




City of Riverside Zero-Emission Fleet Transition Plan Update

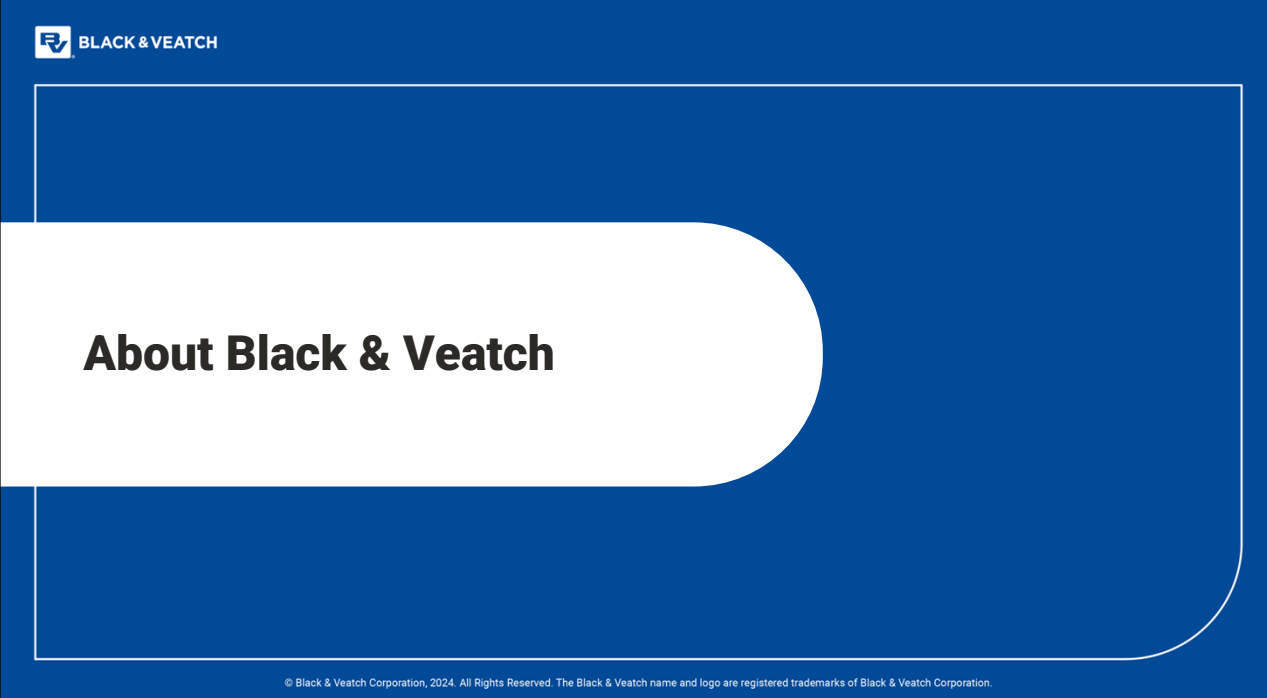
Mobility & Infrastructure Committee
June 13, 2024


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About Black & Veatch

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Black & Veatch Overview

Sustainable Infrastructure Leader

- 12,000+ professionals
- \$4.7 billion in 2023 revenue
- Work in 100+ countries on six continents
- Safety leader
- Consistent high industry rankings

