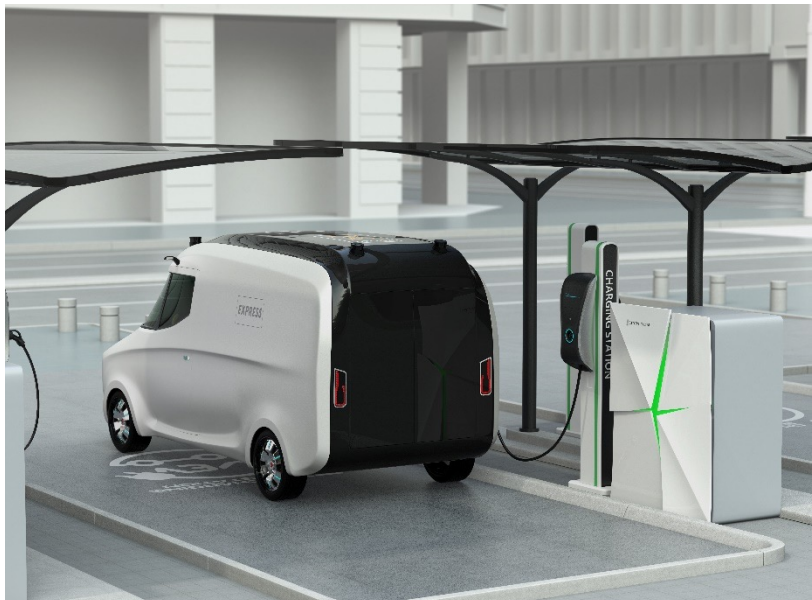
Zero Emissions Future

Electric Vehicle Preparedness



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Meet Our Presenters

Jim Hanson

Transportation Technology Lead

Katie Angell

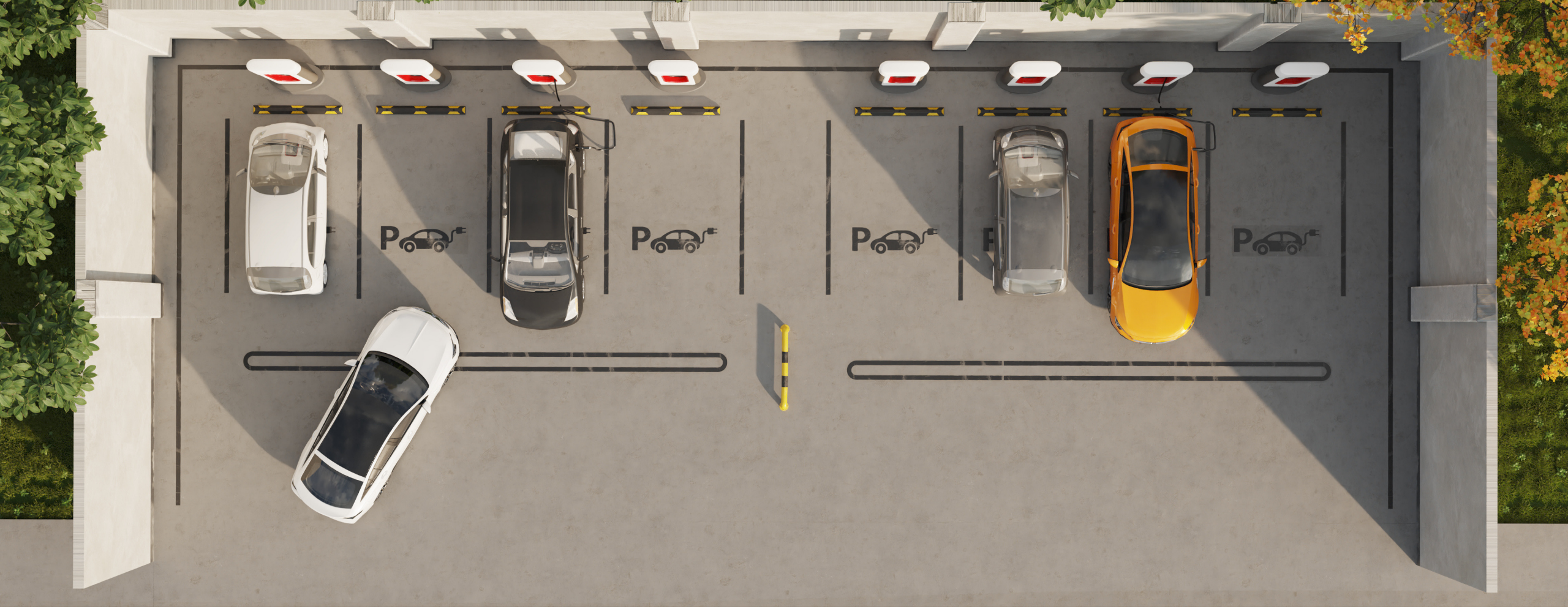
Strategic Communications Manager

Rob Mowat

Electrified Mobility Practice Lead

AGENDA

- Community EV Readiness Plans
- Community Outreach & Education
- EV Adoption - Fleets
- EV Network Charging
- Potential Funding



