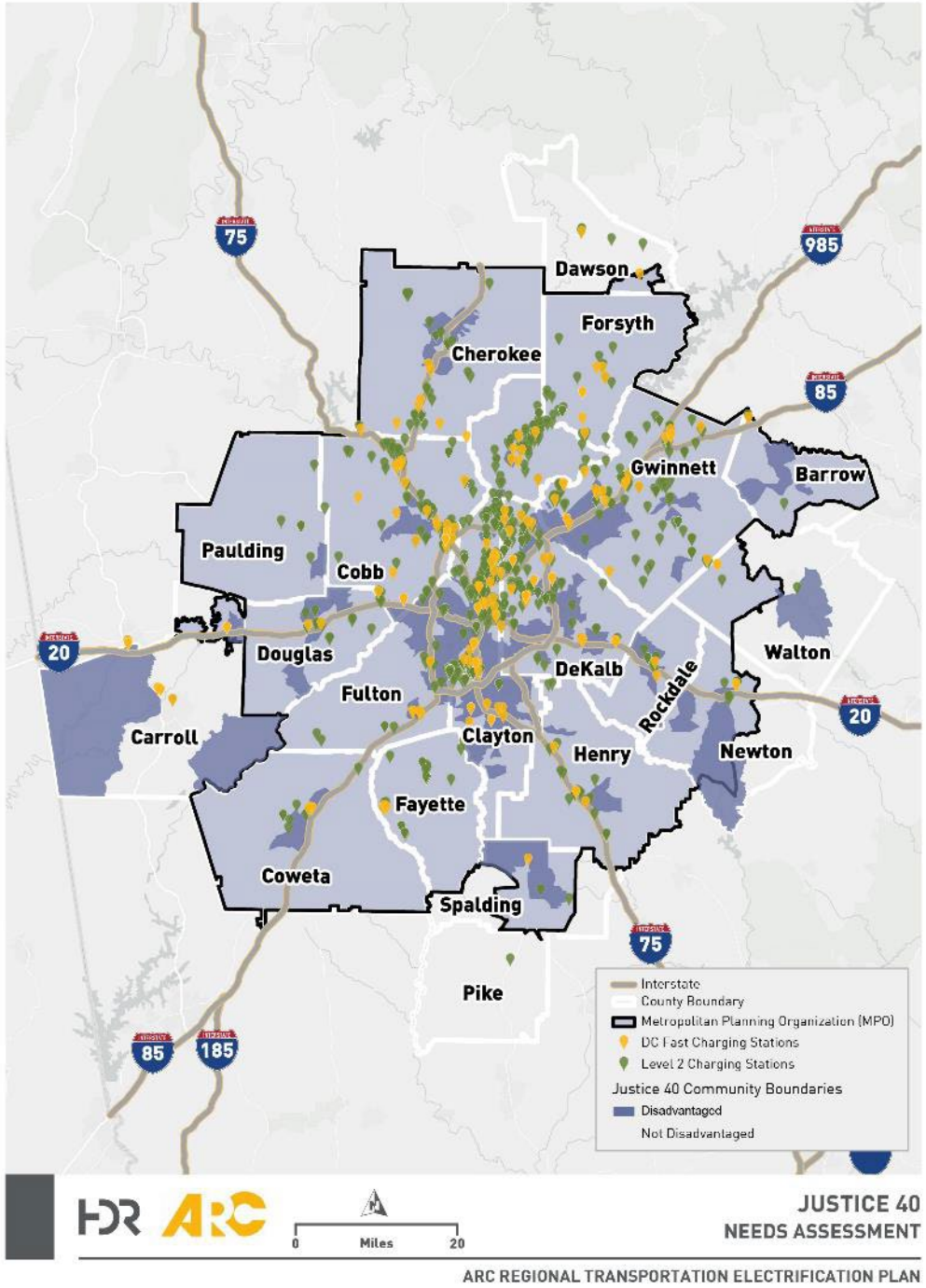
5 Support Electric Grid Stability

Support electric utility grid stability through active and meaningful utility partner collaboration and thoughtful, cooperative planning to anticipate and support EV growth.

Data Snapshot

Existing Chargers and Justice40 Communities

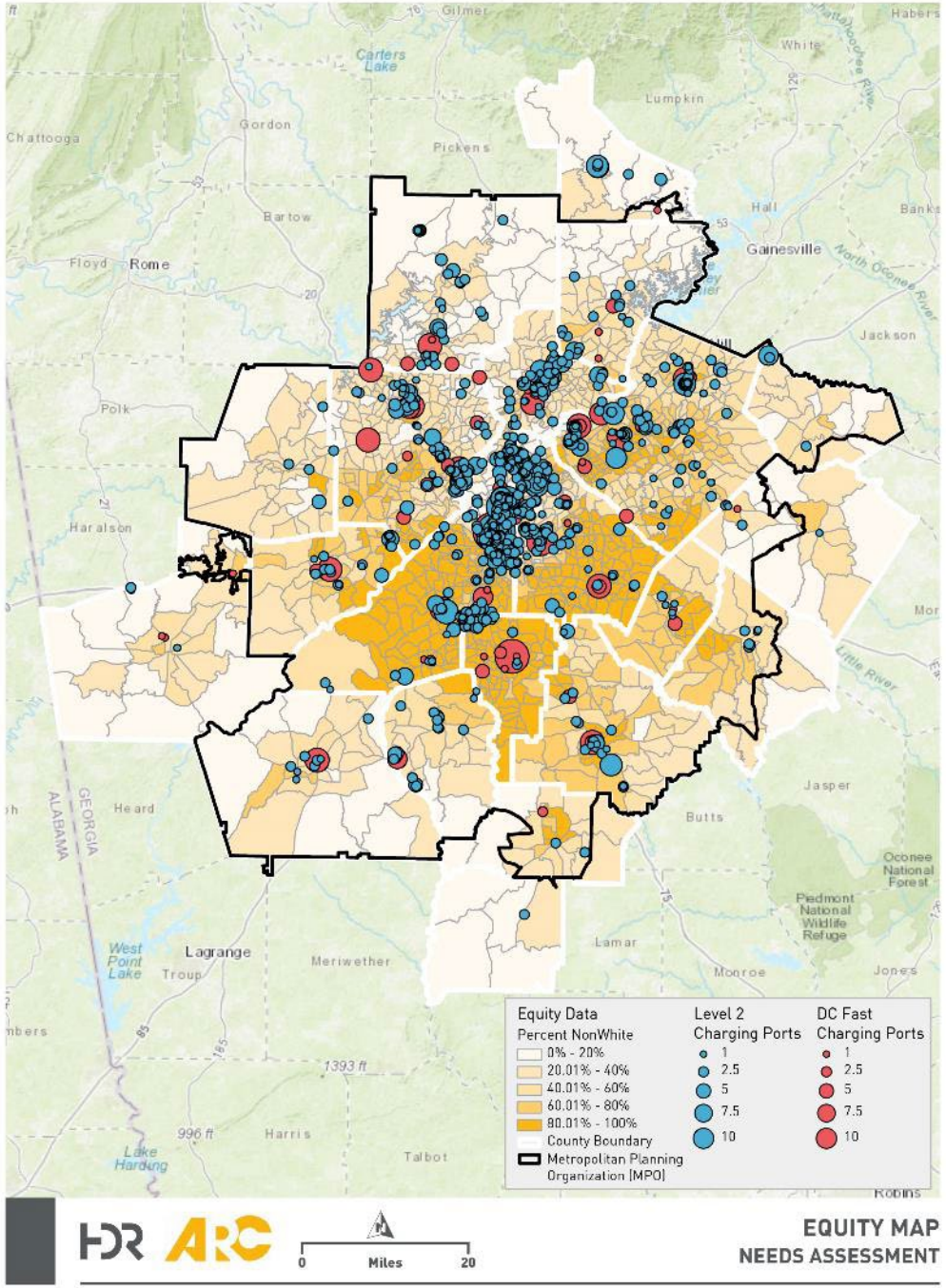
- The federal Justice40 Initiative is a series of changes to improve how government ensures equitable distribution of the benefits of many programs.
- Overlaying existing chargers and Justice40 communities highlights the lack of current EV charging infrastructure across both urban and rural Justice40 communities in the region.