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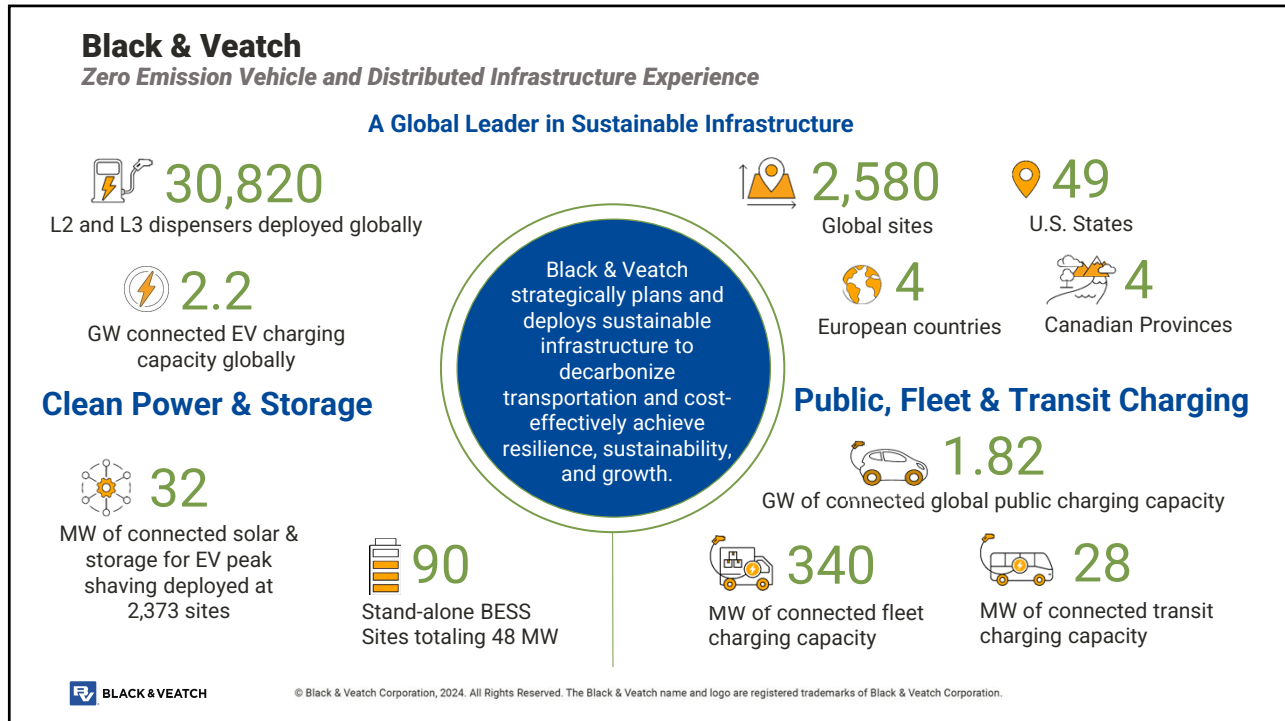
Black & Veatch Offerings

Infrastructure has the potential to transform – to unlock new solutions, create clean versions of essential systems, and close gaps so everyone thrives.

<p>Advanced Power Generation Integrated solutions that address our clients' most pressing issues around energy transition.</p>	<p>Advisory Services Industry-leading consulting services to support technology, operational, financial and regulatory challenges.</p>	<p>Commercial & Industrial Facilities Guiding high-tech, commercial and industrial clients through strategic planning and design of sustainable, resilient, profitable and compliant facilities.</p>	<p>Cybersecurity Providing Cyber Strategy and Cyber Modernization solutions to serve the needs of complex operational technology ecosystems and improve the cybersecurity posture of critical infrastructure.</p>	<p>Distributed Infrastructure Deploying cost-efficient distributed systems across transportation, energy, communications, modular infrastructure and integrated medical and digital health systems.</p>	<p>Environmental Services Solve complex environmental challenges by reducing regulatory complexity and compliance needs and ensuring budget and project schedules are met successfully.</p>
<p>Federal Protecting our government and commercial clients' critical mission facilities, infrastructure and programs worldwide.</p>	<p>Grid Preparing utilities for long-term, sustainable growth through the planning, designing and building of an intelligent, secure and resilient grid.</p>	<p>Operating Asset Optimizing infrastructure for heavy asset owners. Combining industry knowledge, lifecycle experience and proven processes to streamline management.</p>	<p>Process Sustainable process solutions help clients lead the transition of resilient and affordable energy while accelerating pathways to global decarbonization.</p>	<p>Water Complete and customizable technical, management and delivery expertise to solve any water infrastructure-related need.</p>	

