

GO-ing Green: Hydrogen Fuel Cell Transition Project

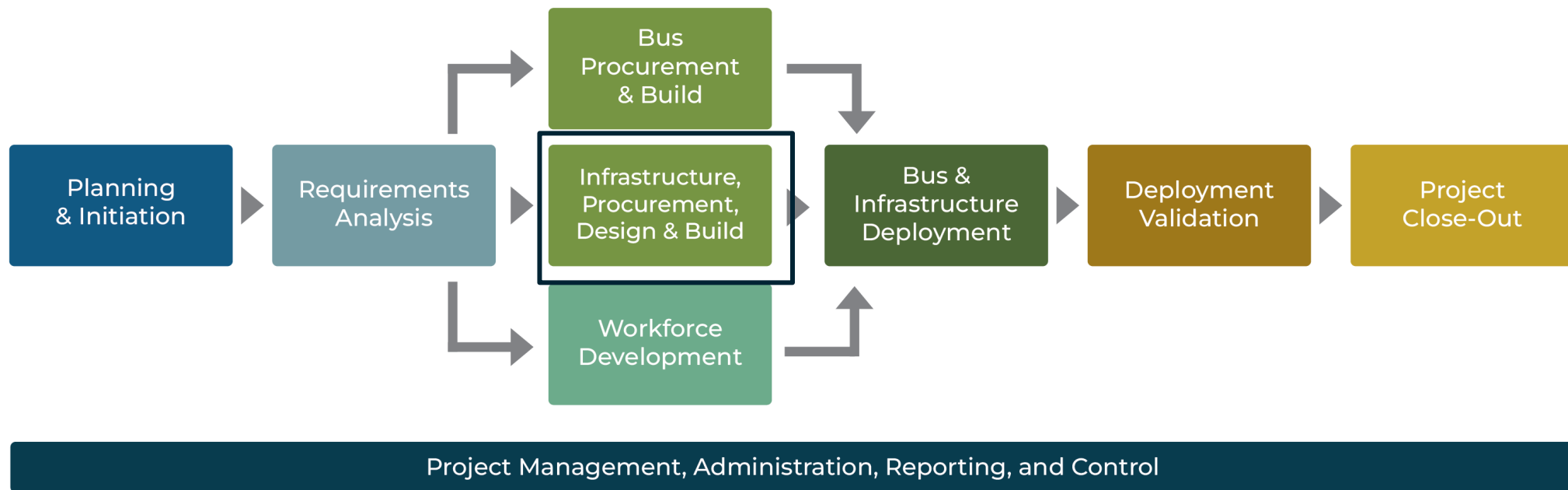
Hydrogen Infrastructure Procurement & Facilities Workshop

May 17, 2023



Agenda

- Introductions
- Infrastructure Procurement
- Data Collection and Specification Development
- Hydrogen Station RFP Support
- Facility Modification RFP Support