Data Snapshot

Existing Chargers and Percent of Non-White Population

- High percentages of non-white residential areas (deeper yellow in color) have large gaps in existing charging ports.
- Together, these maps provide a visual representation of the inability of existing charging infrastructure to meet the needs of majority non-white or Justice40 communities.



EV Charger Planning Tool: Approach and Considerations

- Approach
  - Creates a decision-making tool to help prioritize EV charging corridors and subareas.
  - The web-based tool, still under development, will accompany the delivery of the final plan.
- Considerations
  - The tool utilizes an Activity-Based Travel Demand Model.
  - The tool filters out trips made on the network by those who have access to single-family residential charging.
  - Trips can be measured by purpose, mileage traveled on the network, and stop length (dwell time).
  - The presence of EV chargers will likely shape EV Adoption.
- Use of the EV Charger Planning Tool to guide an ultimate strategy supporting the deployment of charging infrastructure will require further consideration of the unique needs and goals of ARC and its member governments.

EV Charger Planning Tool: Three Broad Principles

Equity

- Median Household Income
- Population in Non-Single-Family Housing
- Proximity to Jobs
- Stops by Justice40 Residents

Environment

- Proximity to Traffic
- Air Pollution

Demand

- Stops by EVs
- Stops by Combustion Autos

DRAFT

Equity

L2 Ports: 2,605 DCFC Ports: 640

Income: 80/100 Housing: 100/100 J40: 55/100 Jobs: 25/100

Instructions: Adjust the sliders below to decide how much weight each factor/element has in determining your priorities inside the **Equity** category.

Map Display

Equity Score

Rank Percentile

0% 100%

Select Geography

(All)