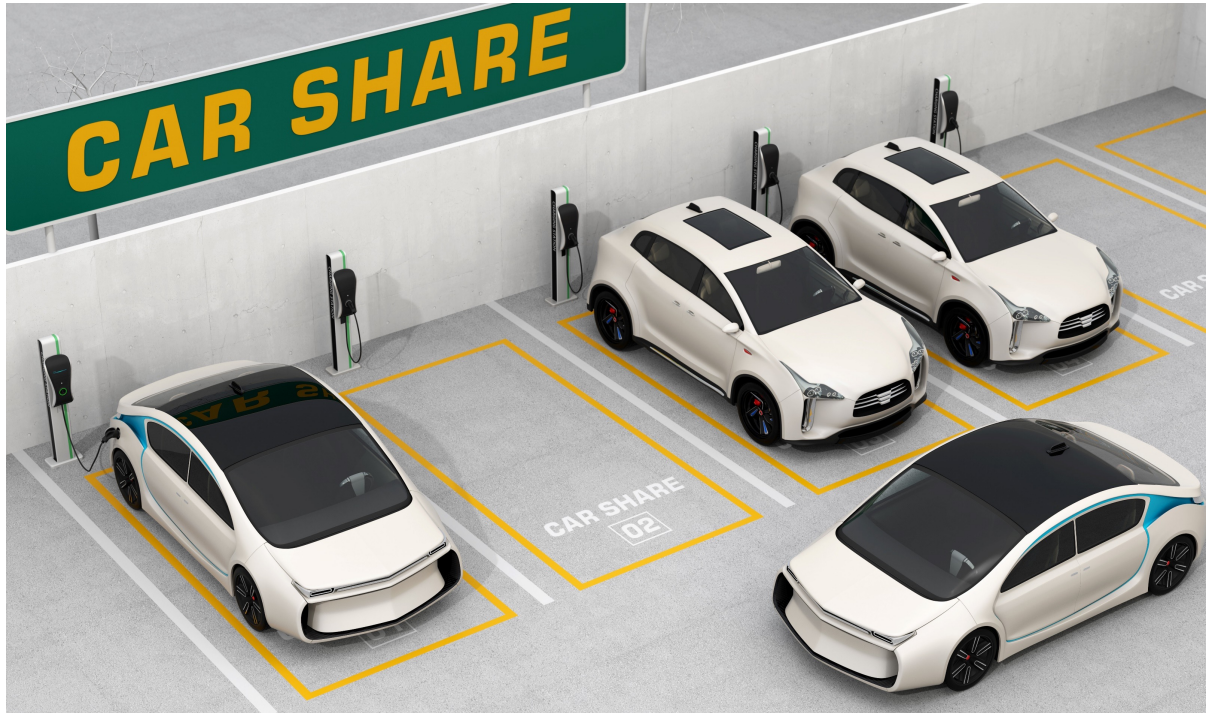
Community EV Readiness Plans

State of Electric Vehicle (EV) Readiness

- Federal goals and initiatives
  - **American Jobs Plan - $174B (proposed)**
    - 500,000 chargers by 2030
    - 50,000 transit and 20% school buses replacements
- State goals and initiatives
  - **State of Colorado EV Plan 2020**
    - Goal of 940,000 EVs by 2030 and supporting infrastructure
  - **Senate Bill 21-260**
    - $700m+ for EV initiatives

Modernized Future of Transportation

- Multi-modal zero emissions transportation options
  - Micro-mobility
  - Transit
  - Car share
- Connected and automated vehicles



EV Community Readiness Plans

A challenge with implementing emerging technology is that agencies often are drawn to trendy projects.

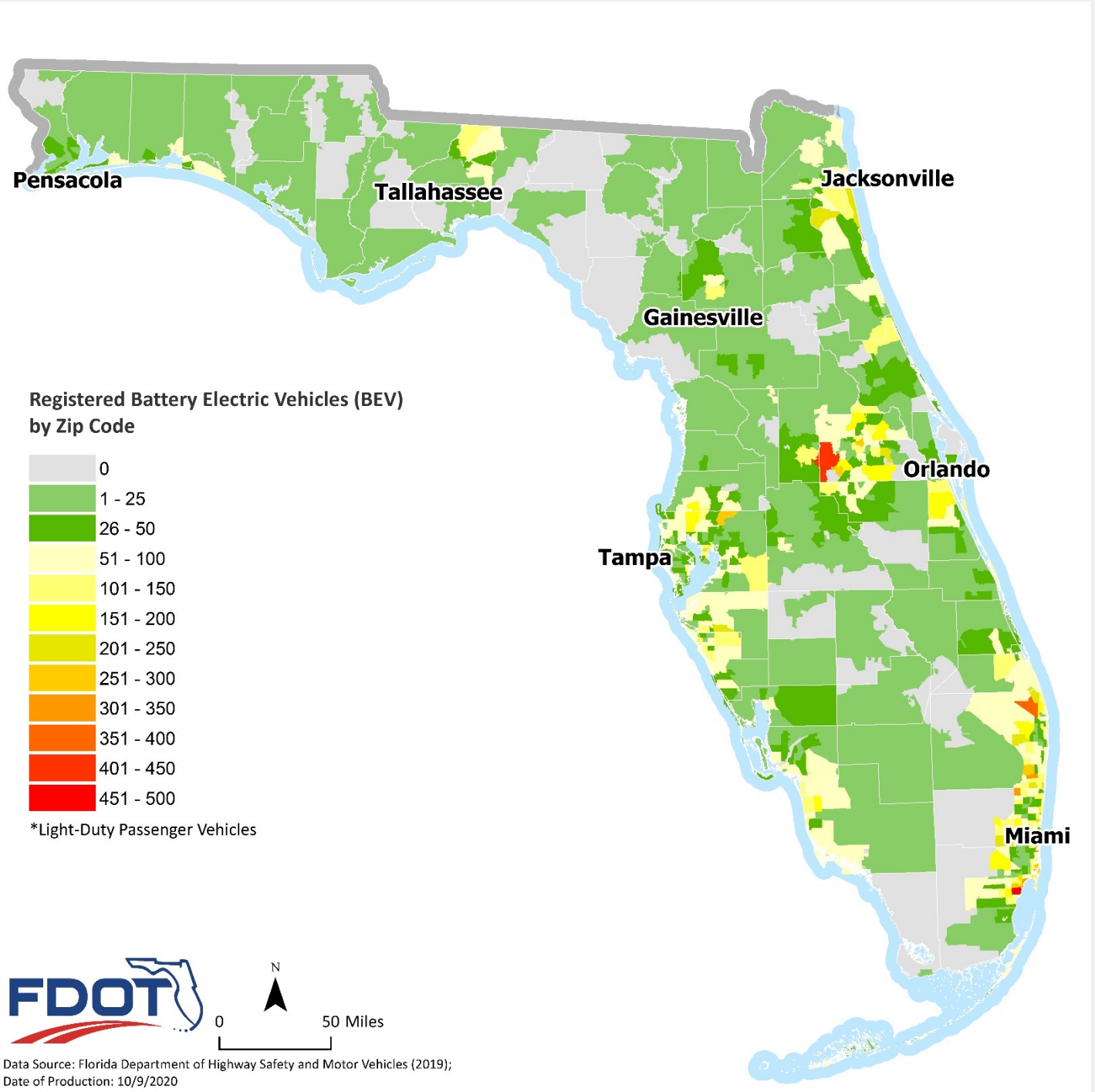
- This is also true with EV infrastructure
  - For example, they get caught up with having a charging station that they put it in a location that doesn't make sense

EV Readiness Plans help agencies strategically identify actions to advance their objectives

Featured Project:
Pueblo County EV Readiness Plan

EV Deployment Factors

- Multi-family housing
- Trip origin/destination
- Employment centers
- Population density
- Household income
- Land use
- Existing charging networks
- Major roadway AAADT



Equity

Equity isn't just about owning an EV, but also about having access to and benefiting from electrified mobility

- Electric buses
- Electric TNCs
- Electric bikes
- Electric micro-mobility

Access and education will be important as EVs become increasingly available in the secondhand car market

Training and livable wages for staff to support EVs is important

Featured Project:
Steamboat Springs EV Readiness Plan

The Basics

What is a readiness plan?

