A Roadmap for Transitioning to Electric Waste Collection Fleets

Presented by John Carlton, PE, BCEE

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The future of waste collection fleets is electric!

Electric collection trucks are where electric buses were **7 years ago**

Significant **growth** is expected

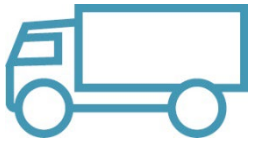
Have you or are you considering a transition to electric collection trucks?

Why Electric Collection Trucks?

Promotes cleaner and healthier air in communities

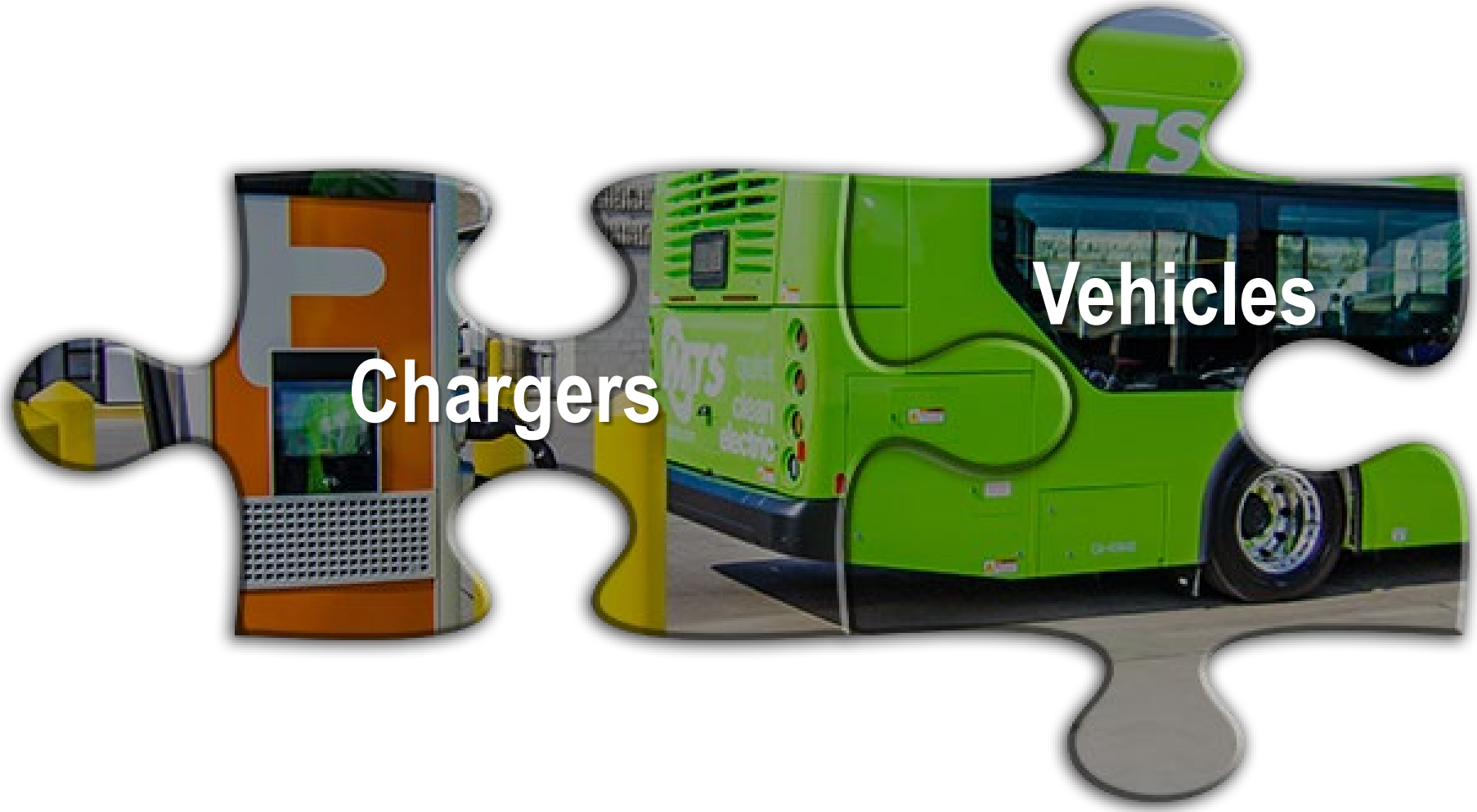
Supports local climate action goals

Reduces noise pollution



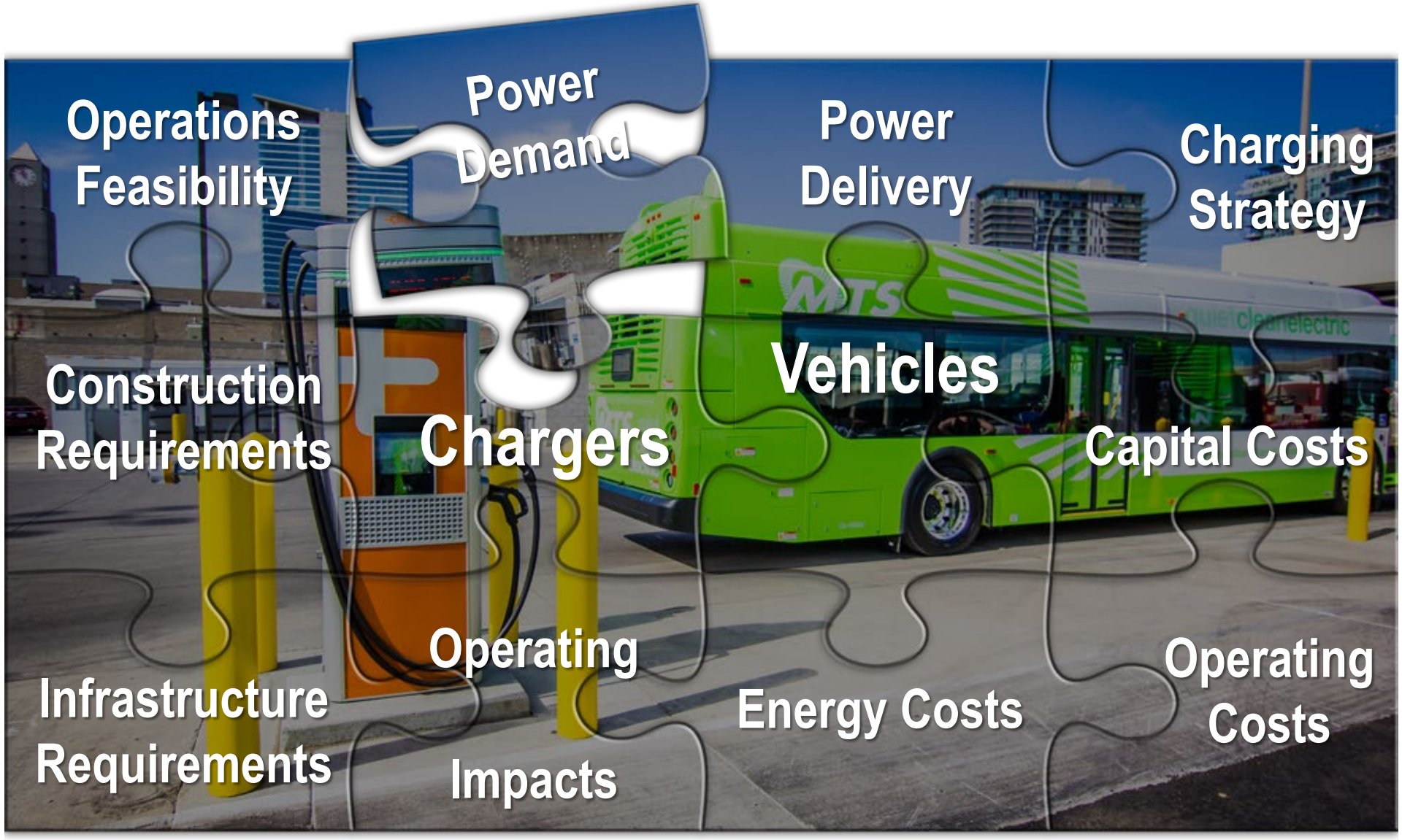
Requires lower maintenance

Perceived Transitioning to Electric Trucks



It’s a Little More Complicated

Putting the Pieces Together



Things to Consider When Transitioning to ZEVs

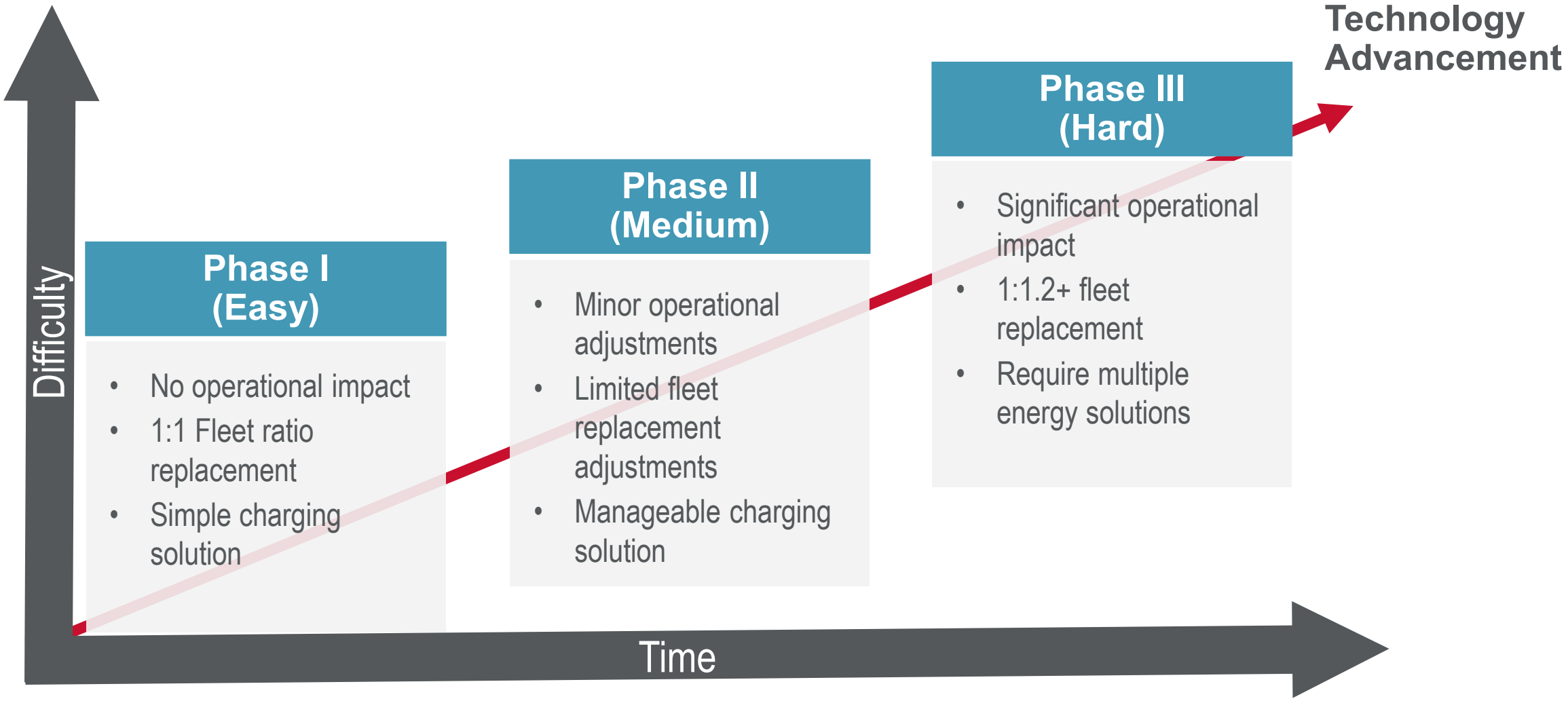
3 Guiding Elements/Principals

- **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.