0% 100%

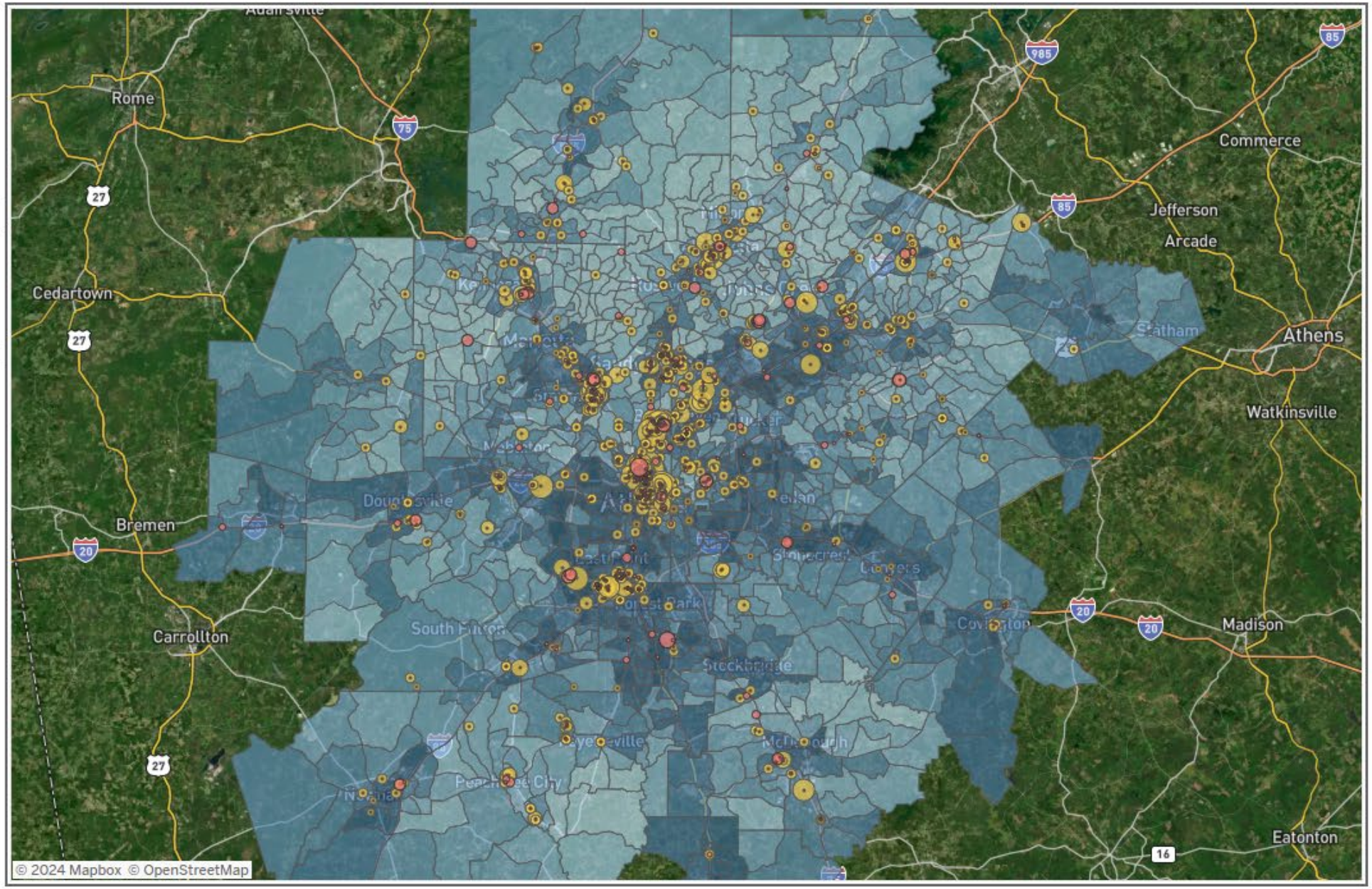
Median Household Income

Multifamily Housing

Charge Stops by J40 Residents

Proximity to Jobs

Atlanta Regional Commission



Example: EV Charging Station Locations

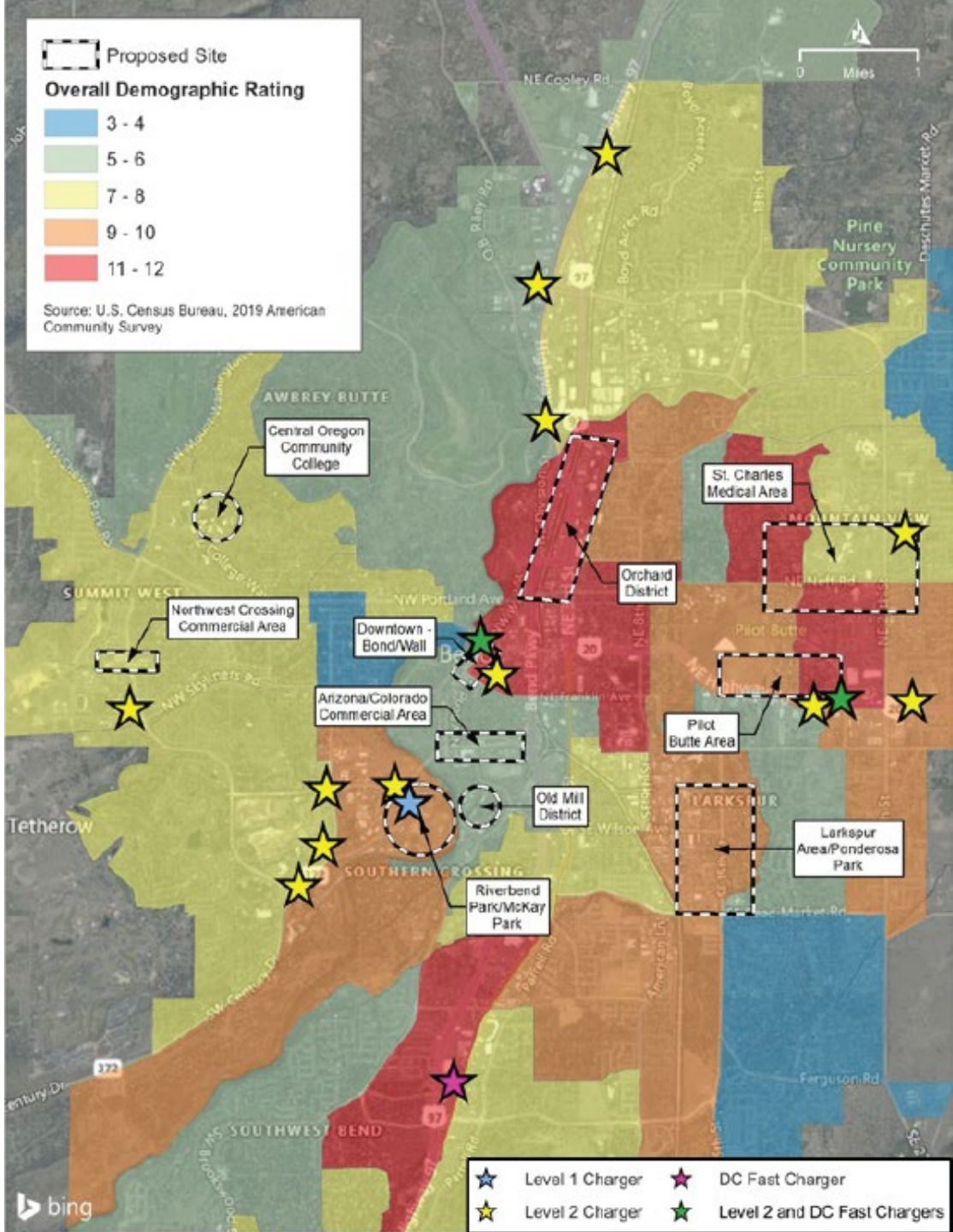
EV charging station locations can support additional regional objectives…

Example Objectives	Suggested Location for EV Charging Stations
High Utilization of Chargers	• Locate EV charging stations where vehicles without access to charging are likely to be parked for long periods of time.
Ensure Equitable Access to EV Charging	• Locate charging in both residential and workplace locations.
Improve Air Quality	• Locate EV charging on heavily polluted corridors.
Support Local Businesses	• Locate Level 2 or DC Fast Charging stations at restaurants, businesses, and shopping centers.

Selecting Charging Sites

Bend, Oregon

- A siting analysis was conducted that balanced the effectiveness and utilization of new charging stations with equitable considerations in an overall demographic rating that layered data together.
- Demographic data at the block group level, including multifamily housing density, income, and race, were acquired from the 2019 American Community Survey.
- Ten charging sites and areas of opportunity for new charging infrastructure were identified in this analysis.



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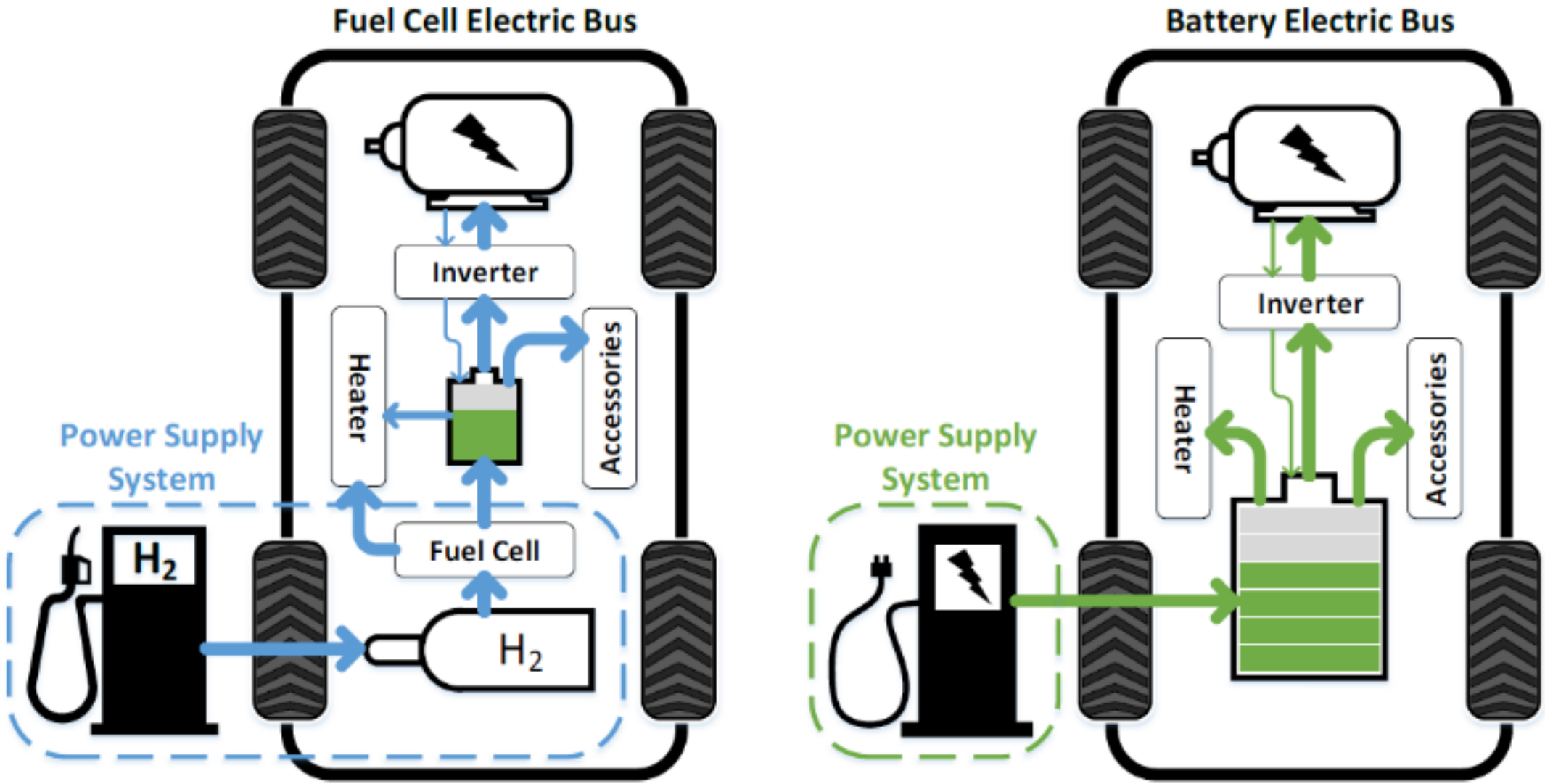
Common Themes in Transitions

- **Transition Planning**
  - Moving from Pilots into Plans
- **Infrastructure Development**
  - Upgrades are Needed
- **Vehicle Fleet Transition**
  - Bus Replacements to Fit Agency Needs
- **Maintenance Facilities**
  - Construction or Modification
- **Workforce Training**
  - Skills and Knowledge; Existing and New Staff
- **Operational Considerations**
  - Addressing Challenges