A strategy for how communities can prepare and support zero emissions mobility

How will this help communities?

Properly align priorities and policies, and to help allocate resources

What Community Needs are Evaluated?

A process to identify trends, gaps, needs, desired direction, and a road map to get there.

The Process

1

Understand Objectives

- Vision, mission, goals
- Existing conditions
- Trends in mobility and electrification
- Barriers to implementation
- Equity and Inclusion

2

Identify Opportunities

- Identify specific actions (policies, programs, pilots) to support goals/direction
- Provide technical resources at a planning level
- Identify infrastructure needs/siting criteria

3

Create the Road Map

- Develop actionable and measurable recommendations achieve objectives based on opportunities

Not all plans and goals are the same…

Every agency has different objectives

- Steamboat Springs
  - Eliminate barriers for adoption of EVs
    - Vehicle sales/servicing
    - Vehicle model availability
    - Charging - Equity
- Pueblo County
  - Siting of Level 2 and DCFC EVSE
  - Criteria for future EVSE
- Washoe RTC
  - Alternative fuels comparison and readiness

Community Outreach & Education

Outreach & Education

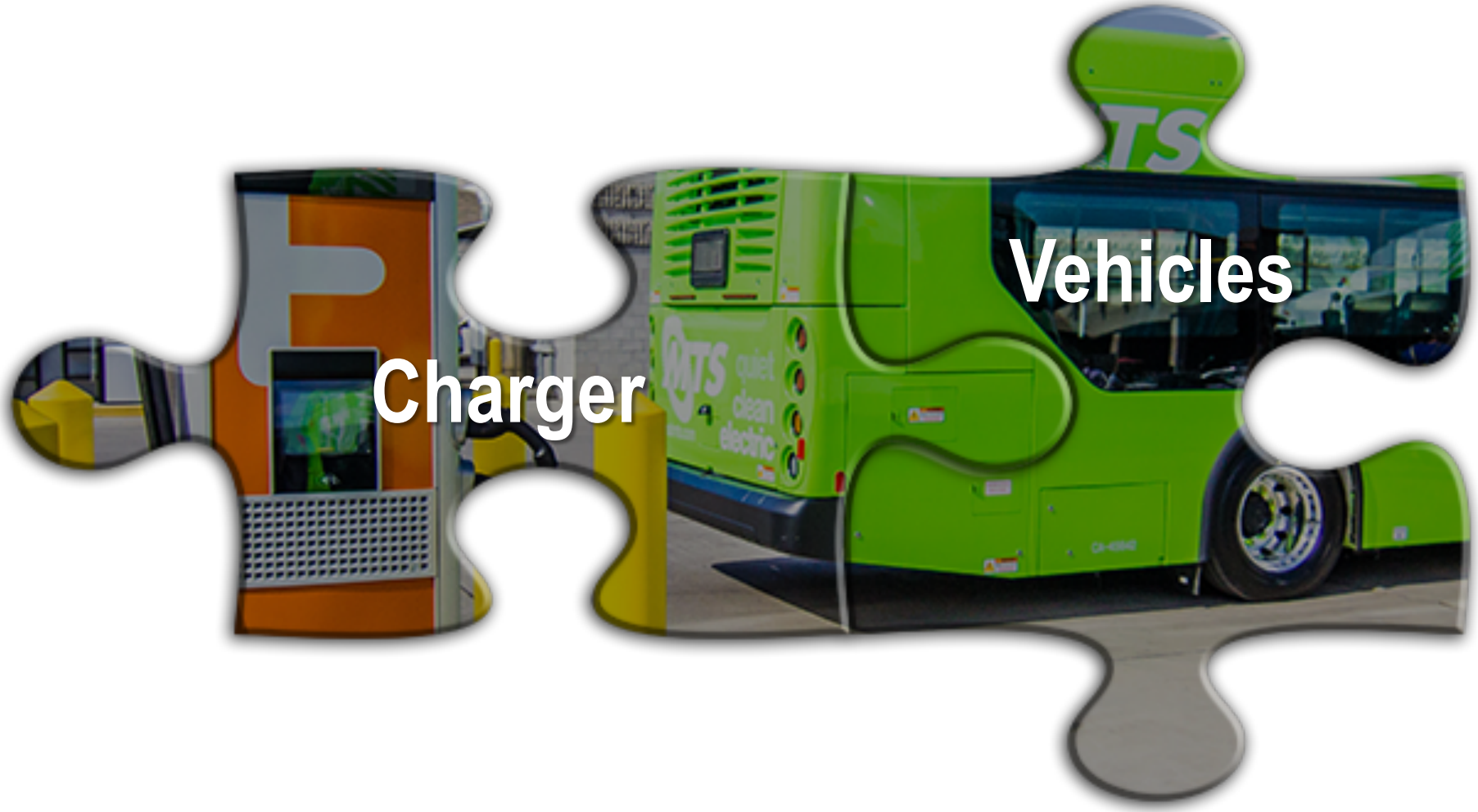
- Start engaging stakeholders and the community in the planning process
  - Partner and industry professional interviews (i.e. local jurisdictions, auto dealers, fleet management companies)
  - Build awareness with the general public and gather input to understand buyer behaviors and experiences
- Kick-starts EV public awareness
- Develops advocates and partners for future implementation
- Sets the stage for a widespread public awareness and education campaign