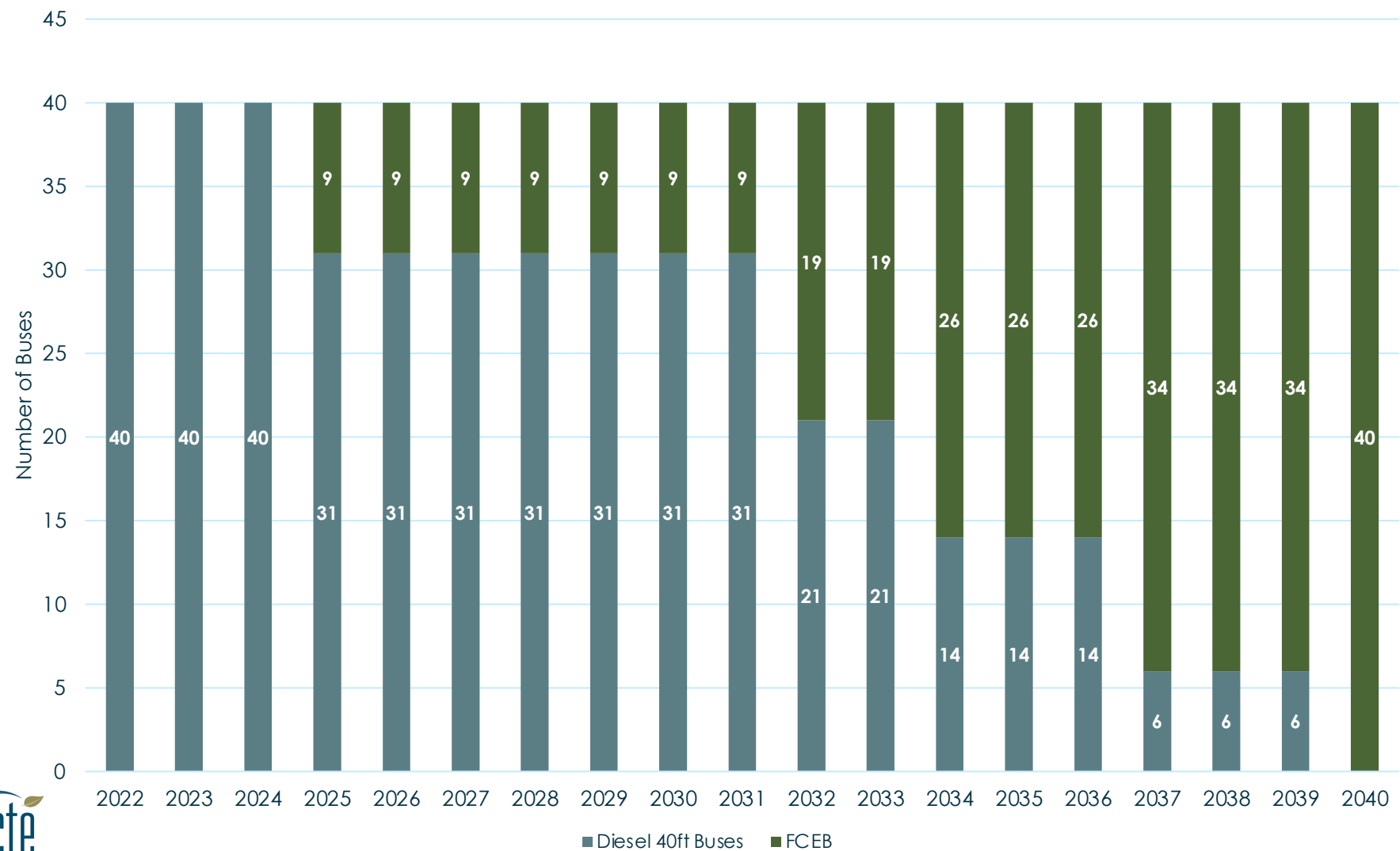
Requirements Analysis or Fuel Demand Analysis

Fleet Data Collection to Inform Fuel Demand Analysis

- Fleet composition
- Current bus year, vehicle ID, model, length, model year, technology
 - Annual vehicle miles traveled by block schedule
 - Fuel consumption
 - Fuel economy
- Future service and bus deployment projections
- Route ID, block schedule, deadhead, service type

Example Data: Fleet Deployment Schedule

The Goal is to 1. understand current fleet service and project future deployment



Service Increase since 2022	Year
0%	2022
0%	2023
0%	2024
0%	2025
0%	2026
40%	2027
40%	2028
40%	2029
40%	2030
40%	2031
60%	2032
60%	2033
60%	2034
60%	2035
60%	2036
60%	2037
60%	2038
60%	2039
60%	2040