Zero Emission Bus Vehicle Types



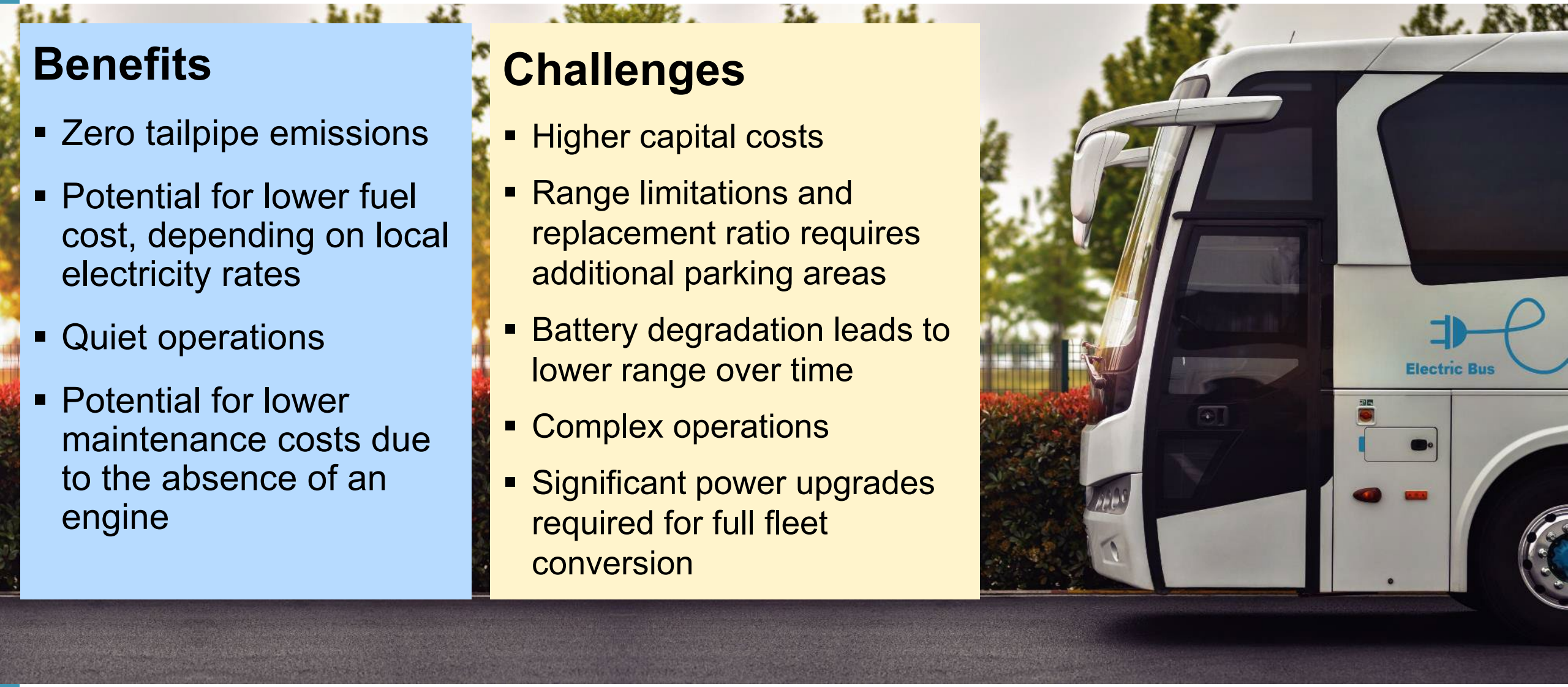
Battery Electric Bus

Benefits

- Zero tailpipe emissions
- Potential for lower fuel cost, depending on local electricity rates
- Quiet operations
- Potential for lower maintenance costs due to the absence of an engine

Challenges

- Higher capital costs
- Range limitations and replacement ratio requires additional parking areas
- Battery degradation leads to lower range over time
- Complex operations
- Significant power upgrades required for full fleet conversion



Types of Bus Charging

Slow Depot Charging

Fast Conductive Charging

Fast Inductive Charging

Plug-in

- Most common for overnight base/depot charging
- Never take the plug away
- Least intrusive
- Currently installed at many peer agencies for pilot buses and lessons learned

PierceTransit

Pantograph

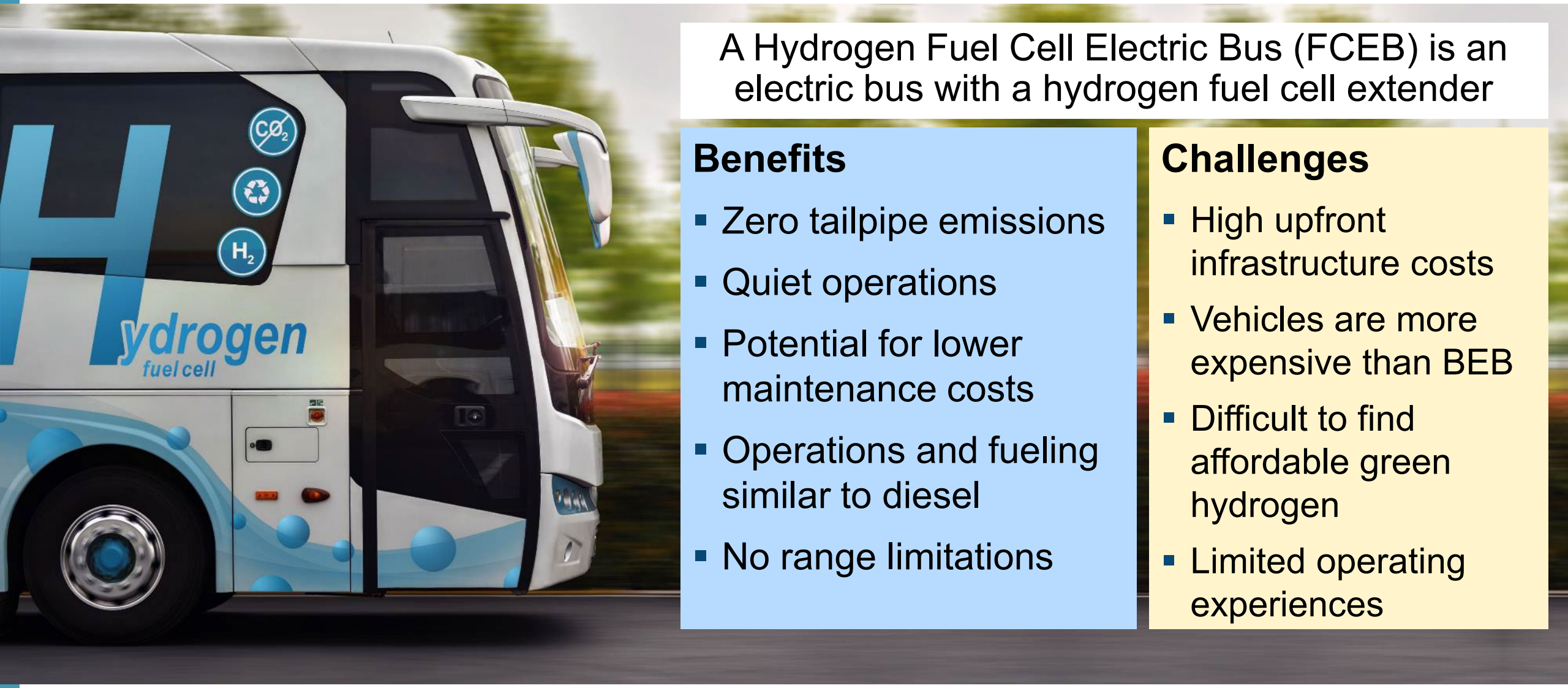
- Common for on-route
- Can be used for base/depot charging and on-route fast charging
- Moderate equipment footprint
- Multiple vendors
- Moving parts and maintenance
- Potential impacts to pole/gantry