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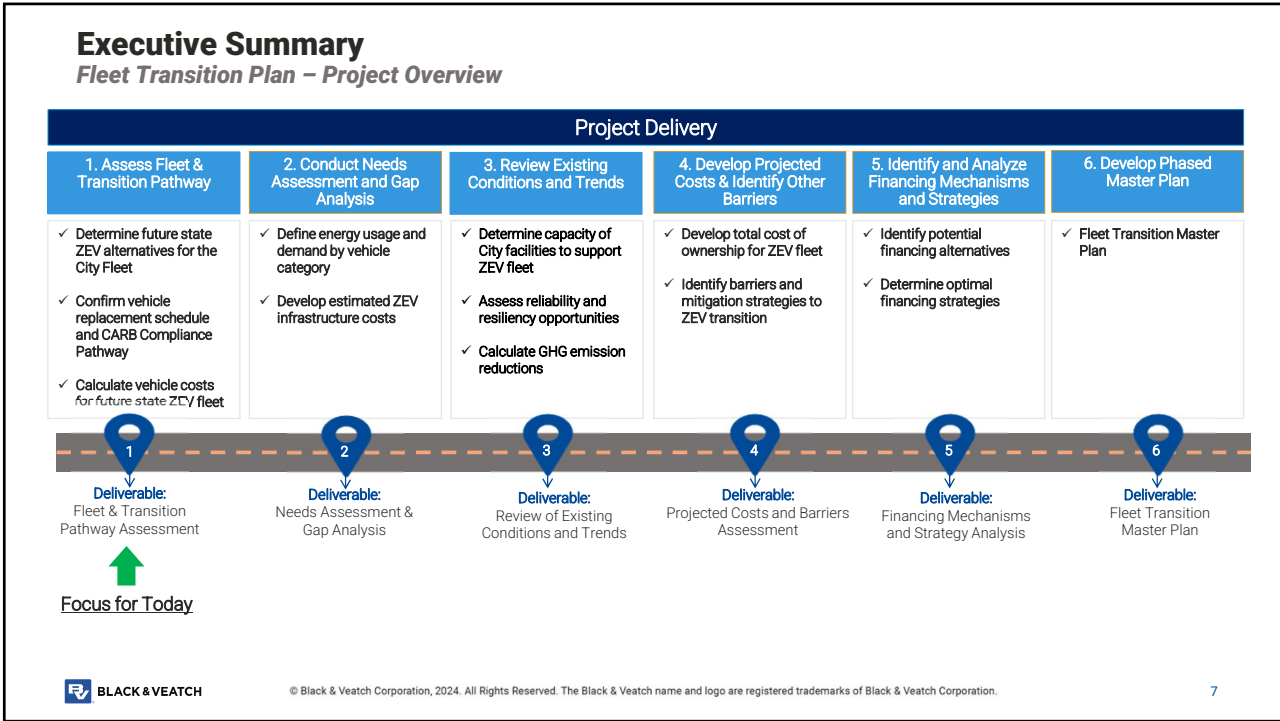
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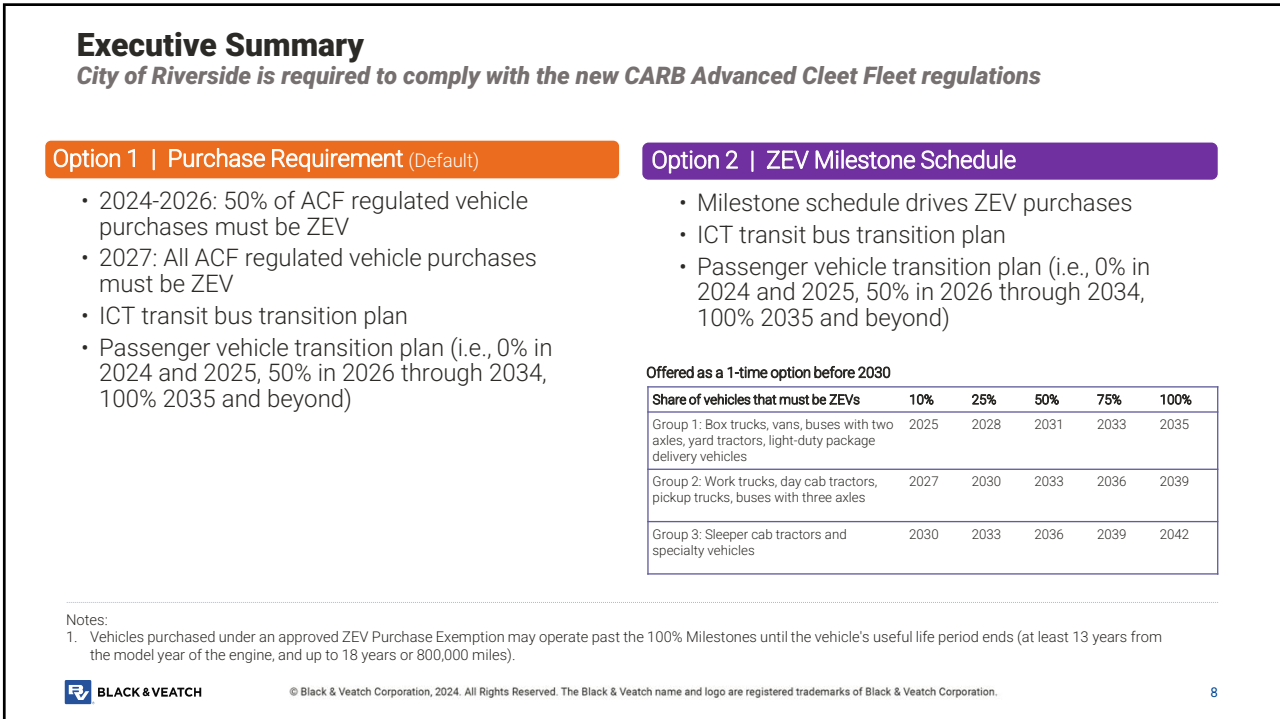
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Executive Summary