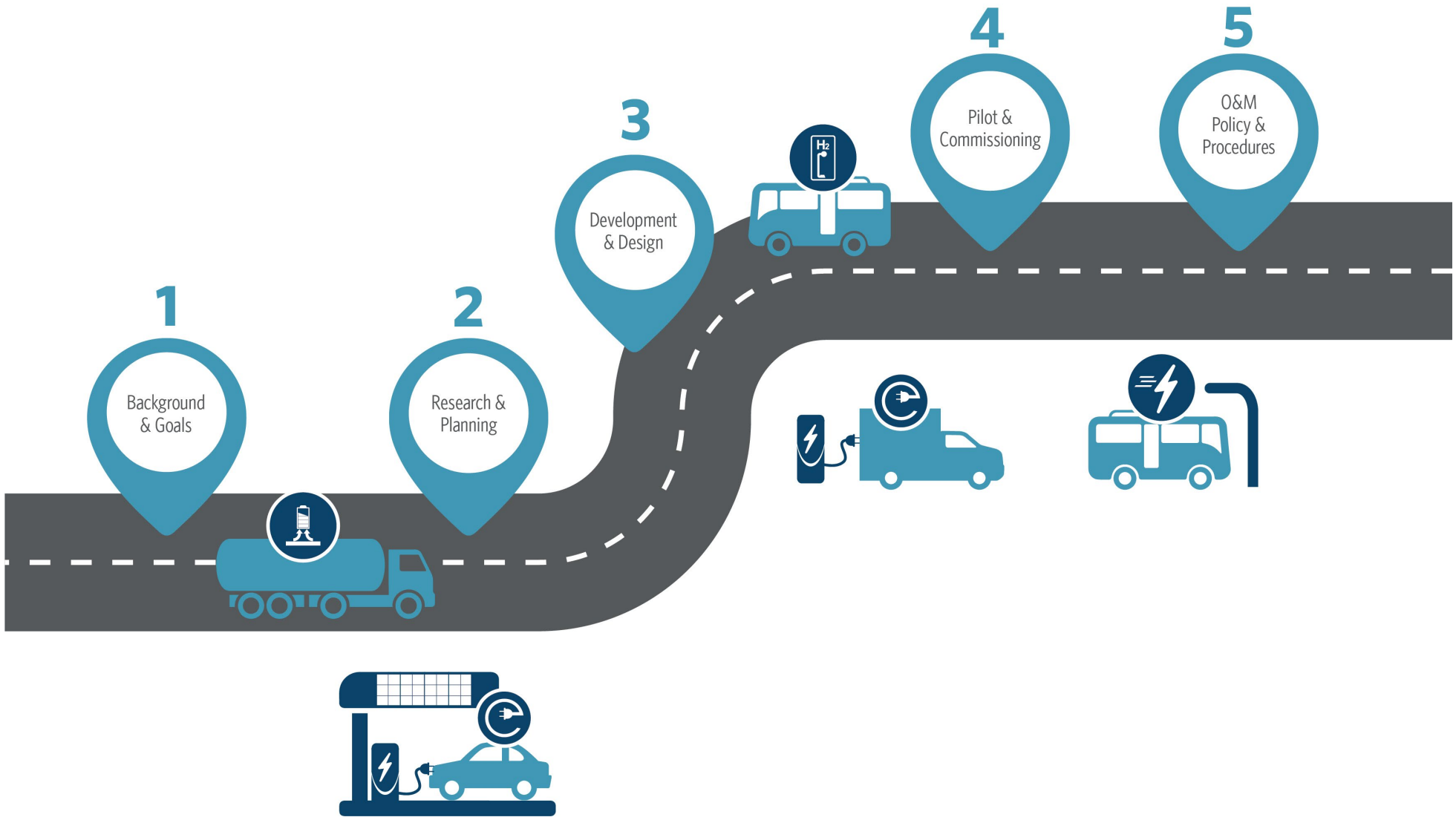
- **First Things First**
  Lay a solid foundation with research, planning and design to create a clear roadmap that helps you avoid pitfalls and streamline scaling and implementation.