GCTD ICT Plan Fleet Deployment Schedule

The Goal is to 1. understand current fleet service and project future deployment

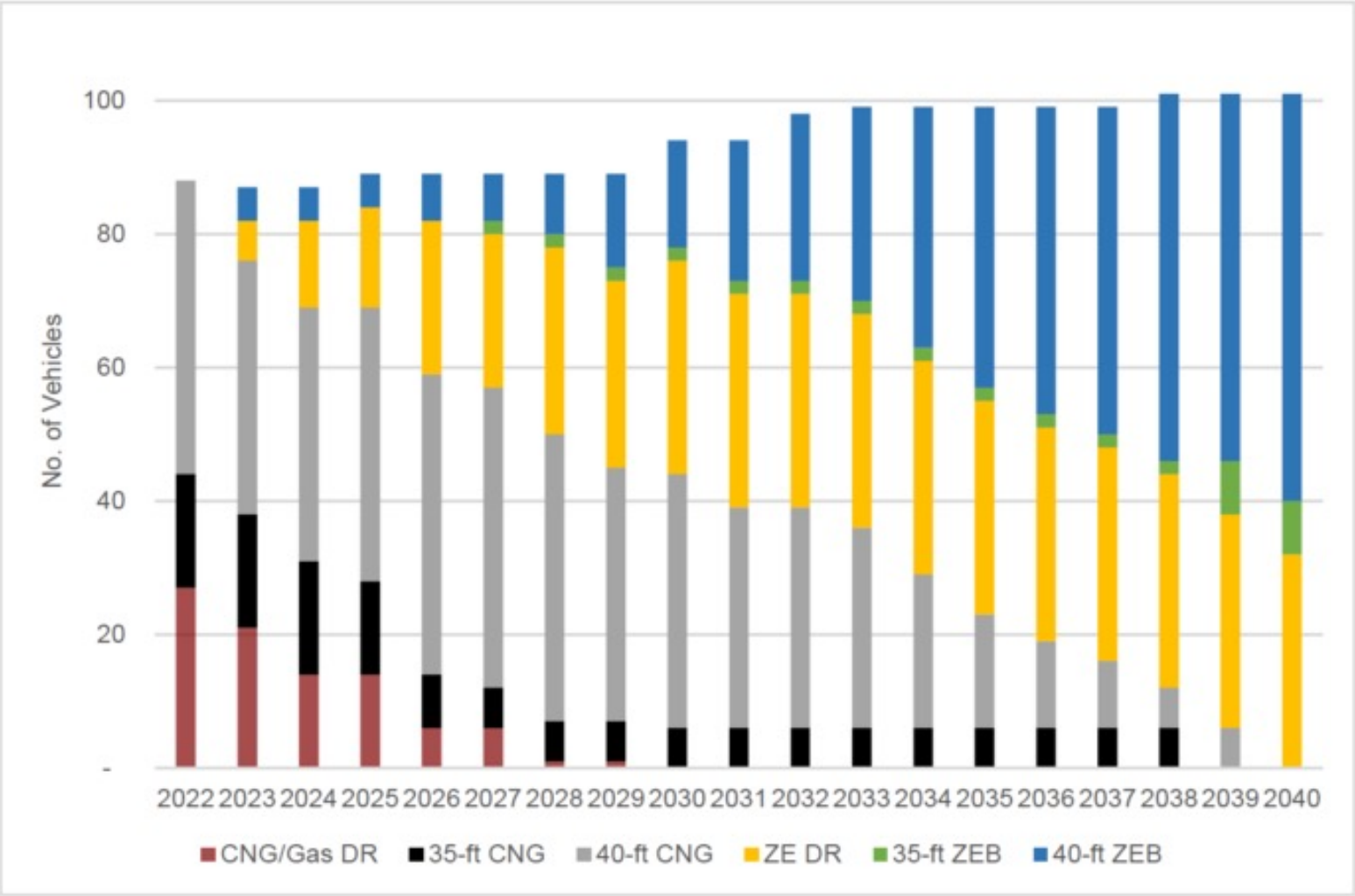
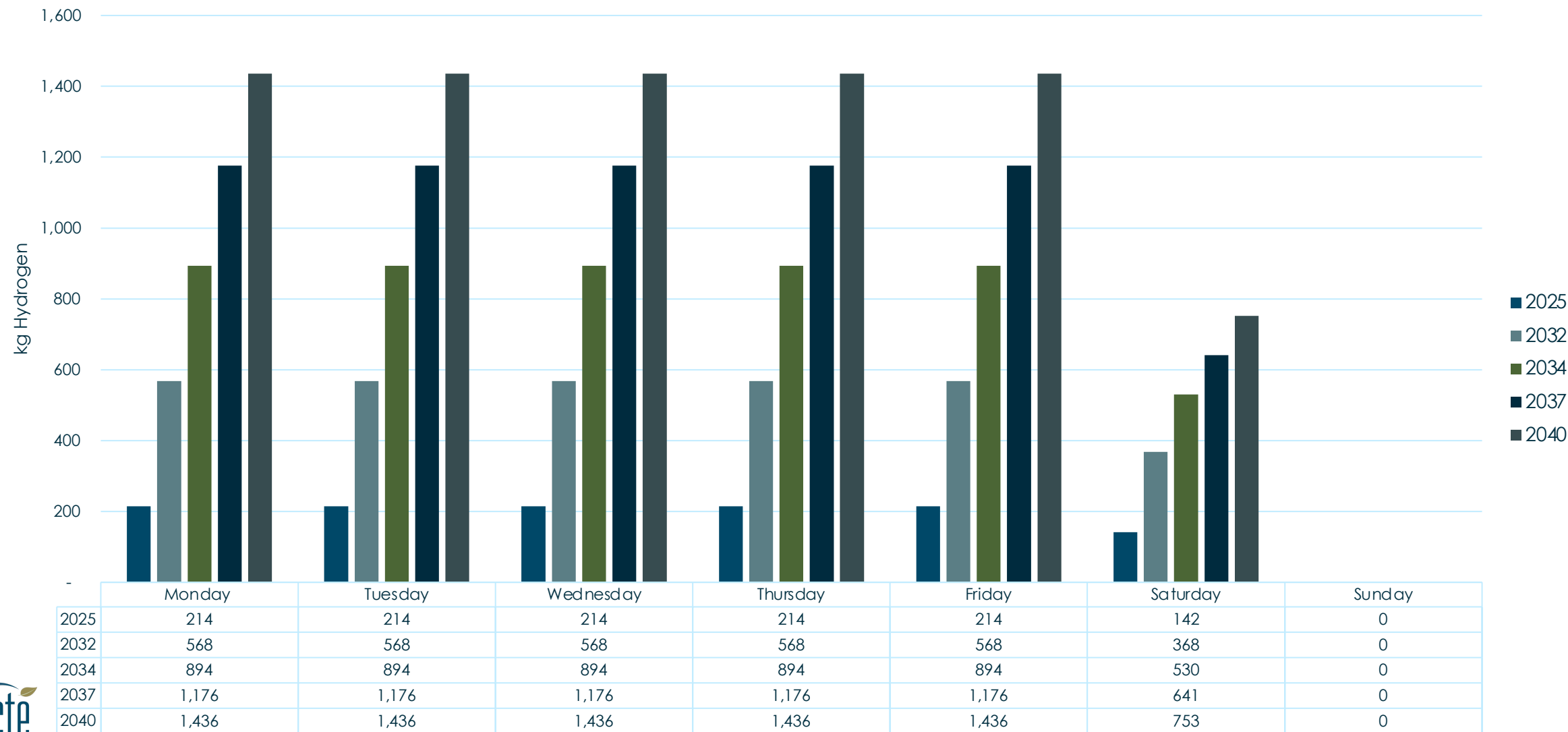