Building Public Awareness

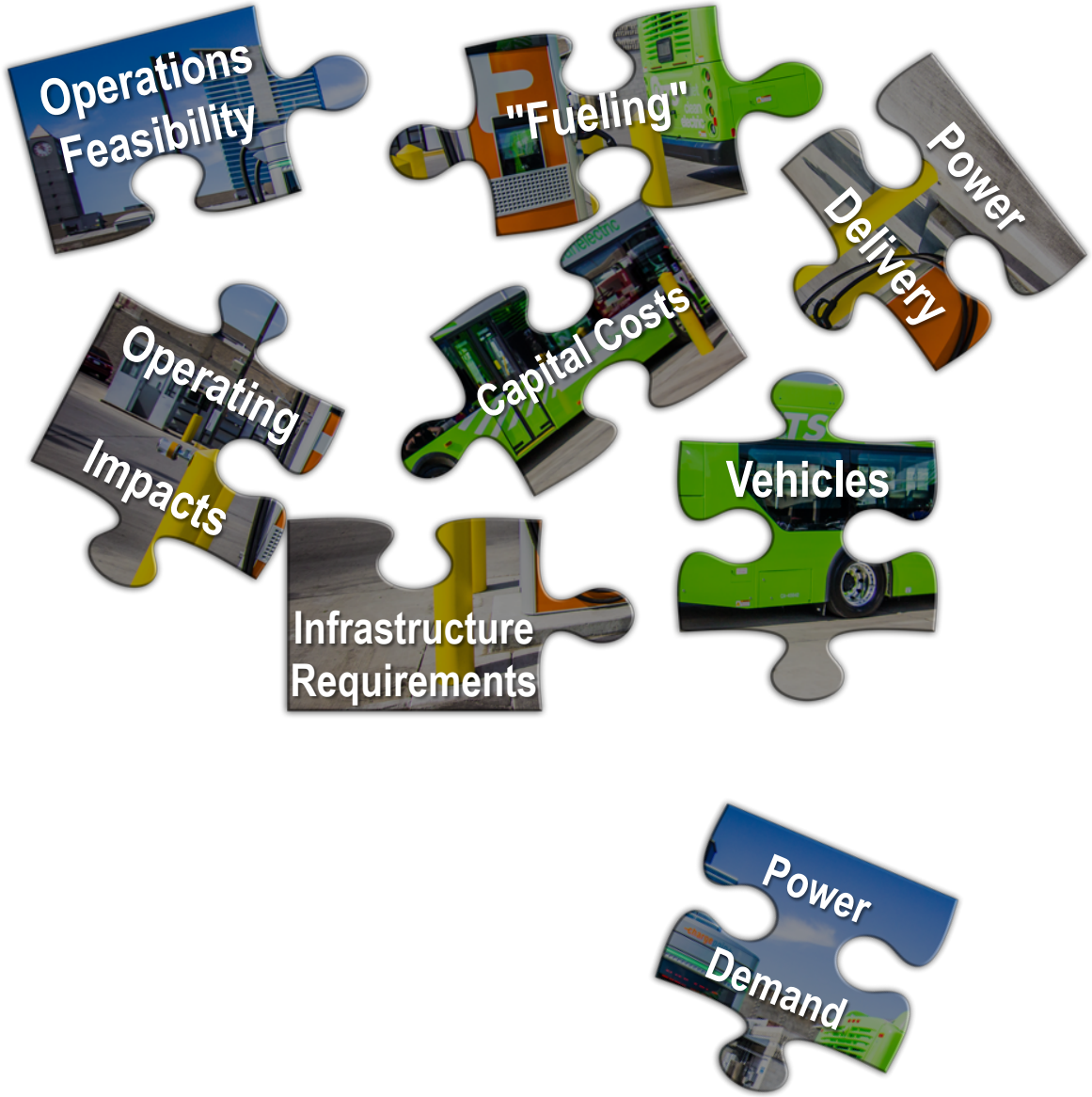
- Understand existing behaviors
  - Market research
  - General census data
  - Social listening – what are people saying about ZEM?
  - Socioeconomic trends – how do people get their information?
- Develop an equitable campaign strategy with messaging that resonates with all audiences
- Leverage partner communication outlets
  - Consistent and wide-spread messaging

EV Adoption - Fleets

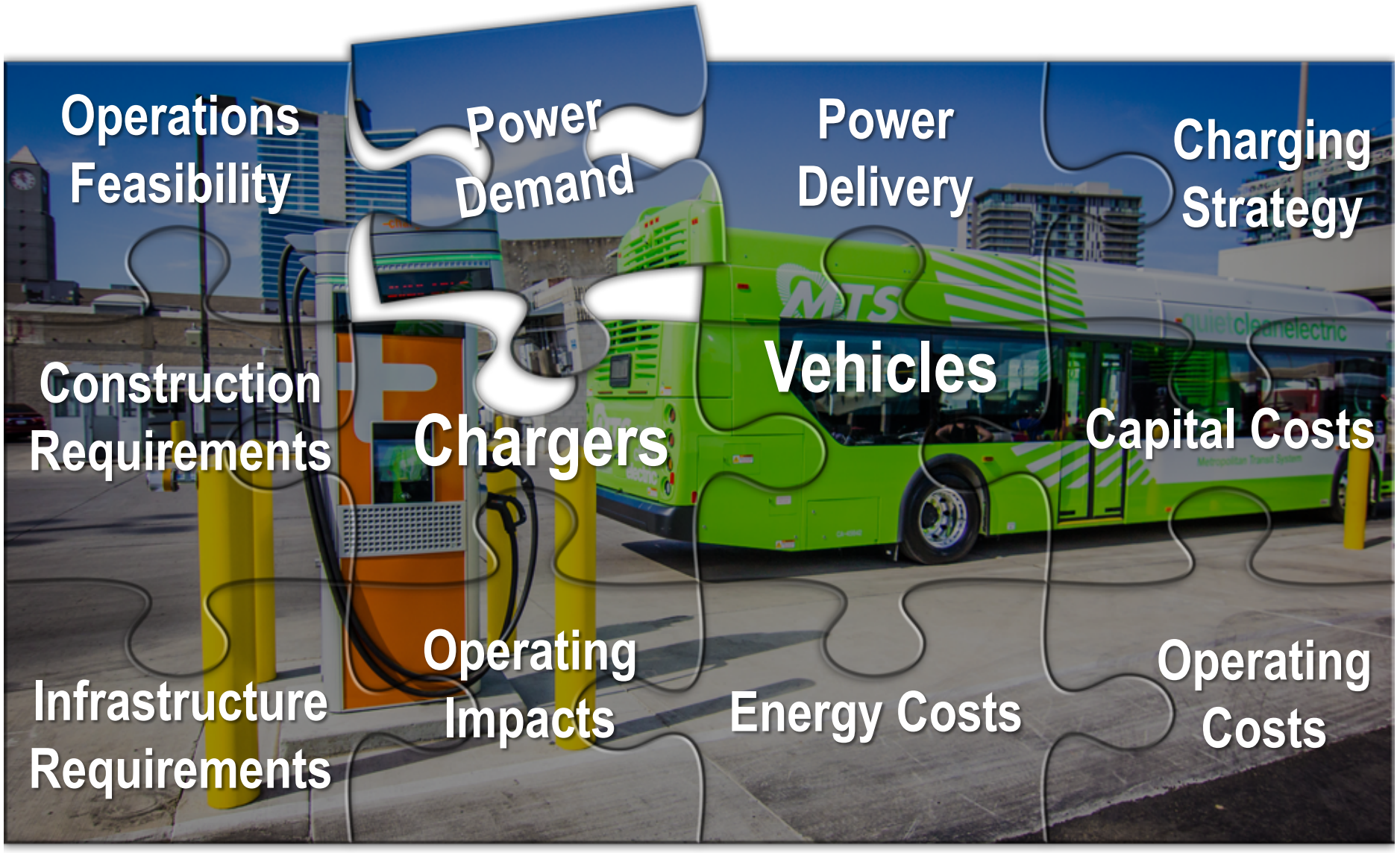
Things to consider when transitioning to ZEM