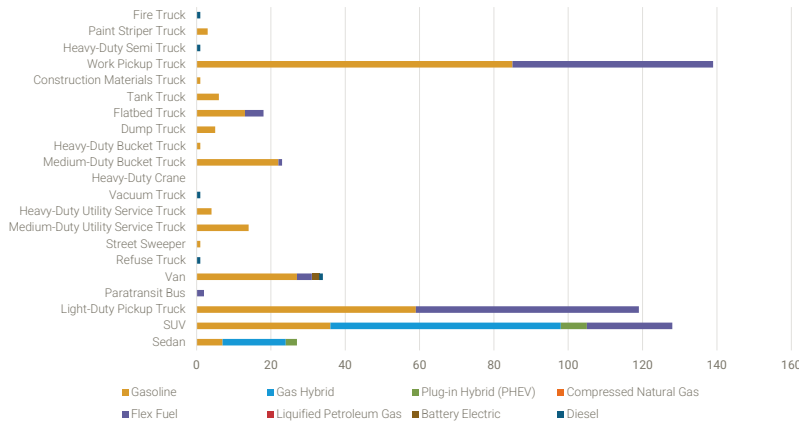
Key insights from the Fleet & Transition Pathway Assessment

Fleet Assessment	Fleet Utilization Analysis	Fleet Suitability Analysis	Compliance Pathways	Vehicle Cost Analysis
Analyze current fleet to identify potential ZEV alternatives based on vehicle types and operational characteristics.	Assess vehicle utilization to identify underutilized vehicles and provide recommendations.	Profile key ZEV operational attributes to determine suitability to meet current fleet requirements.	Evaluate CARB ACF compliance pathway options and provide recommendation for selection and fleet transition.	Analyze the vehicle purchase and lifecycle cost differences between ICE and ZEV alternatives for replacement.
Key Insights				
<ul style="list-style-type: none"> 701 total fleet vehicles 373 are ACF regulated 34 are ICT regulated 294 vehicles are exempt from ZEV transition requirements ZEV alternatives are available for 15 of the 21 vehicle types in the City fleet Selected ZEV alternatives are all Battery Electric 	<ul style="list-style-type: none"> 17 vehicles had 0 annual mileage data reported in 2023 31 vehicles were under 10% of the average vehicle type utilization in 2023 Vehicles <1,000 annual miles may apply for ACF Backup Vehicle exemption 	<ul style="list-style-type: none"> 7 vehicle types have high ZEV transition suitability 8 vehicle types have medium suitability 6 vehicle types have low suitability From the 21 vehicle types, 6 do not have ZEV alternatives with 2 of the 6 being ACF-Exempt. 	<ul style="list-style-type: none"> ACF Option 1 is the recommended transition pathway Option 2 increases ZEV purchase burden by more than double of Option 1 Option 1 is driven by Fleet Manager procurement Option 2 is driven by ACF Milestone schedule, requiring replacement before vehicle end-of-life 	<ul style="list-style-type: none"> Option 1: \$88.4M cumulative vehicle purchase cost (2024 – 2040) Option 2: \$126.0M cumulative vehicle purchase cost (2024 – 2040) No ZEV Procurement: \$118.0M cumulative vehicle purchase cost (2024 – 2040)