Figure 17: GCTD fleet composition through 2040 by vehicle type and technology

Example Data: Fleet Hydrogen Demand

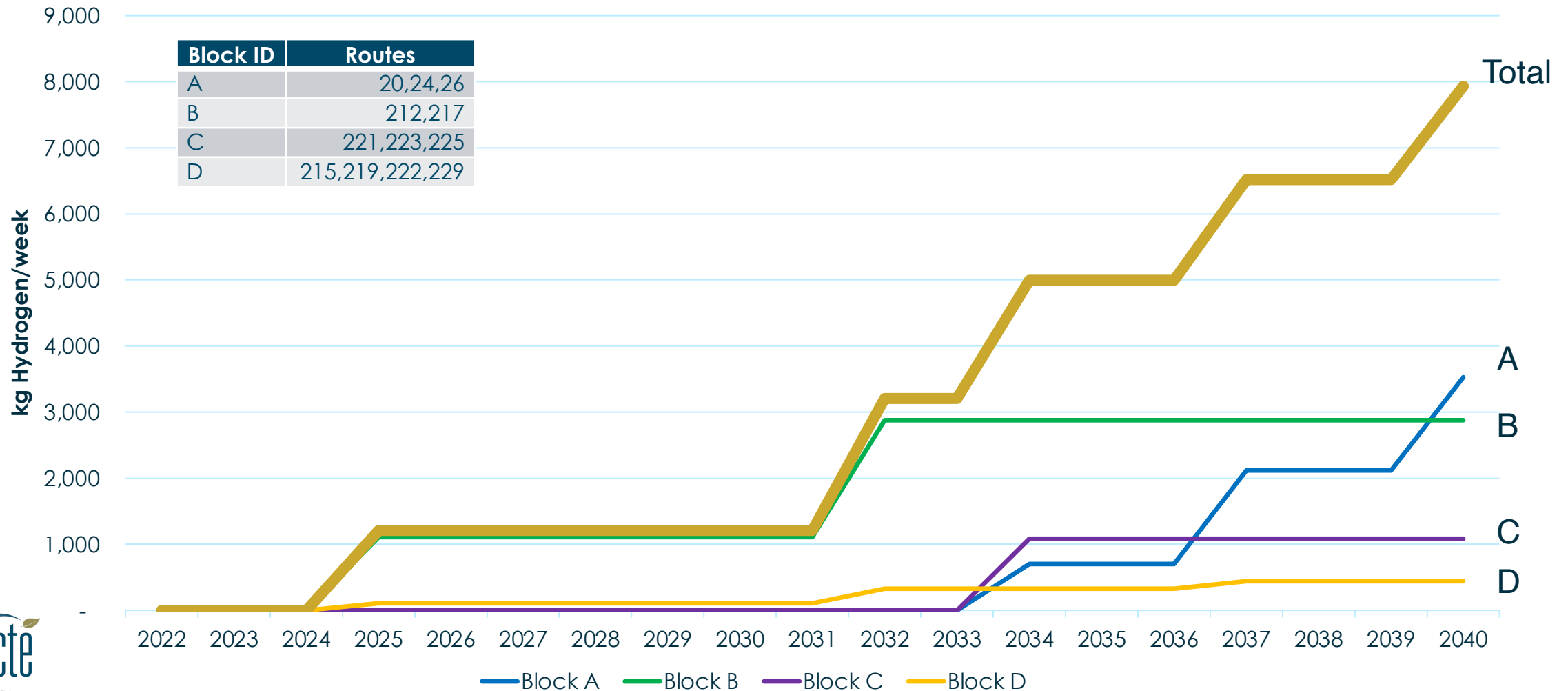
The Goal is to 2. understand FCEB fleet hydrogen demand