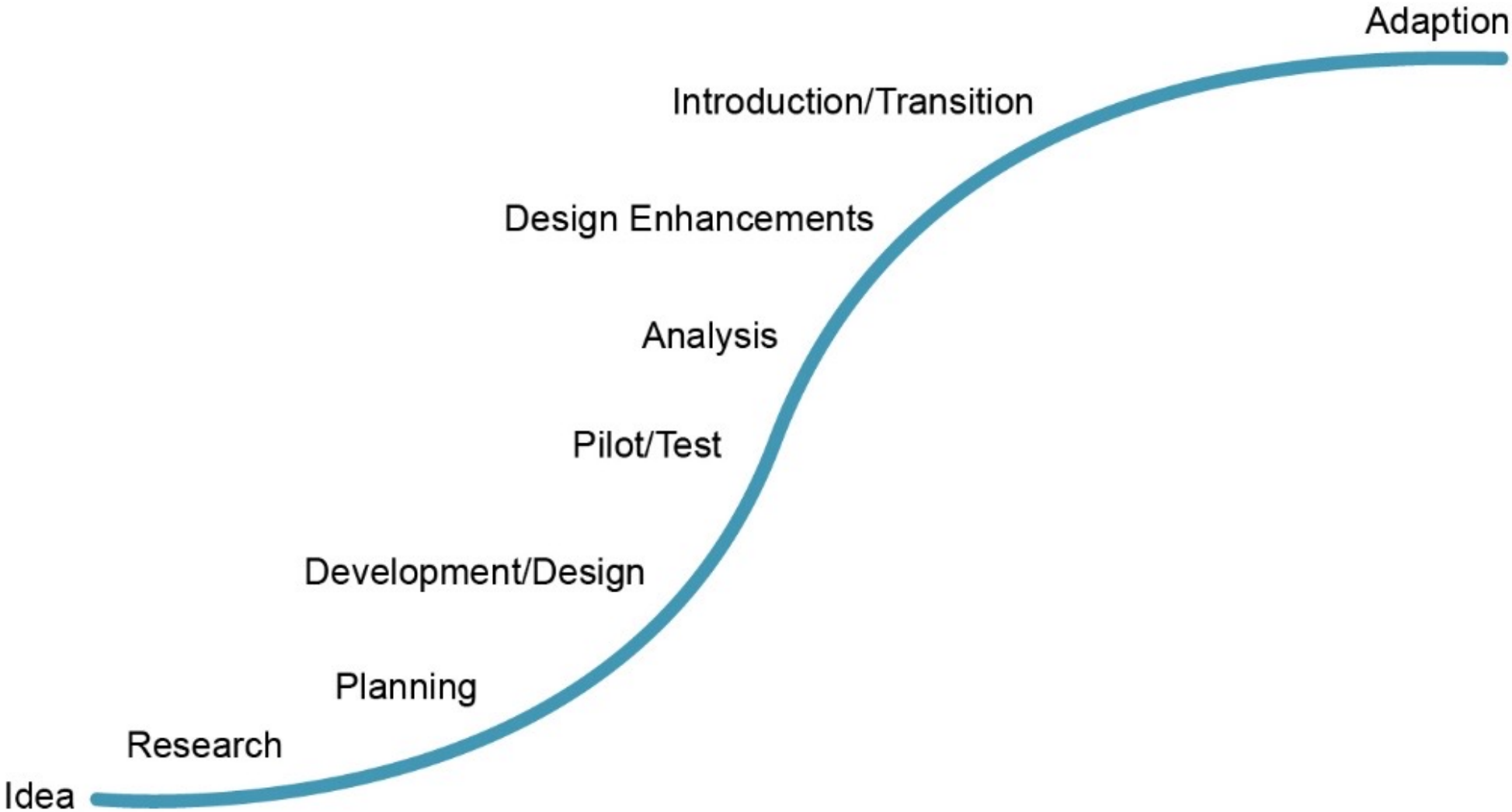
Things to Consider When Transitioning to ZEVs