Inductive

- Least common
- Flush with the ground
- Minimum footprint
- Can charge while bus riders get on and off
- Operates through snow/ice
- Proprietary vendors

PierceTransit

Hydrogen Fuel Cell Bus



A Hydrogen Fuel Cell Electric Bus (FCEB) is an electric bus with a hydrogen fuel cell extender

Benefits

- Zero tailpipe emissions
- Quiet operations
- Potential for lower maintenance costs
- Operations and fueling similar to diesel
- No range limitations

Challenges

- High upfront infrastructure costs
- Vehicles are more expensive than BEB
- Difficult to find affordable green hydrogen
- Limited operating experiences

Hydrogen Fueling Options

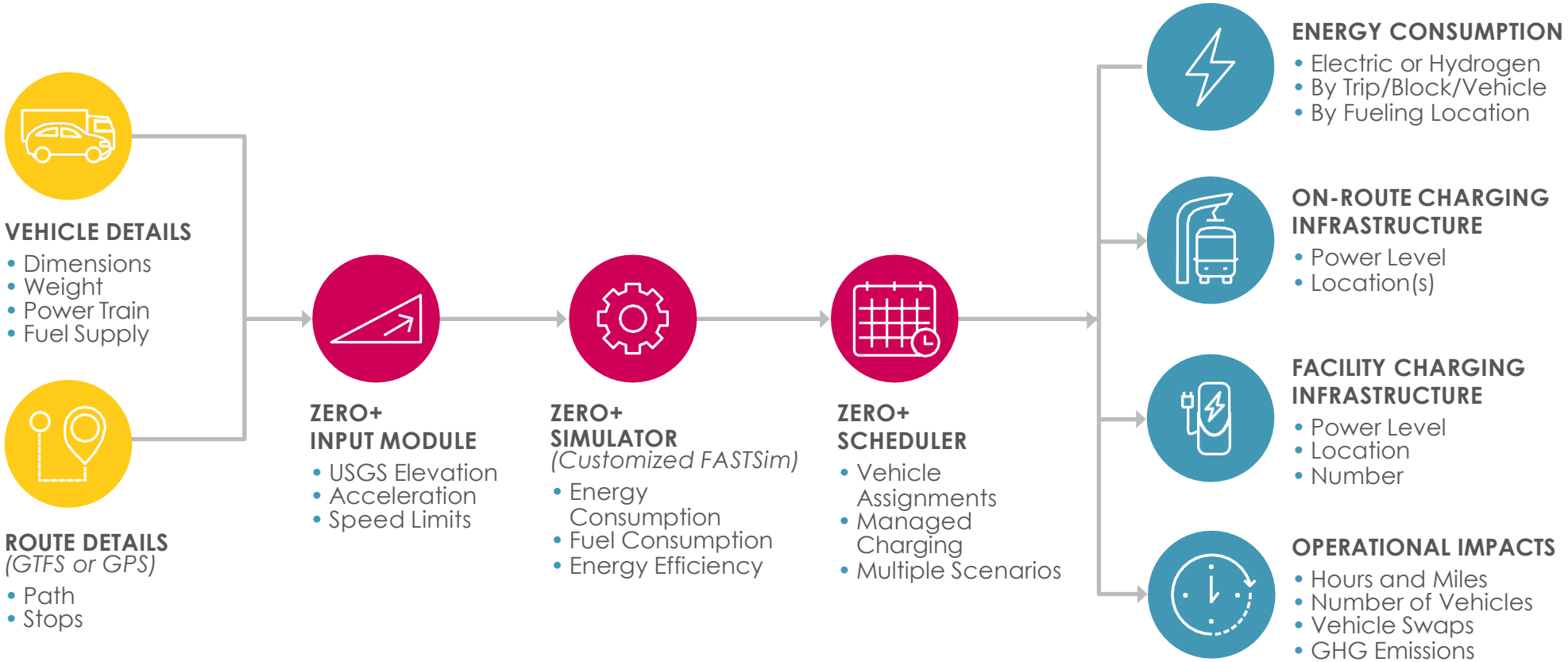
Delivery by Truck and Tank

- Liquid (LH2): Less frequent deliveries; Must be converted for use into gaseous; More equipment needed
- Gaseous (GH2): Correct form for vehicle use; Stored at ambient temperatures; Smaller quantities; More frequent deliveries required

On-Site Production

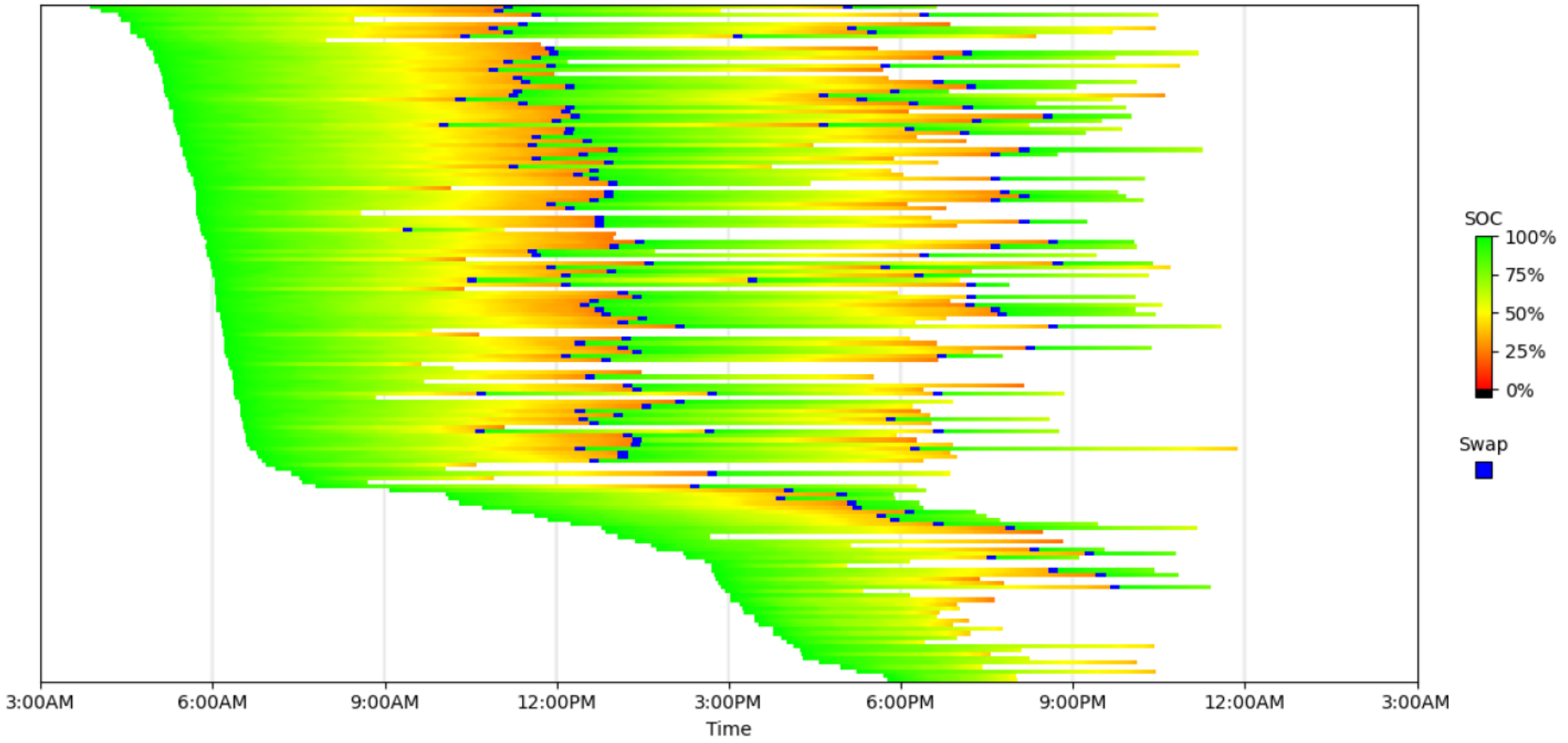
- Larger volumes; High capital expense; More space needed; Buffer distances around infrastructure can be considerable