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

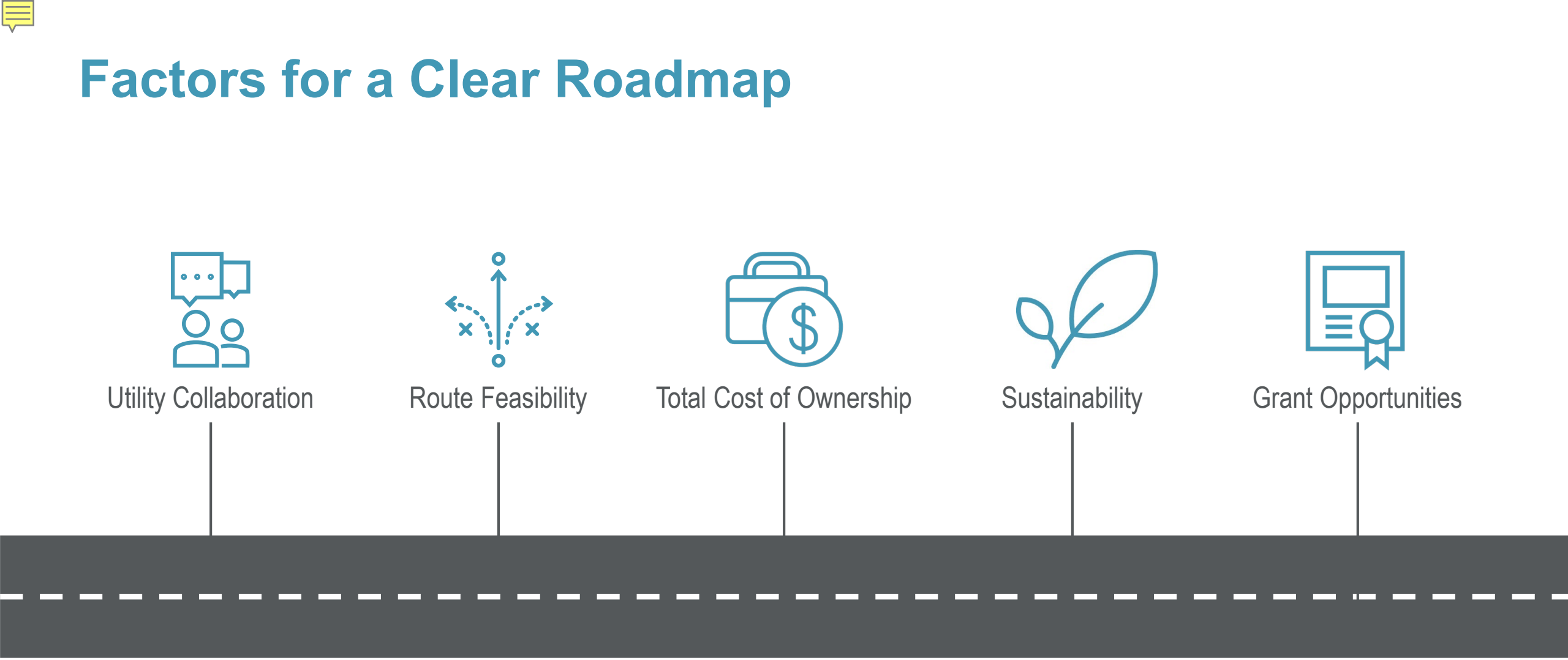
Challenges of Transitioning



Development: Roadmap to Transition



Factors for a Clear Roadmap



The Right Tools Make a Difference

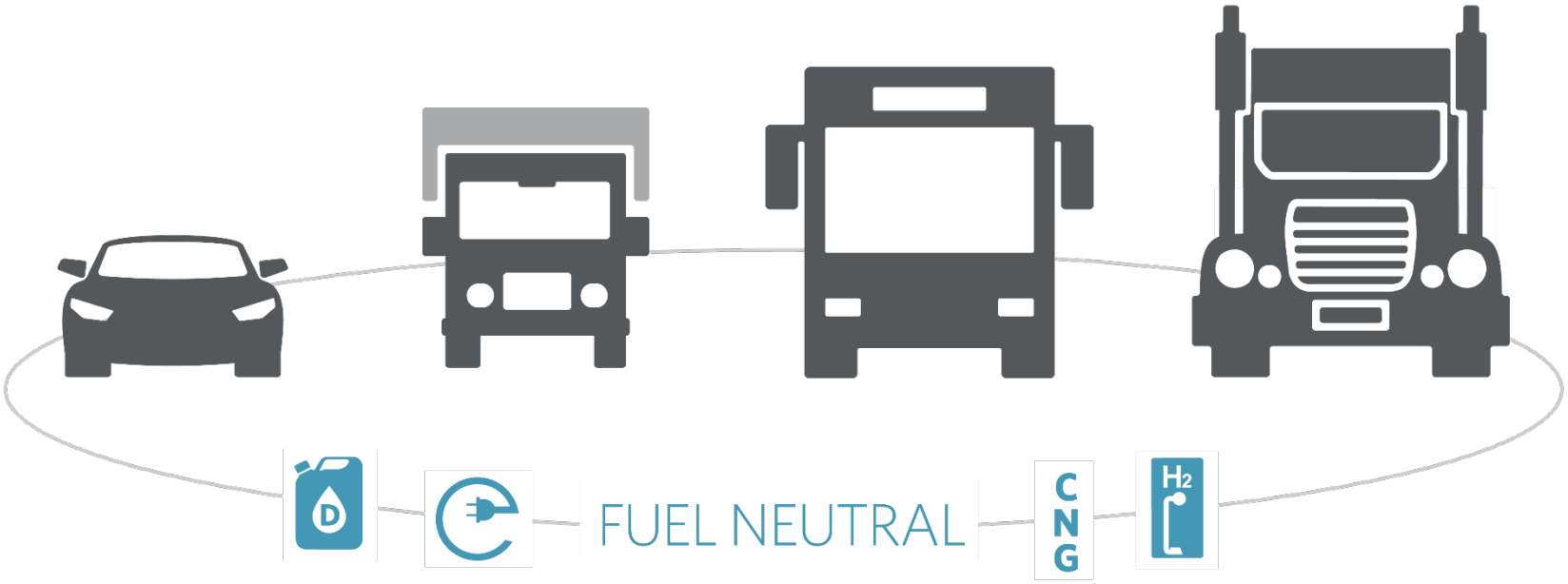
Zero+

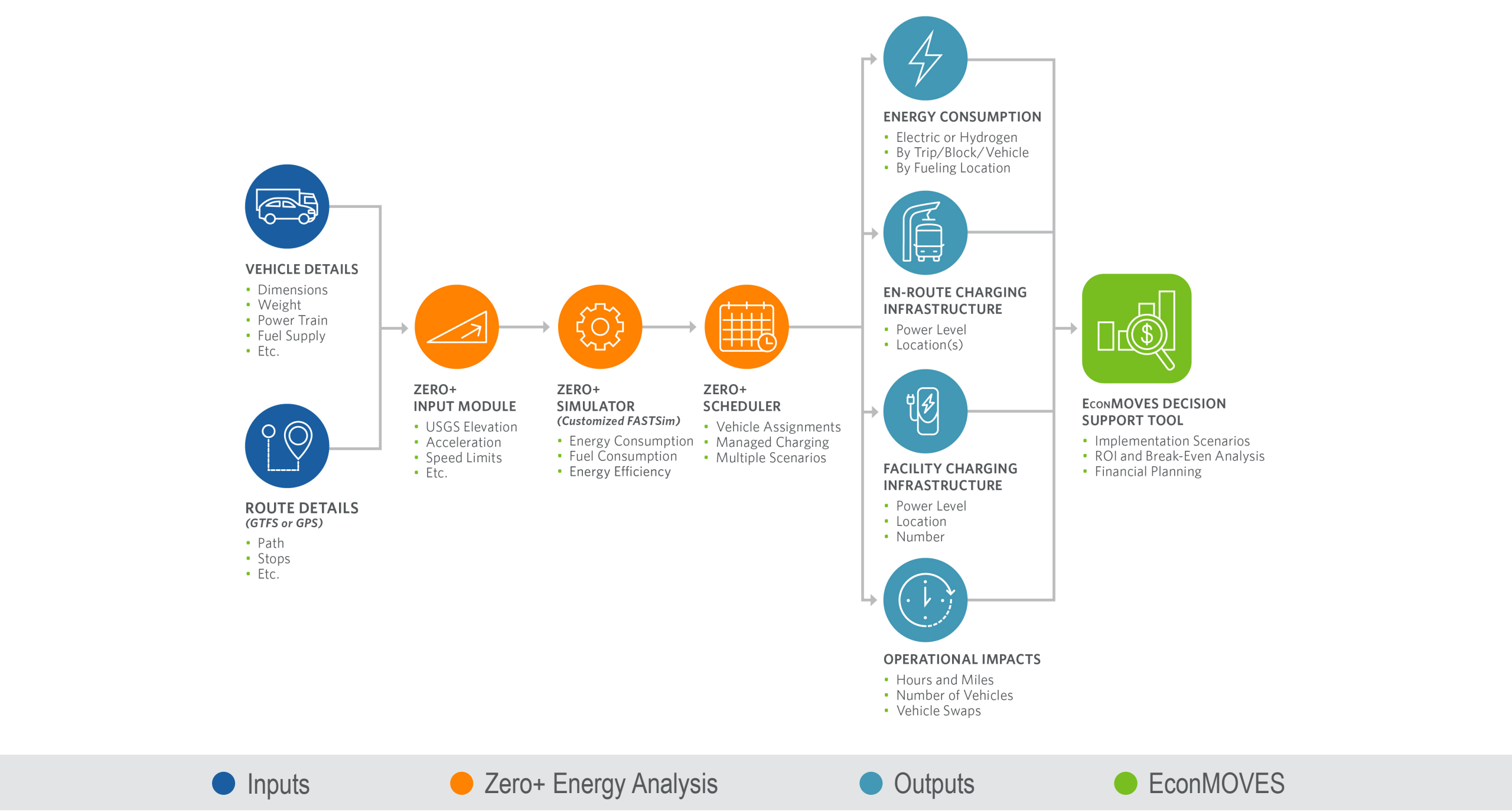
Fleet Optimization Tool

EconMOVES

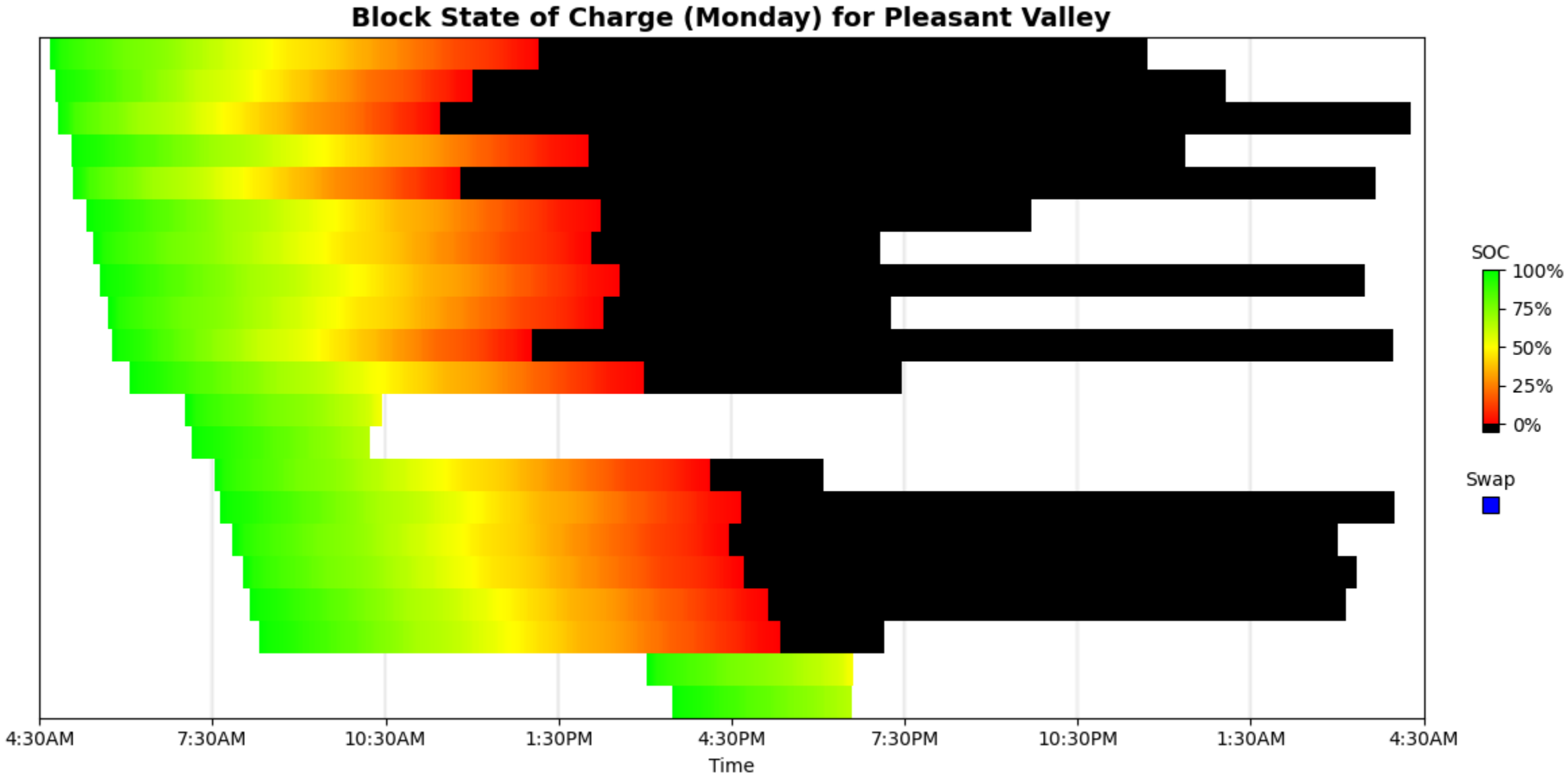
HDR's ZERO+ Model Design

- Model is network based, implemented in a GIS environment utilizing GTFS or GPS data
- Energy estimation is performed using a simulation model called FASTSIM