Executive Summary

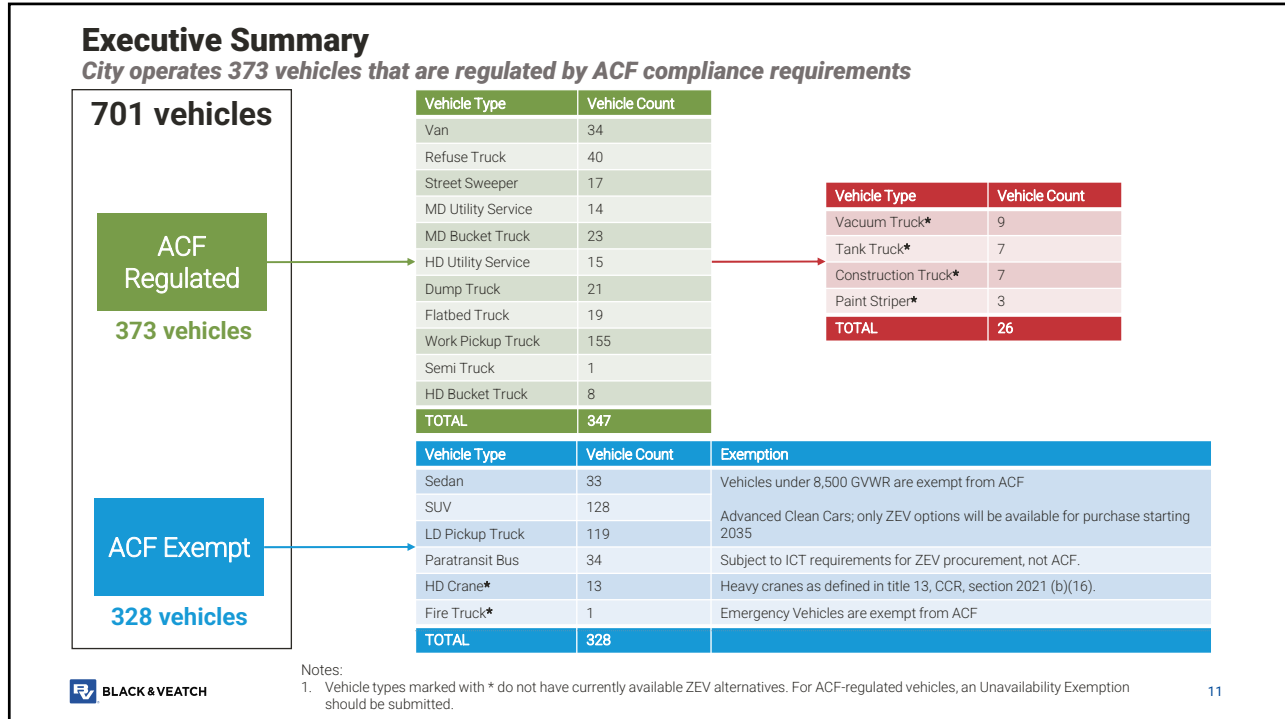
City operates 701 vehicles across 21 different vehicle and 8 fuel / electric types