Route Modeling

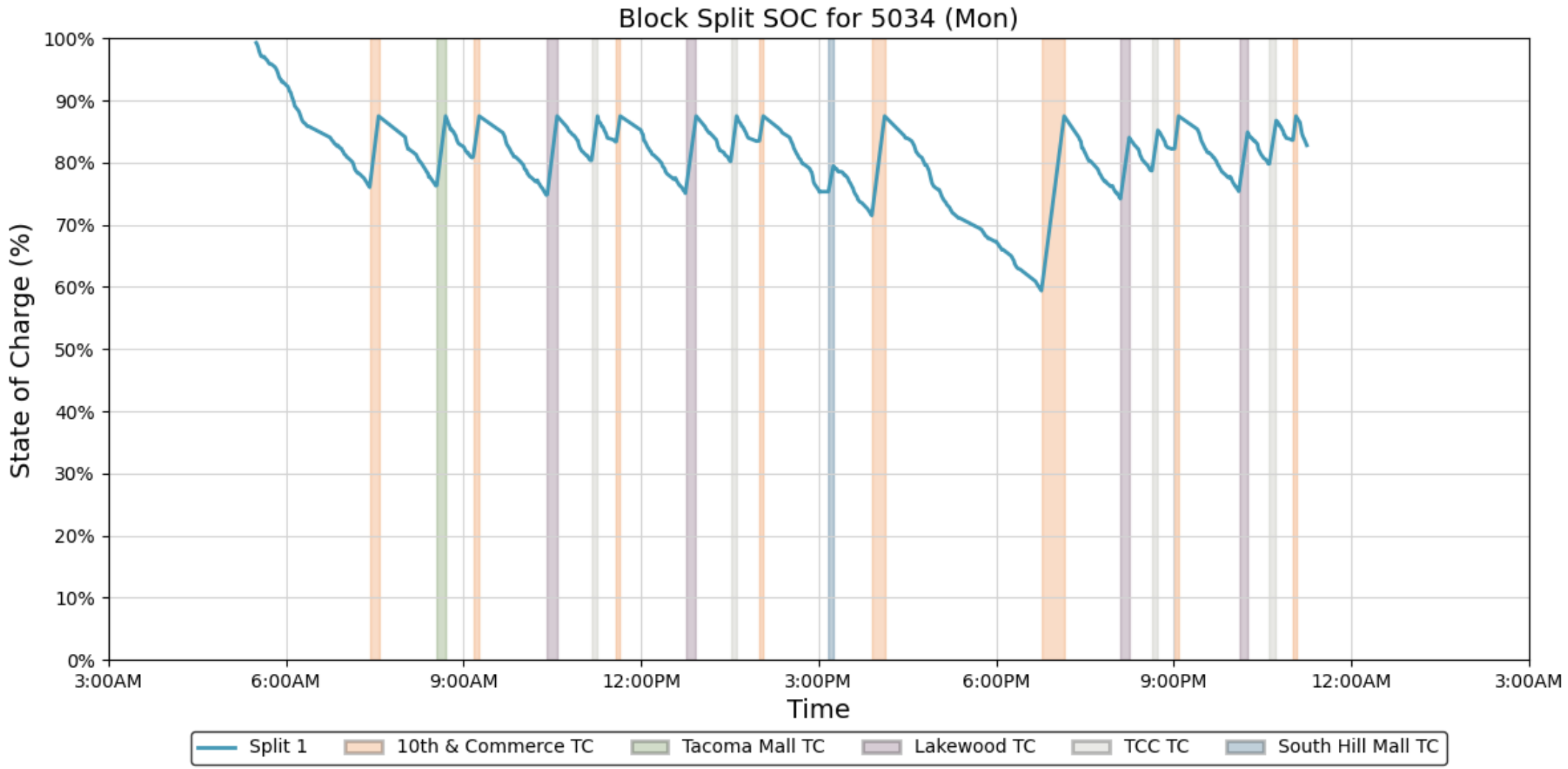


Route Modeling

Figure 3: BEB Depot-Only Block State of Charge (Weekdays)