There's More to ZEM Transition Considerations



New Technology Introduction Curve



Transitioning to Zero Emission Vehicles

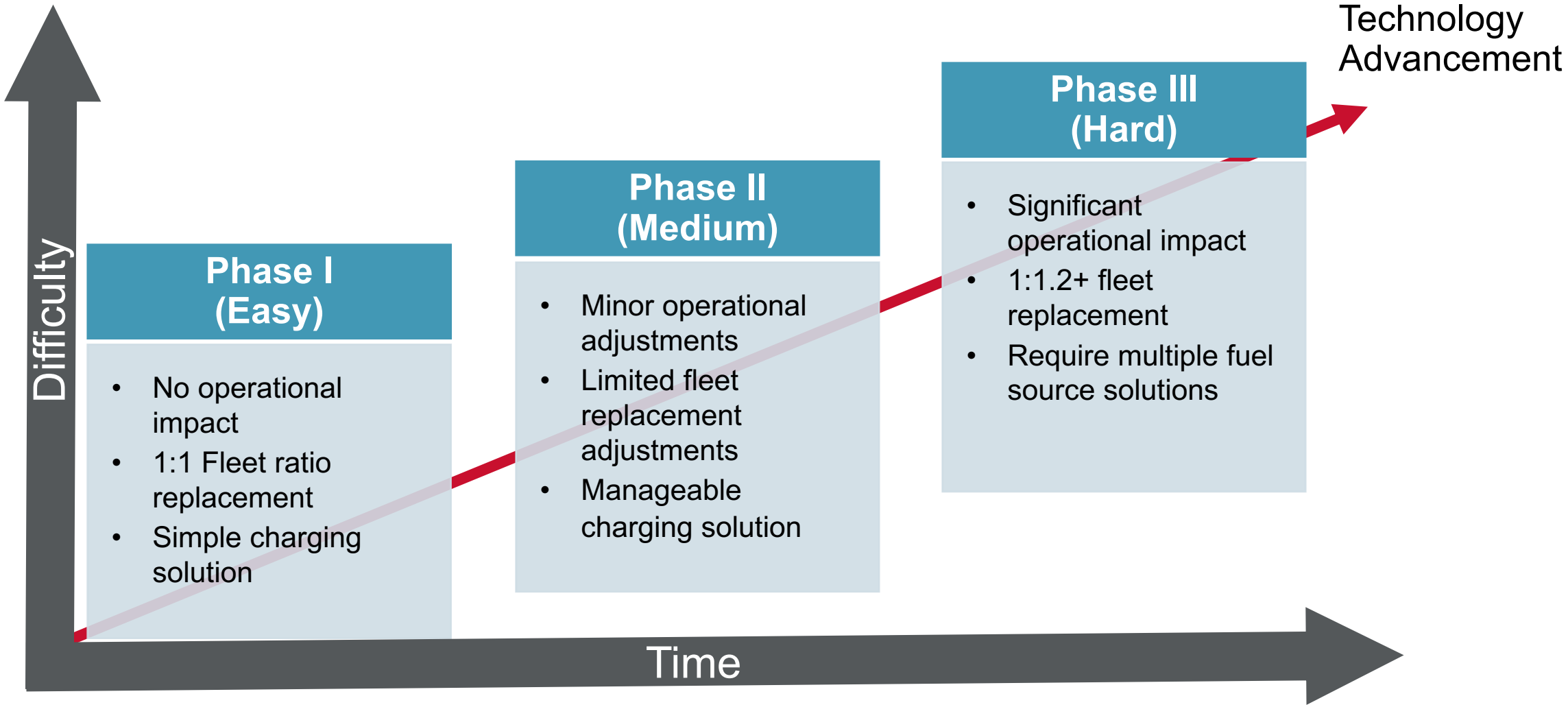
3 Guiding Elements/Principals

- **Idea to Implementation**
  Look for an industry-recognized expert in transportation, energy and facility design to collaborate on the full scope of your project — from research, planning and design through operations.

- **First Things First**
  Lay a solid foundation with research, planning and design to create a clear roadmap that helps you avoid pitfalls and streamline scaling and implementation.

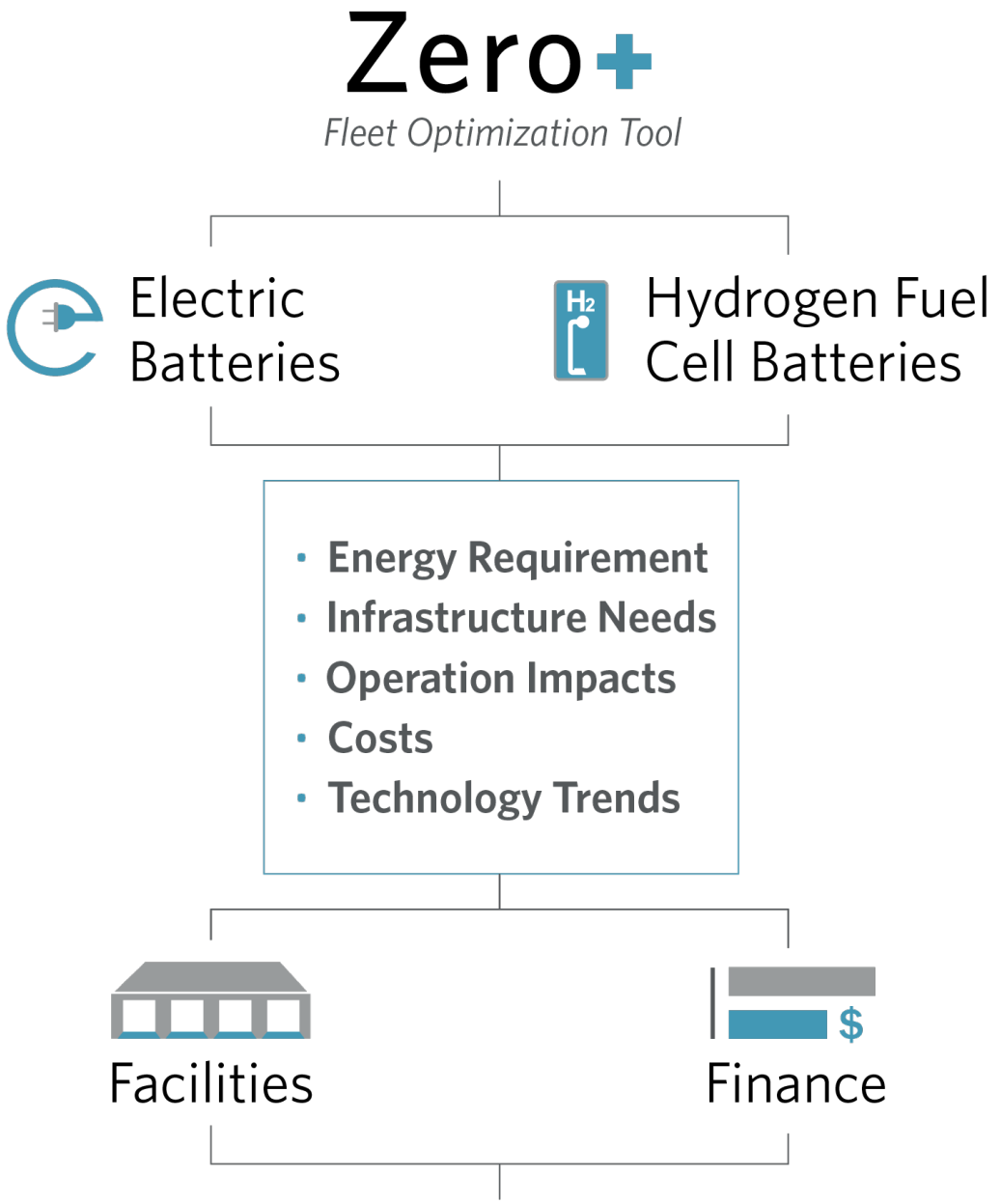
- **Data-driven Decisions**
  Cross-layer GIS-based modeling with operational fleet data to understand operating, charging/fueling cost scenarios. Integrate that data with suitability models to complete a sustainable value analysis to help you prioritize next steps.