Example Data: Fleet Hydrogen Demand

The Goal is to 2. understand FCEB fleet hydrogen demand

Weekly Hydrogen Consumption



Phase 3: Infrastructure Procurement, Design, & Build

Task Description

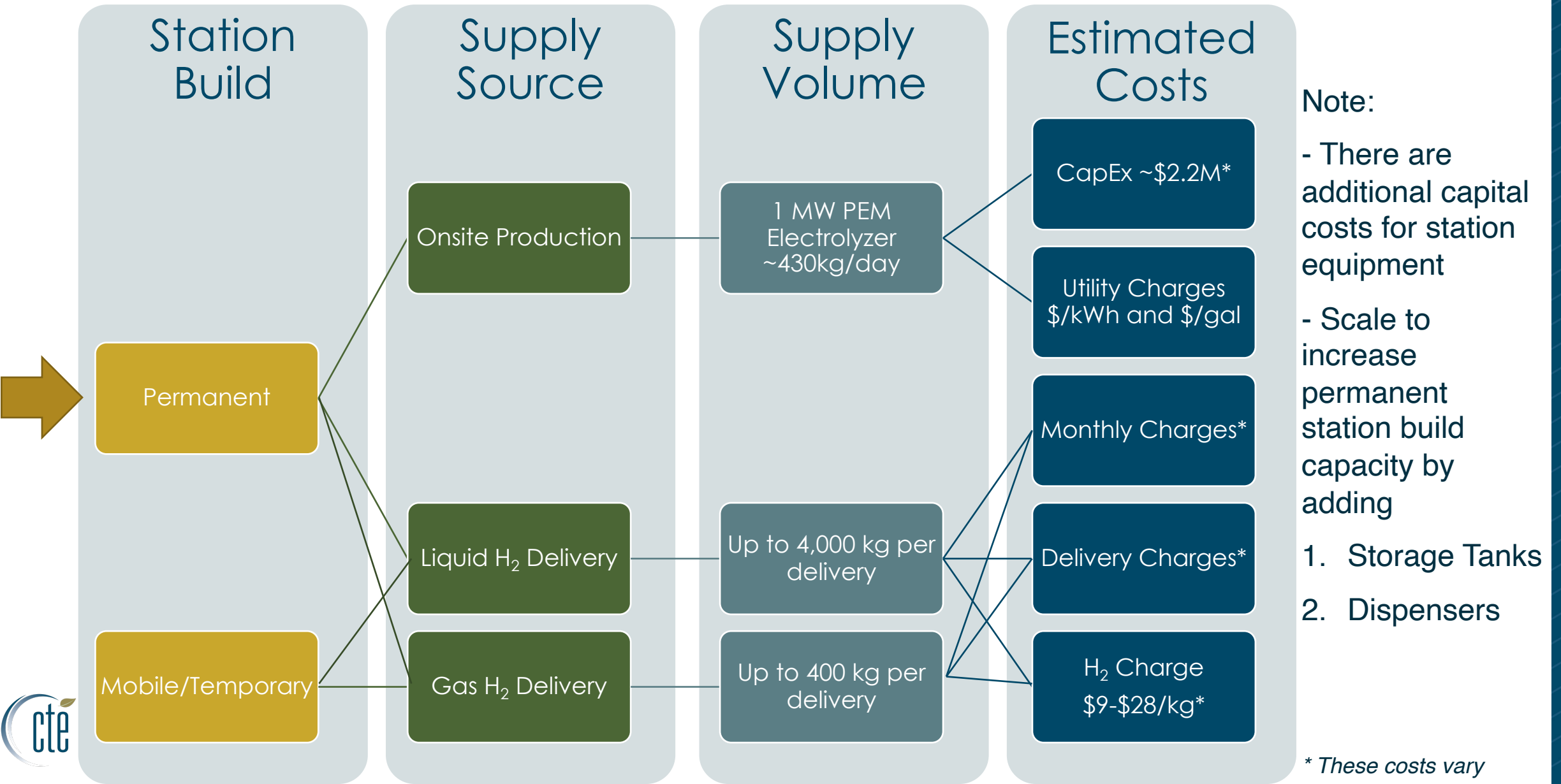
- Develop and finalize hydrogen fueling station specifications
- Review and evaluate the existing modeled fuel demands and conceptual design
- Issue refueling station RFP
- Issue facility modification RFP
- Vendor(s) selection