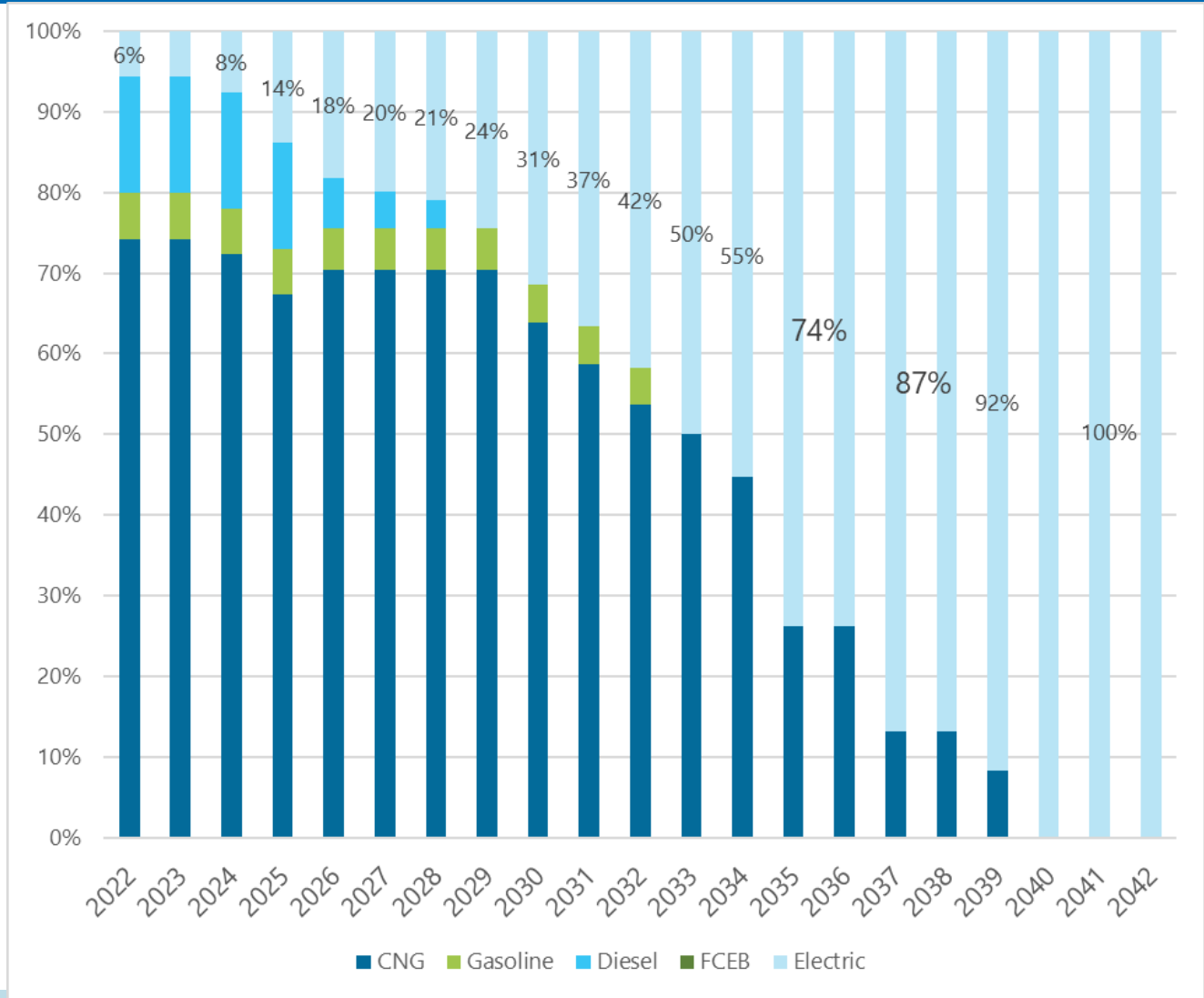


Operations First Approach



Proposed Transition - Buses

- 9 existing BEBs
- 3 BEBs 2024 (FTA Lo-No Award 2022)
- 2 BEBs 2025
- 2 BEBs 2026
- 3 BEBs 2027
- 3 BEBs 2028 (for total of 23)
- BEB Transition Plan assumed 32 BEBs in operation by 2028 – this would require significant grant funding awarded to achieve



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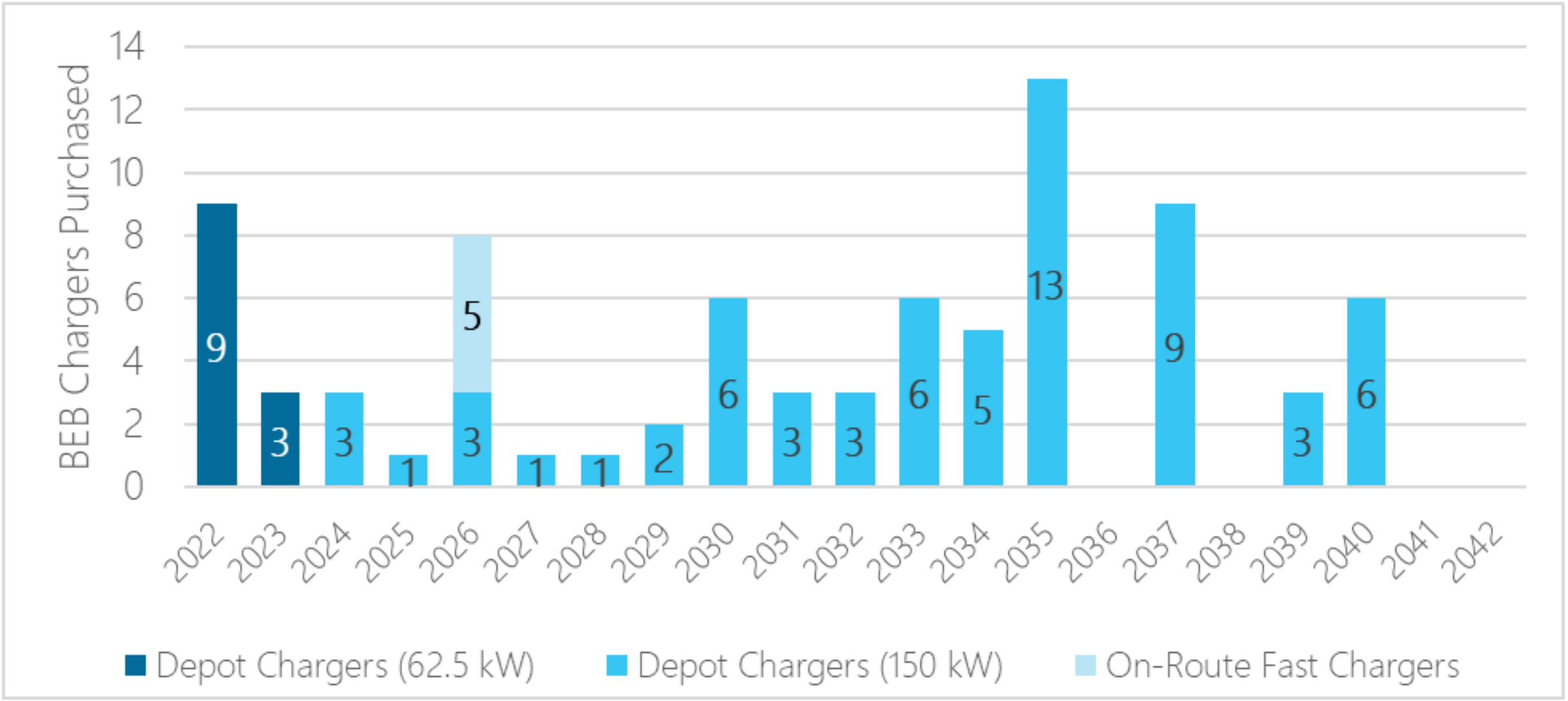
Proposed Transition - Chargers



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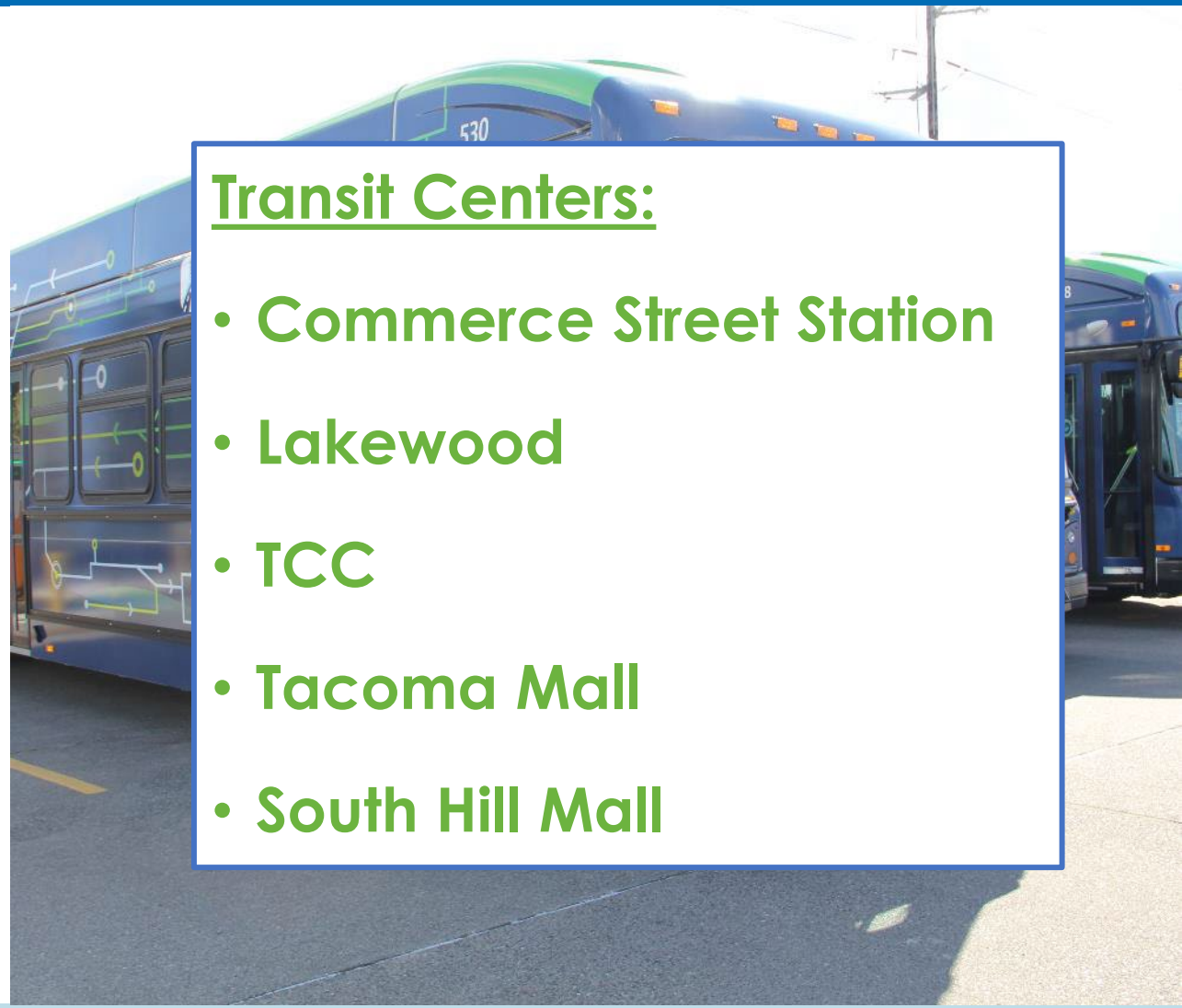
By the Numbers