A Phased Approach



Zero+ Tool

- Simulate electric vehicle operation for a fleet using GTFS or GPS data.
- Combines lots of information:
  - Route shapes/paths
  - Elevation changes
  - Stops, stop signs, stop lights, turns, idle time, etc.
  - Vehicle details (size, weight, power, etc.)
- Physics level simulation of energy
  - FASTSim from National Renewable Energy Laboratory



Feasibility Analysis Report

Zero Emissions Vehicle Facility Infrastructure

"Future Proof" Facilities

- Understanding of Functional Flow
  - Energy Delivery Infrastructure
- ZE Facility Considerations:
  - Bay sizing
  - Vehicle Circulation
  - Vehicle Parking
  - Access to top/bottom of vehicle
  - Storage

Featured Project: Metropolitan Transit System (MTS) Zero Emissions Charger Design

EV Network Charging

Planning Elements

- Local goals and objectives
- Types of chargers
- Siting Considerations
- Purchase/Installation Costs
- Ownership Models
- Utility Coordination
- Revenue Generation
- Open Access or Network
- Available Funding

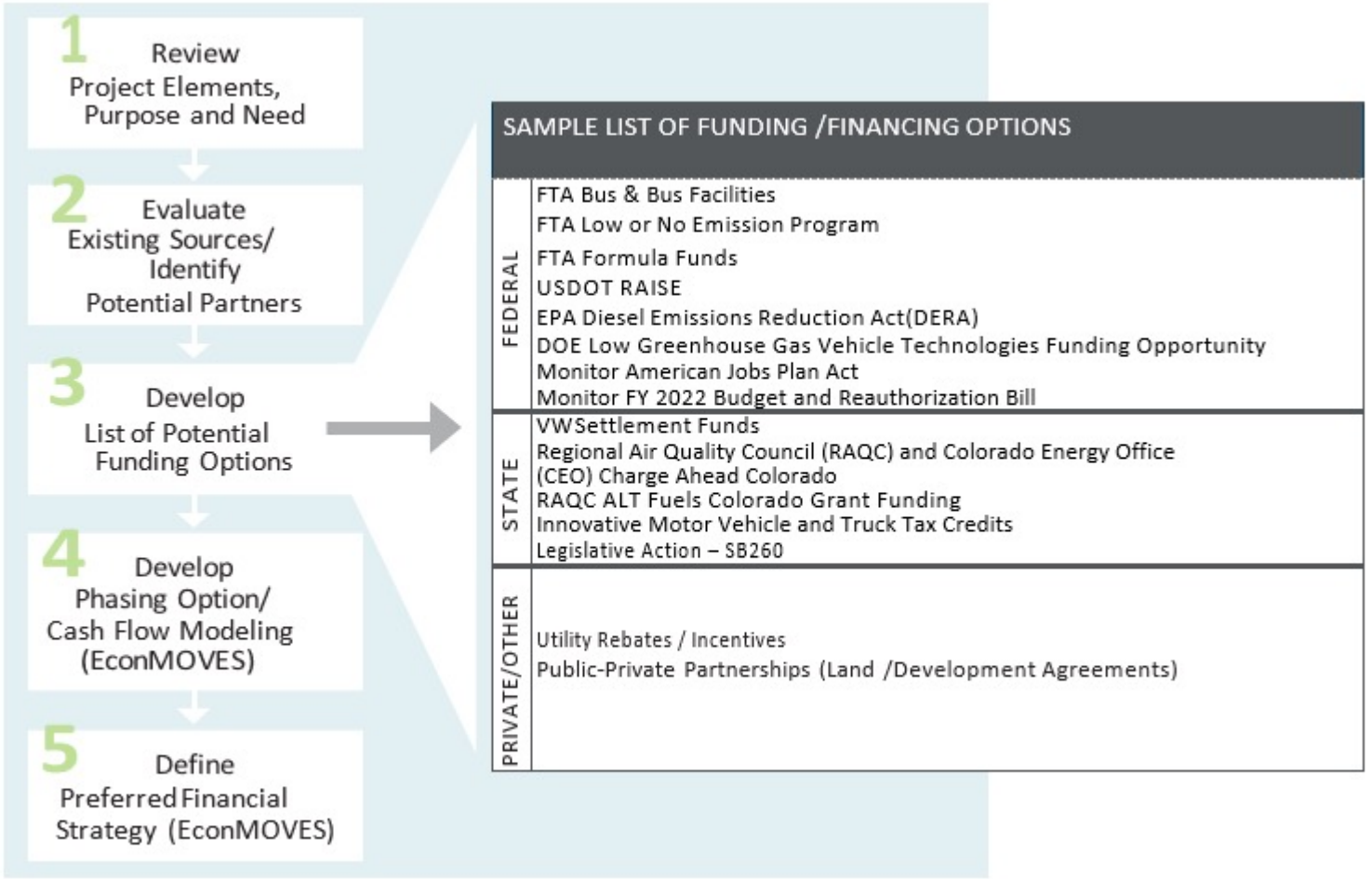
LEVEL 1	LEVEL 2	DIRECT CURRENT FAST CHARGE (DCFC)
2 to 5 miles of range per 1 hour of charging	10 to 20 miles of range per 1 hour of charging	60 to 80 miles of range per 20 minutes of charging
J1772 Charge Port	J1772 Charge Port	CCS Charge Port, CHAdeMO, Tesla
		