CTE Deliverable

- Refueling station RFP procurement support, technical evaluation, and selection
- Facility modification RFP procurement support and technical evaluation
- Technical advisory

Fueling Solution Approaches

The Goal is to 3. select the best fueling solution for agency FCEB fleet needs



Refueling Station Procurement

- Define the scope of work
- Finalize the technical specifications
 - Design/Build based on requirements analysis
- Develop the contract terms and conditions
- Publish RFP
- Support for technical evaluation of bidders
- Safety review of the station design
- Lessons learned:
 - Subcontractor accountability
 - Clear and measurable boil off estimate
 - Station expansion clause
 - Detailed facility performance metrics and testing procedures
 - Reliability

Facility Modification / Gas Detection Upgrades

- State of Existing Maintenance Facility
 - Upgrading present maintenance bay
 - Future plans for new builds
- RFP
- Defining the scope of work
- Contract Structure
 - Design Build (Single-prime contracts)
 - Design/Bid/Build (Multi-prime contracts)
- Mechanical, electrical, and gas detection/alarm systems
- Technical evaluation of A&E proposals
- High-level NFPA 2 compliance review and input

Infrastructure Budget Items

PROJECT BUDGET				
Item Description	Partner	Qty	Unit Cost plus Tax	Project Total
Facilities				
Facility Upgrades for H2 Compatibility Design & Construction Management	RFP	1	\$ 250,000	\$ 250,000
Facility Upgrades for H2 Compatibility Construction	RFP	1	\$ 1,000,000	\$ 1,000,000
Hydrogen Fueling Station Design/Build	RFP	1	\$ 7,000,000	\$ 7,000,000
Facilities Subtotal				\$ 8,250,000

Awarded Amount: \$7,425,000

Phase 4: Bus & Infrastructure Deployment

Task Description

- Bus and infrastructure commissioning
- Validate the performance and operation of the buses and infrastructure
- Buses enter revenue service

CTE Deliverable

- Validation test plan
- Validation test report

Validation Testing Process Overview Example

1. Perform on-site tests with one of the GCTD's FCEBs
 - a. Route performance: Compare conditions (all on one route)
 - b. Route performance: Baseline all key routes targeted for FCEB deployment
 - c. HVAC loads and auxiliary load measurement
 - d. Fueling
2. Collect operational and bus data from tests using bus performance telematics system and manual methods for redundancy
3. Collect GPS data at Hz rate using GPS data logger as backup



Phase 5: Deployment Validation

Task Description

- Collect, analyze, and report Key Performance Indicators (KPIs)

CTE Deliverable

- Deployment validation KPIs workshop
- Data collection and reporting plan
- Monthly KPI reports