Existing Fleet Inventory by Vehicle and Fuel Type

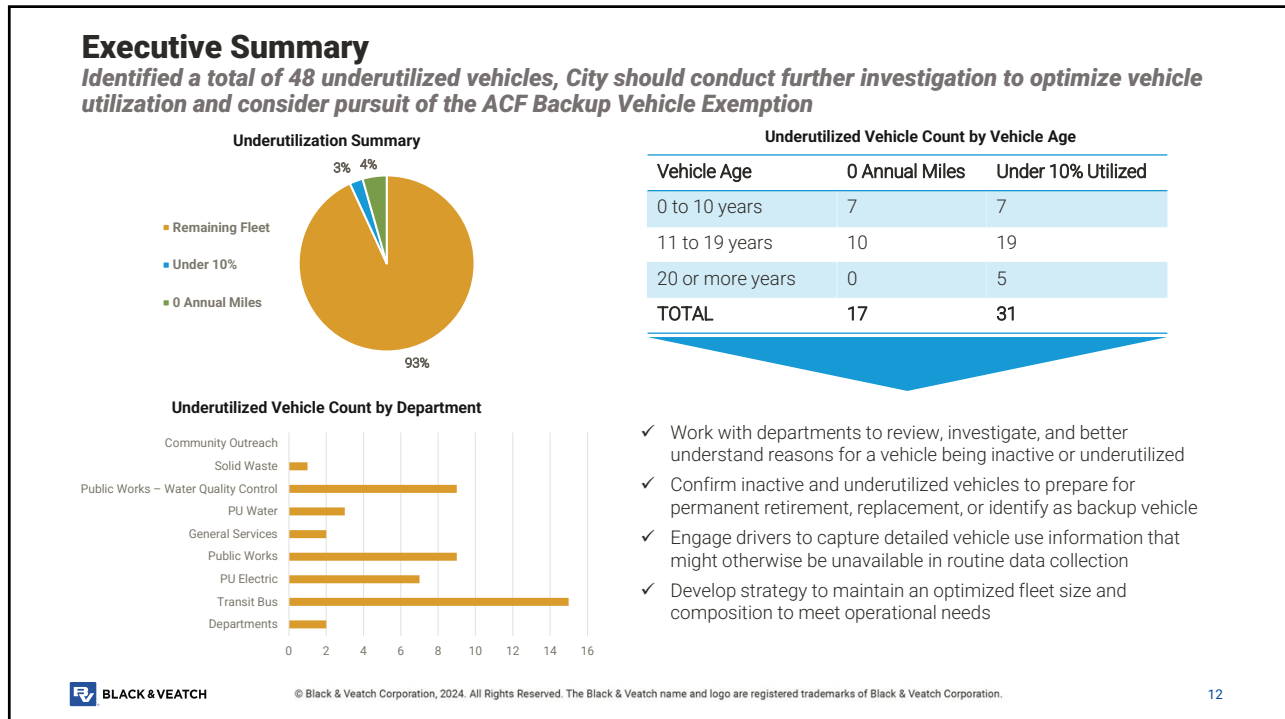


Notes:

1. Vehicle count reflects existing inventory as of 04/11/2024
2. Vehicle count and fuel / electric types **do not** include vehicles from the police and fire departments



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Executive Summary

Identified that one-third of City vehicle types have low ZEV alternative suitability and require the City to pursue the ACF Unavailability Exemption

	Range	Payload	GVWR	Configuration	Availability	Suitability
HIGH	Sedan					1.00
	SUV					1.00
	Pickup Truck					1.00
	Paratransit Bus					1.00
	Van					1.00
	Heavy Duty Semi Truck					1.00
MEDIUM	Refuse Truck					1.20
	Work Pickup Truck					1.40
	Street Sweeper					1.40
	Dump Truck					1.60
	Heavy Duty Utility Truck					1.60
	Flatbed Truck					1.80
	Medium Duty Utility Truck					1.80
LOW	Heavy Duty Bucket Truck					1.80
	Medium Duty Bucket Truck					2.00
	Vacuum Truck					3.00
	Tanker Truck					3.00
	Construction Materials Truck					3.00
Paint Striper Truck					3.00	
Heavy Duty Crane					3.00	
Fire Truck					3.00	

Suitability Scoring		
Color	Score	Definition
Green	1	High
Yellow	2	Medium
Red	3	Low

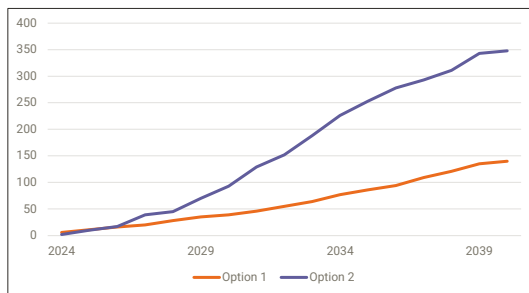
Metric	Definition
Range	Capability of ZEV alternative to meet operational requirements (e.g., duty cycle, or vehicle miles traveled.)
Payload	Carry capacity suitability ZEV alternative to meet operational requirements of current fleet vehicles.
GVWR	Gross Vehicle Weight Rating. Suitability of ZEV alternative to meet required GVWR of the current GVWR of fleet vehicles.
Configuration	Suitability of ZEV alternative to meet the required height, weight, width, length, and vocational body of current fleet vehicles.
Availability	Market availability of ZEV alternatives.