- Most of the buses would charge at multiple transit centers over the day.
- 36% charge at a single location
- 20% charge at 2 locations
- 25% charge at 3 locations
- 16% charge at 4 locations
- 3% charge at all 5 locations.



Transit Centers:

- **Commerce Street Station**
- **Lakewood**
- **TCC**
- **Tacoma Mall**
- **South Hill Mall**

*On-route charging location stops vary by block (i.e. 30+ possible combinations)

PierceTransit

Clarification on Charging Needs

Table 8: On-Route Charging at Transit Centers

Transit Center	Number of Chargers	Number of Charging Ports	Energy Needed (in MW)	Design to Commissioning
Commerce Street Station	(4) 450 kW (1) 180 kW	**7 ports total** 1 port per 450 kW 3 ports per 180 kW	1.38	2022-2023: (1) 180 kW charger 2033-2035: (4) 450 kW chargers
Lakewood	(4) 450 kW	**4 ports total** 1 port per 450 kW	1.2	2025–2027
TCC	(4) 450 kW	**4 ports total** 1 port per 450 kW	1.2	2031–2033
Tacoma Mall	(3) 450 kW	**3 ports total** 1 port per 450 kW	0.9	2034–2036
South Hill Mall	(3) 450 kW	**3 ports total** 1 port per 450 kW	0.9	2034–2036

BEB Long-Term: Infrastructure Plan

BEB Depot Chargers at 65th Facility

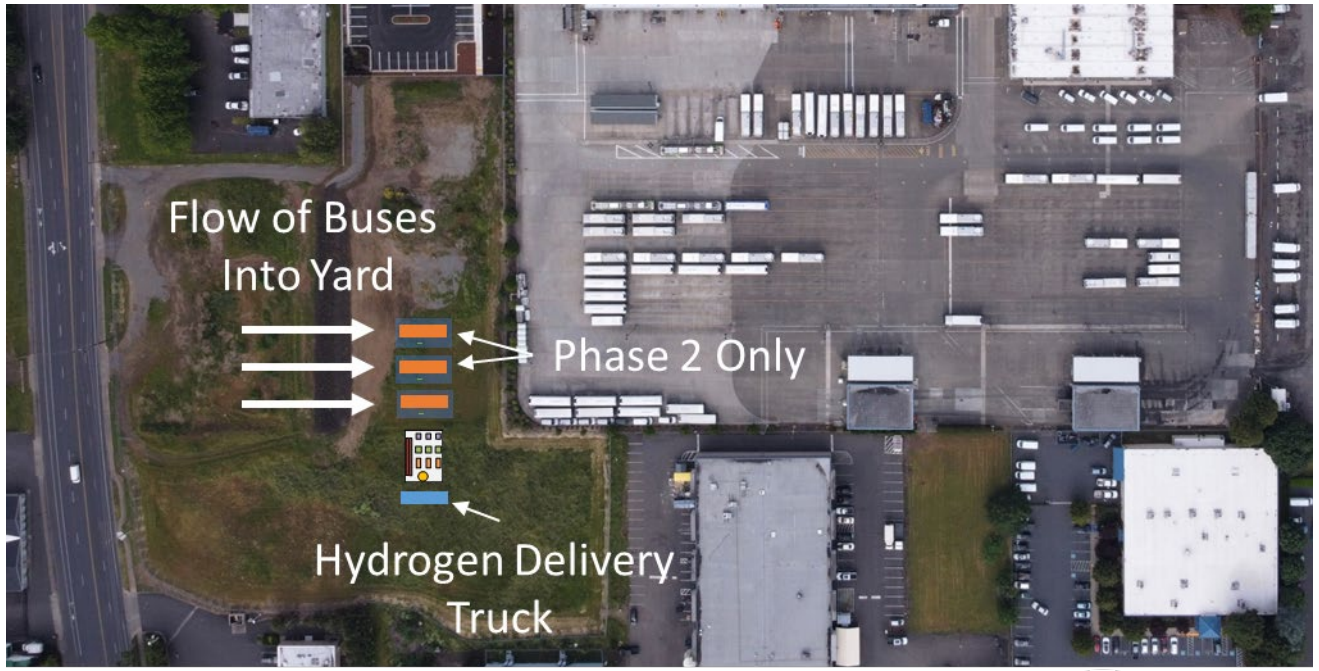
BEB On-Route Chargers at Three Transit Centers

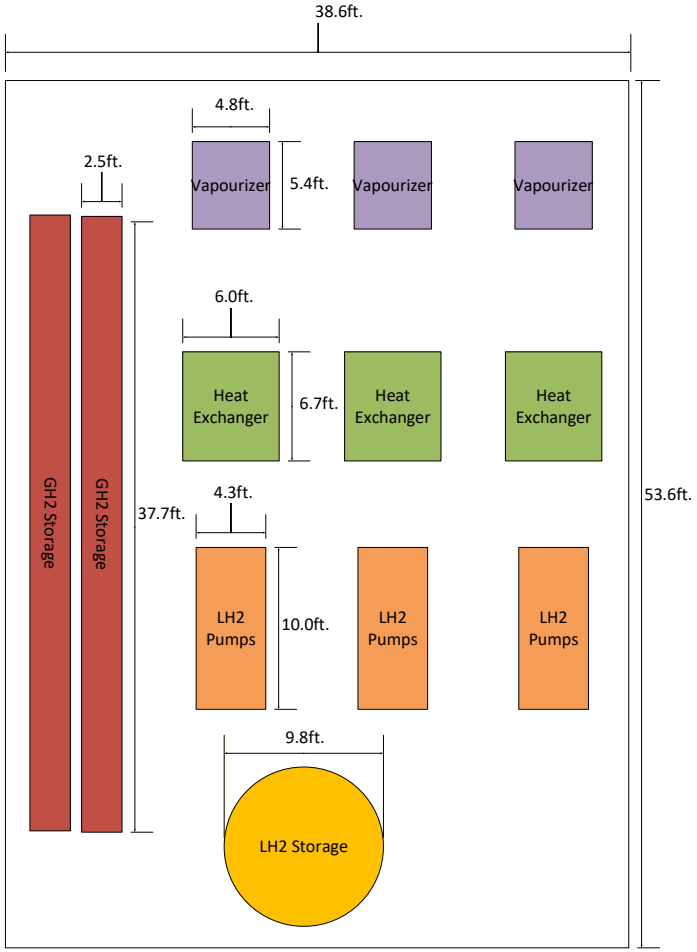
Fisher's Landing

99th Street

Van Mall

FCEB Long-Term: Infrastructure Plan





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