Alternating Current (AC) LEVEL 1 equipment (often referred to simply as Level 1) provides charging through a 120 volt (V) AC plug. Most, if not all, PEVs will come with a Level 1 cordset, so no additional charging equipment is required. On one end of the cord is standard NEMA connector, (for example, a NEMA 5-15, which is common three-prong household plug) and on the other end is SEA J1772 standard connector (often referred to simply as J1772, shown in the above image). The J1772 connector plugs in to the car's J1772 charge port, and the NEMA connector plugs in a standard NEMA wall outlet. Level 1 charging is typically used when there is only a 120V outlet available, such as while charging at home, but can easily provide charging for all of a driver's needs. For example, 8 hours of charging at 120V can replenish about 40 miles of electric range for a mid-size PEV. As of 2019, less than 5% of public charging outlets in the United States were Level 1.	AC LEVEL 2 equipment (often referred to simply as Level 2) offers charging through 240V (typical in residential applications) or 208V (typical in commercial applications) electrical service. Most homes have 240V service available, and because Level 2 equipment can charge a typical PEV battery overnight, it is commonly installed at PEV owners' homes for home charging. Level 2 equipment is also commonly used for public and workplace charging. This charging option can operate at up to 80 amperes (Amp) and 19.2 kW. However, most residential Level 2 equipment operates at lower power. Many of these units operate at up to 30 Amps, delivering 7.2 kW of power. These units require a dedicated 40 Amp circuit. As of 2019, over 80% of public outlets in the United States were Level 2. Level 2 charging equipment uses the same J1772 connector and charge port that Level 1 equipment uses. All commercially available PEVs have the ability to charge using Level 1 and Level 2 charging equipment. Although Tesla vehicles do not have a J1772 charge port, Tesla does sell an adapter.	DIRECT-CURRENT (DC) fast charging equipment (typically 208/480V AC these-phase input), enables rapid charging along heavy traffic corridors at installed stations. As of 2019, about 15% of charging outlets in the United States were DC fast chargers. There are three types of DC fast charging systems, depending on the type of charge port on the vehicle: SAE Combined Charging System (CCS), CHAdeMO, or Tesla. The CCS (as known as J1772 combo) connector is unique because a driver can use the same charge port when charging with Level 1, 2 or DC fast equipment. The only difference is that the DC fast charge connector has two additional bottom pins. The CCS connector is used by Chevorlet and BMW PEVs, for example. The CHAdeMO connector is the most common of the three connector types and is used by Nissan, Mitsubishi, and Toyota PEVs, for example. Tesla vehicles have a unique charge port and connector that works for all their charging options including their fast charging option, called a supercharger.

Implementation/Operations

- Signage/Markings
- Parking Policy/Enforcement
- On-going Maintenance
- Design Work
- Installation
- Construction Oversite
- Commissioning
- Procurement Types
- Community goals

Potential Funding

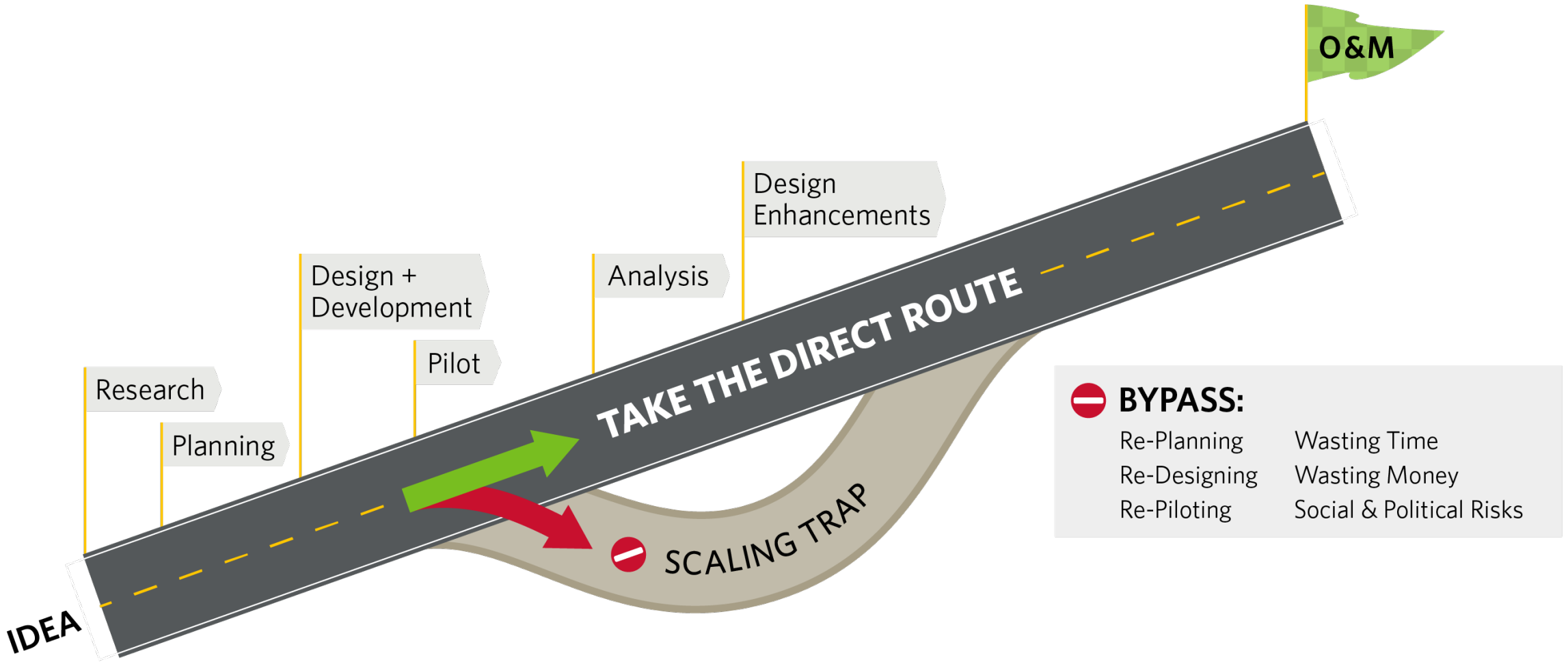
Funding Opportunities



American Jobs Plan

- 500,000 Chargers by 2030
- 50,000 Transit and 20% school buses replacements
- New Transit and Rail projects
- Grid Improvements/Renewables
- Facility Rehabs-Energy Efficiency

Take the Direct Route



Questions?