- Fleet operation on each vehicle is simulated at a micro level
- Model can be easily customized to fit specific needs of a fleet operator
- Fuel-neutral (diesel, electric, hydrogen fuel cell and CNG can be modeled)

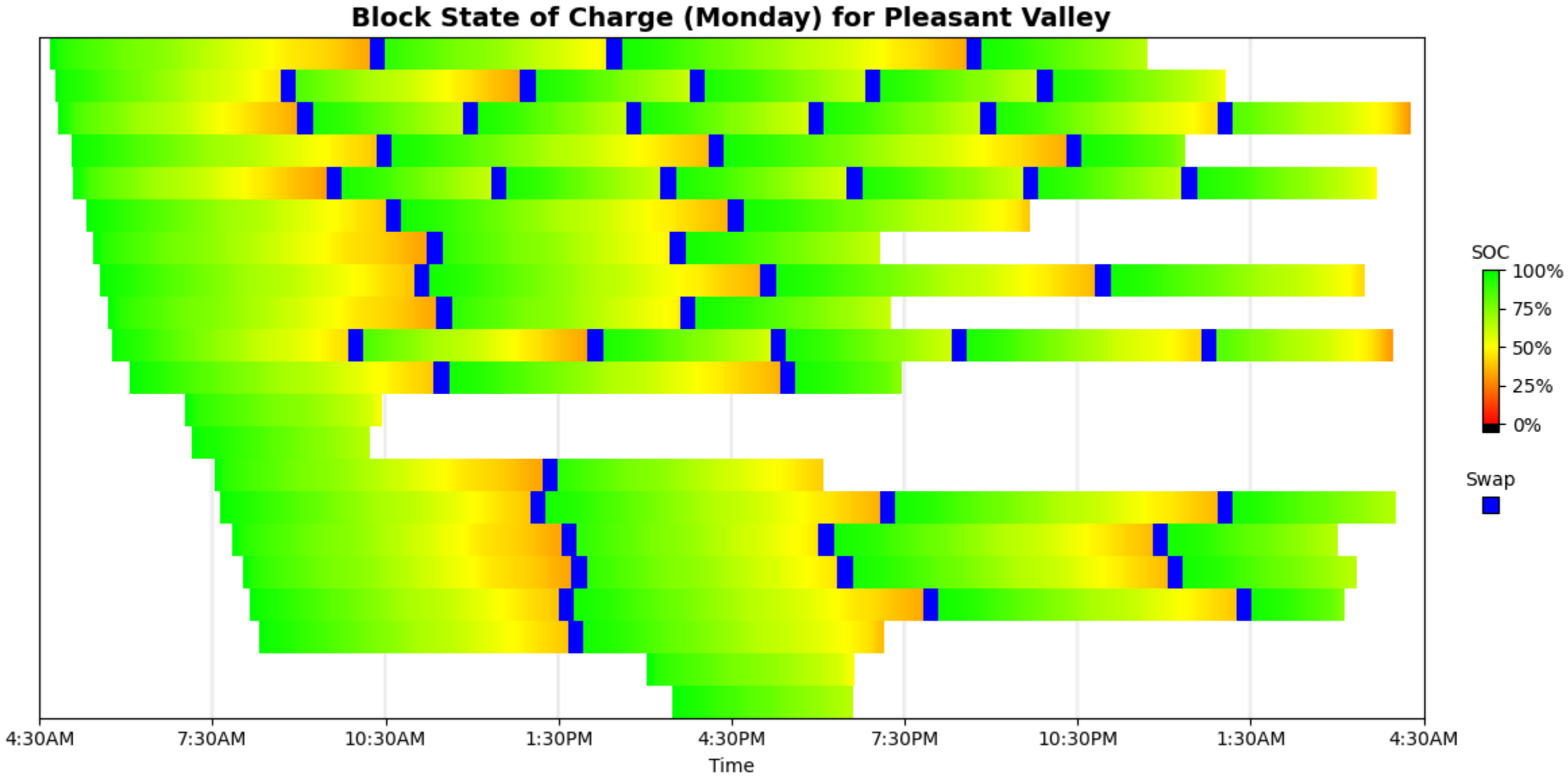



VEHICLE DETAILS
• Dimensions
• Weight
• Power Train
• Fuel Supply
• Etc.
ROUTE DETAILS
(GTFS or GPS)
• Path
• Stops
• Etc.
ZERO+
INPUT MODULE
• USGS Elevation
• Acceleration
• Speed Limits
• Etc.
ZERO+
SIMULATOR
(Customized FASTSim)
• Energy Consumption
• Fuel Consumption
• Energy Efficiency
ZERO+
SCHEDULER
• Vehicle Assignments
• Managed Charging
• Multiple Scenarios
ENERGY CONSUMPTION
• Electric or Hydrogen
• By Trip/Block/Vehicle
• By Fueling Location
EN-ROUTE CHARGING
INFRASTRUCTURE
• Power Level
• Location(s)
FACILITY CHARGING
INFRASTRUCTURE
• Power Level
• Location
• Number
OPERATIONAL IMPACTS
• Hours and Miles
• Number of Vehicles
• Vehicle Swaps
EconMOVES DECISION
SUPPORT TOOL
• Implementation Scenarios
• ROI and Break-Even Analysis
• Financial Planning
Inputs
Zero+ Energy Analysis
Outputs
EconMOVES