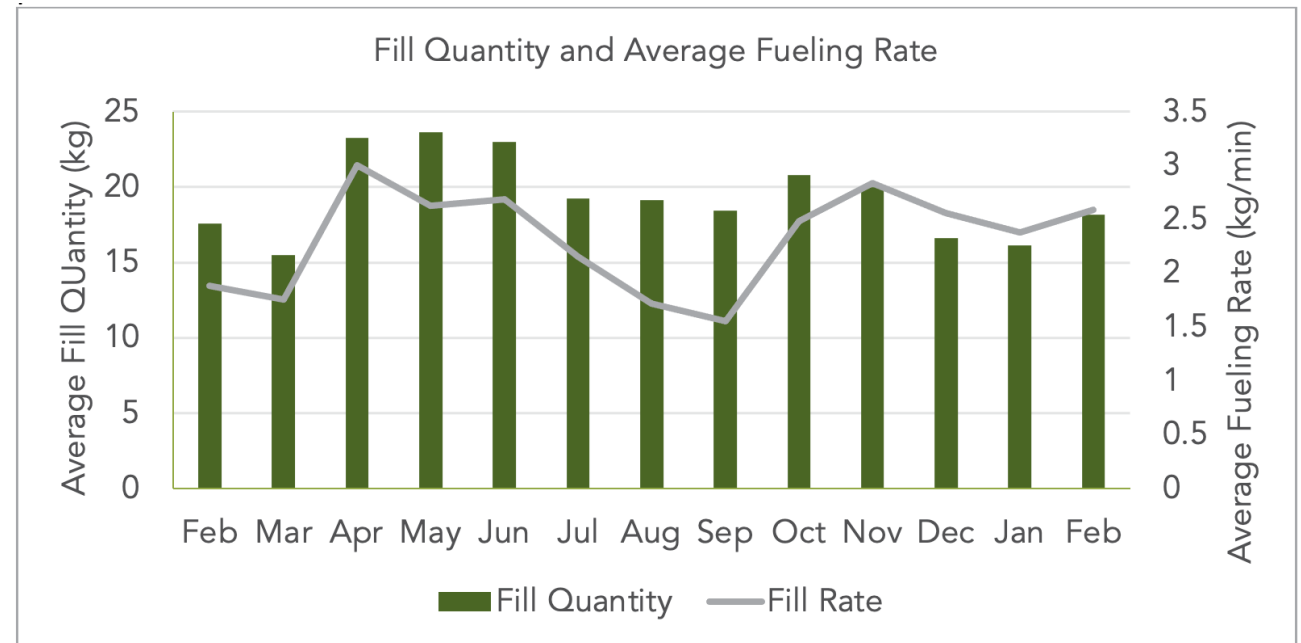
Key Performance Indicators (KPIs)

- **KPI Reporting Objectives**

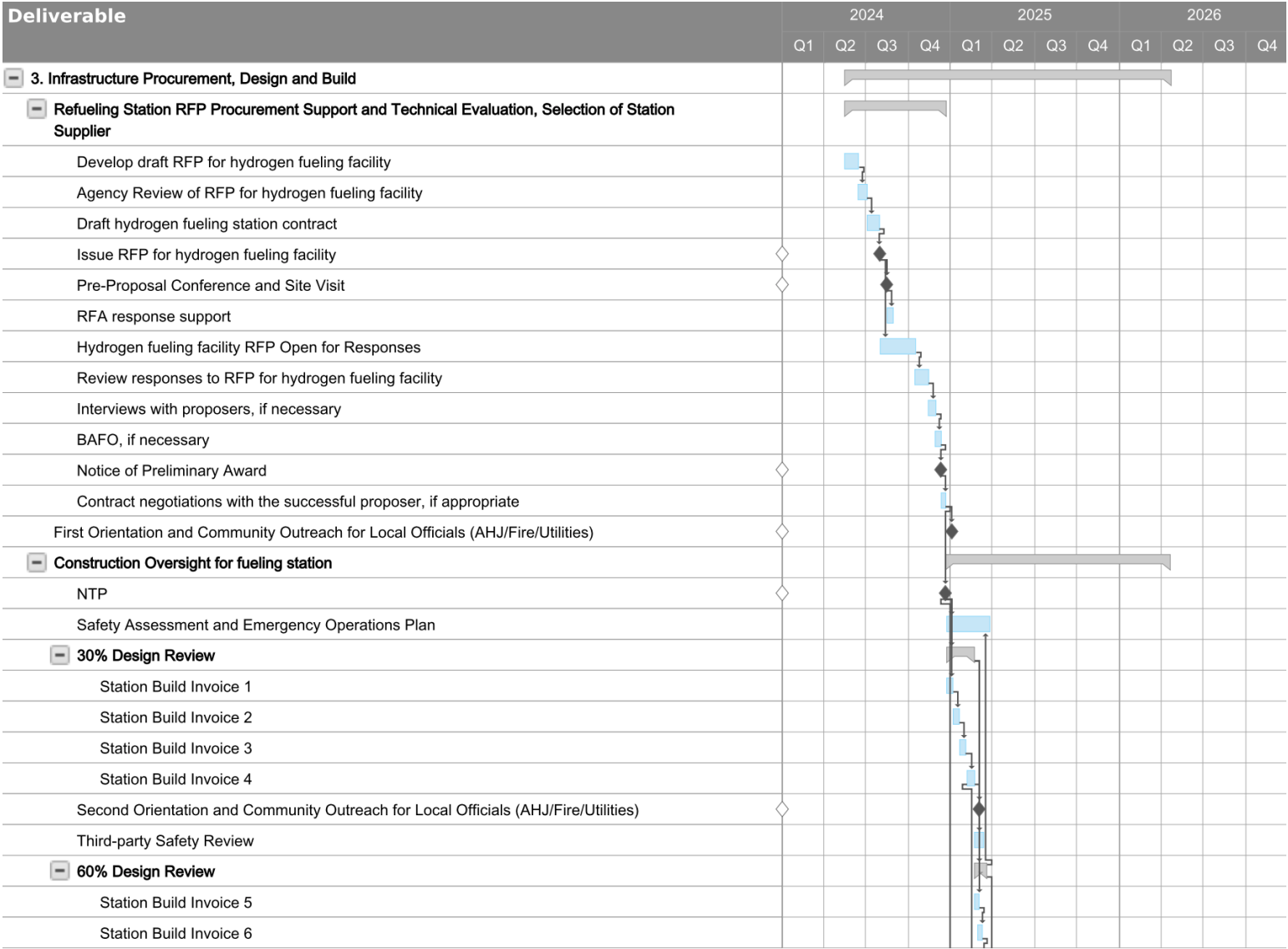
- Vehicle performance
- **Refueling station performance**
- **Fuel consumption**
- Fleet availability
- Financial comparison to baseline
- Emissions reduction impacts
- Custom

- **Deliverables**

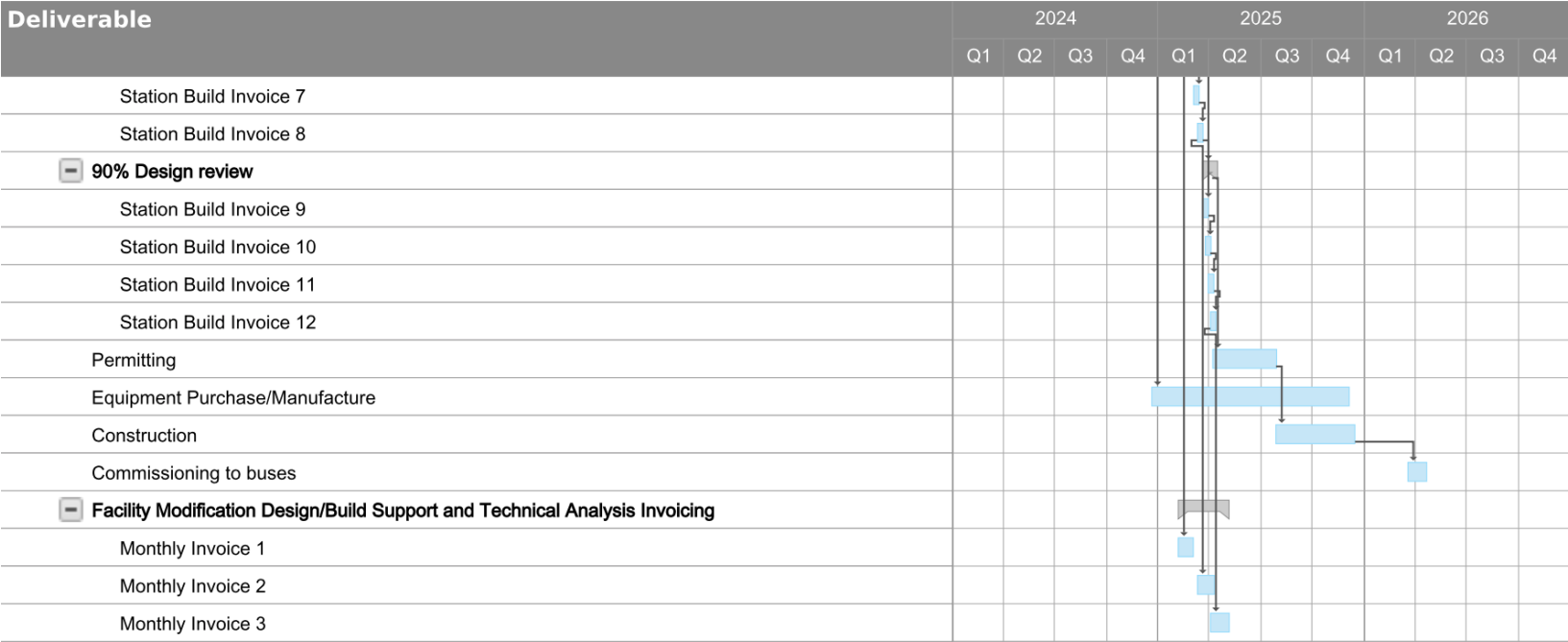
- Post-deployment KPI workshop
- Monthly KPI reports



Timeline



Timeline (continued)



Questions & Discussion