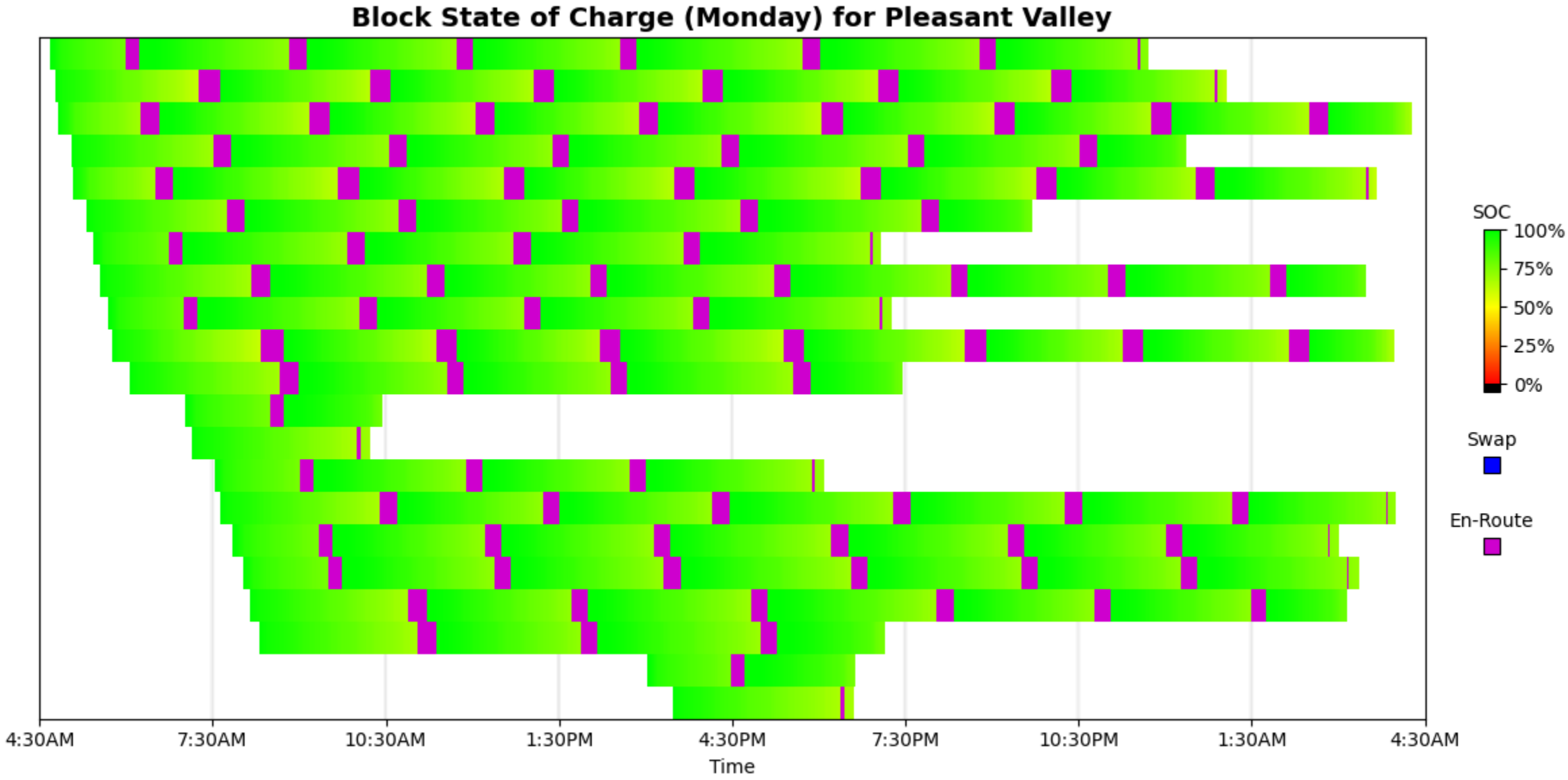
HDR Zero+ Fleet Optimization



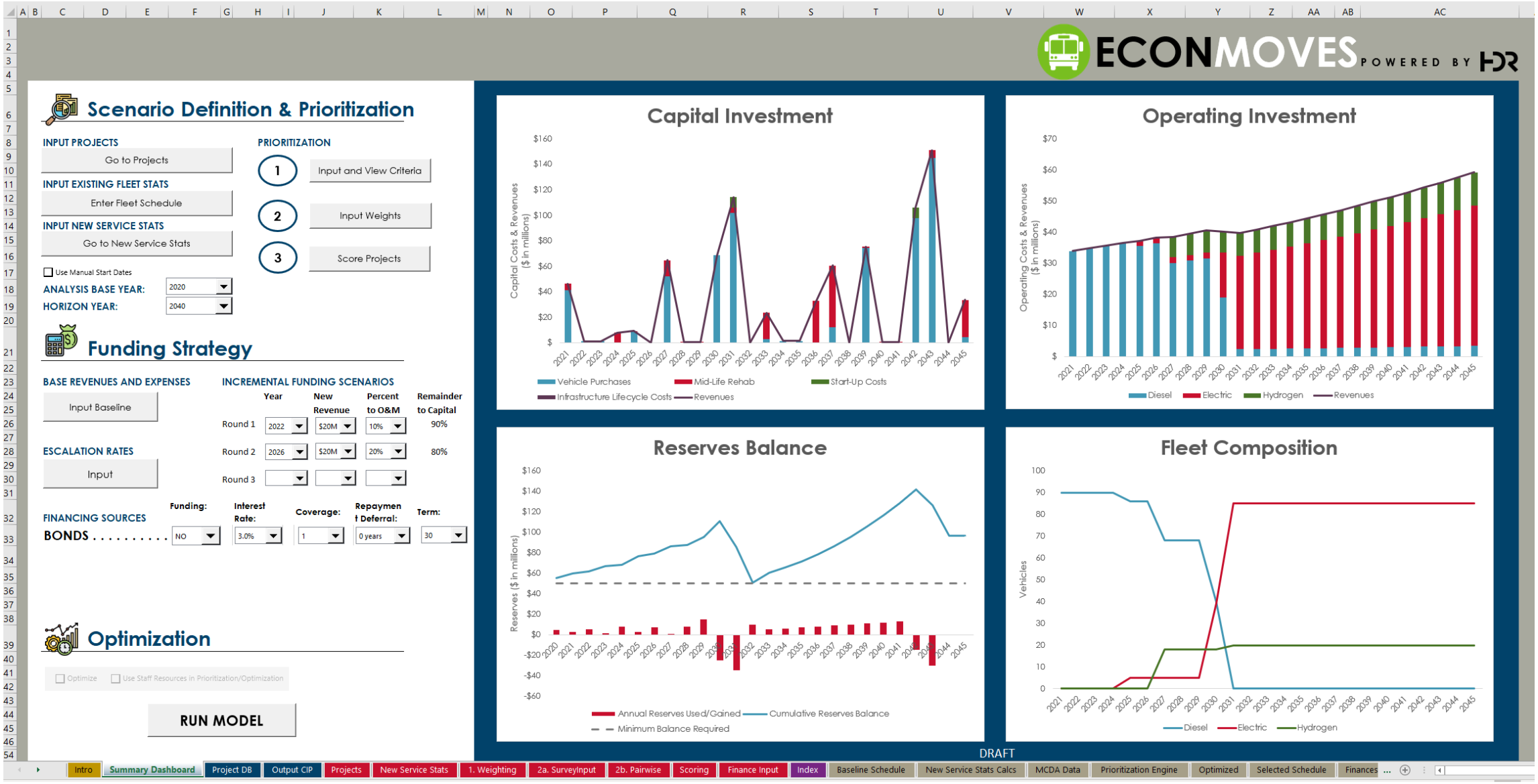
HDR Zero+ Fleet Optimization

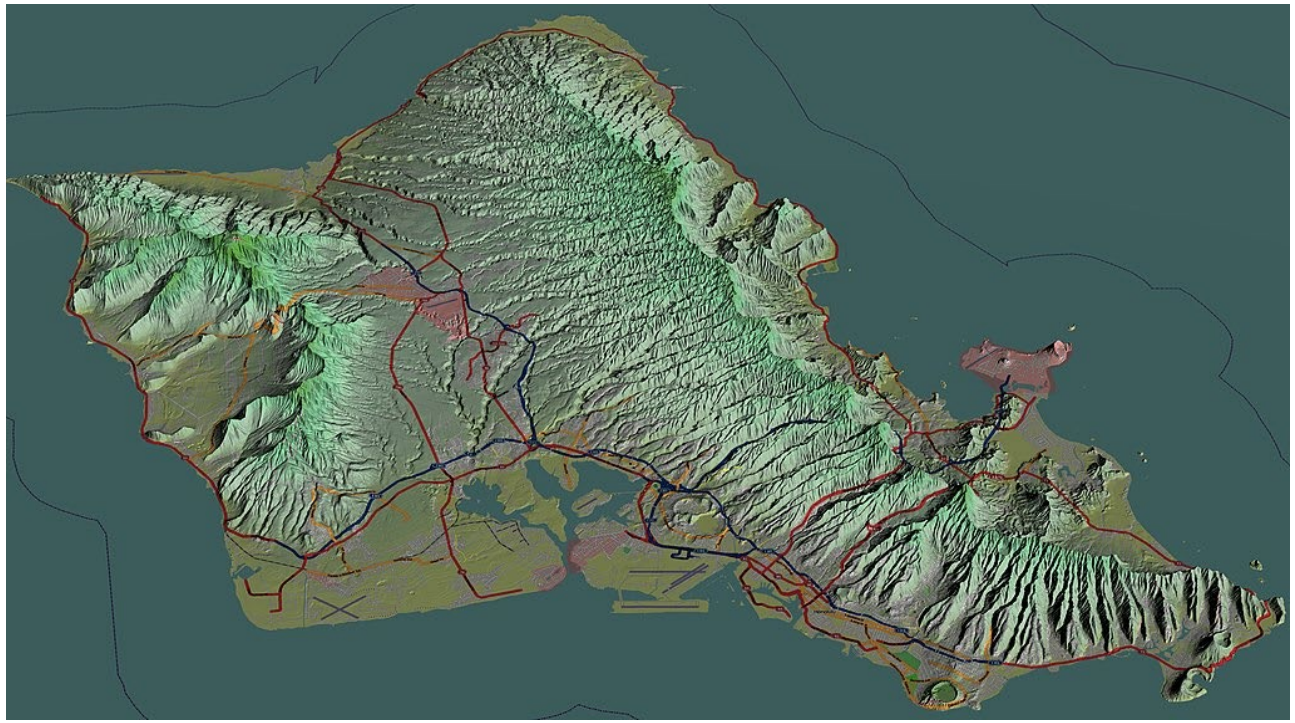


HDR Zero+ Fleet Optimization



HDR EconMOVES





HDR is Supporting EV Waste Collection

In Conclusion…

Plan from the very start to avoid pitfalls of the scaling trap

Functional analysis and incremental decision-making will lead to success

Well-thought-out roadmap leads to the best technical and financial outcomes

Questions?

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