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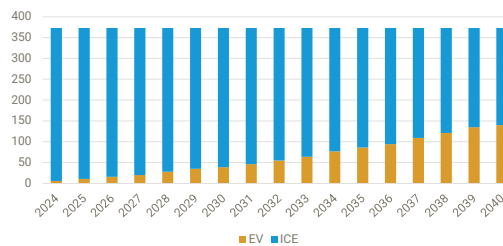
Executive Summary

We recommend the City implement ACF Option 1 due to Option 2 requiring more than double ZEV purchases by 2040

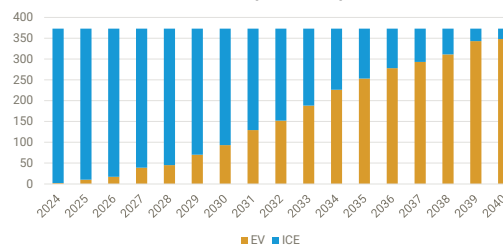
ZEV Purchase Analysis (Option 1 & 2 Scenarios)



ACF Fleet Composition - Option 1



ACF Fleet Composition - Option 2



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Executive Summary

From 2024 to 2026, we recommend the below vehicle replacement schedule under ACF option 1, due to those vehicles having the most suitable ZEV alternatives and lowest purchase price

2024 Replacements		2025 Replacements		2026 Replacements		
Vehicle ID	Vehicle Type	Vehicle ID	Vehicle Type	Vehicle ID	Vehicle Type	
EV	H267	Van	C1059	Work Pickup Truck	H271	Van
	H320	Van	C1098	Work Pickup Truck	E362	MD Bucket Truck
	E342	MD Bucket Truck	E356	MD Bucket Truck	E376	MD Bucket Truck
	E347	MD Bucket Truck	E357	MD Bucket Truck	E383	MD Bucket Truck
	E335	Flatbed Truck	E368	MD Bucket Truck	E369	MD Bucket Truck
	C1069	Work Pickup Truck				
ICE	J175	Refuse Truck	J172	Refuse Truck	E412	Construction Materials Truck
	J183	Refuse Truck	J176	Refuse Truck	E363	Construction Materials Truck
	I064	Street Sweeper	E354	MD Bucket Truck	J165	Refuse Truck
	E327	Vacuum Truck	E355	MD Bucket Truck	E361	Vacuum Truck
	E340	HD Bucket Truck			E372	Vacuum Truck
	E341	HD Bucket Truck				

	2024	2025	2026
Replaced with EV	6	5	5
Replaced with ICE	6	4	5
Total Replacements	12	9	10



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Executive Summary

When comparing vehicle purchase and lifecycle costs scenarios, ACF Option 1 is also the most cost-effective scenario against Option 2 and No ZEV Procurement

Scenario: ACF Option 1

- ACF Purchase Requirement
- ICT transit bus transition plan
- Passenger vehicle transition plan

Total Transition Costs = \$88.4M

Scenario: ACF Option 2

- ACF Milestone Schedule
- ICT transit bus transition plan
- Passenger vehicle transition plan

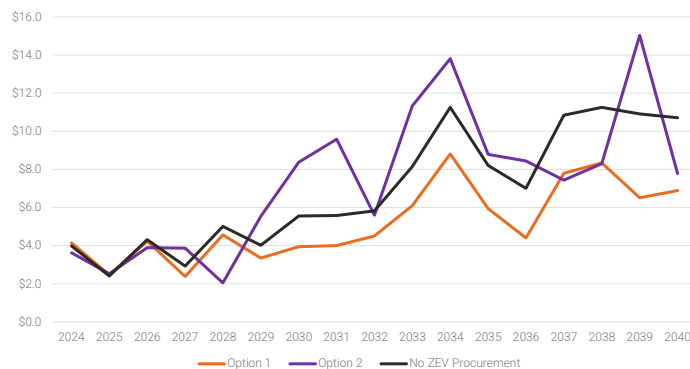
Total Transition Costs = \$126.0M

Scenario: No ZEV Procurement

- Based on benchmark vehicle replacements derived for Option 1
- No ZEV purchases, only ICE replacements

Total Transition Costs = \$118.0M

Annual Cost Comparison: ACF Option 1 vs ACF Option 2 vs No ZEV Procurement (millions)

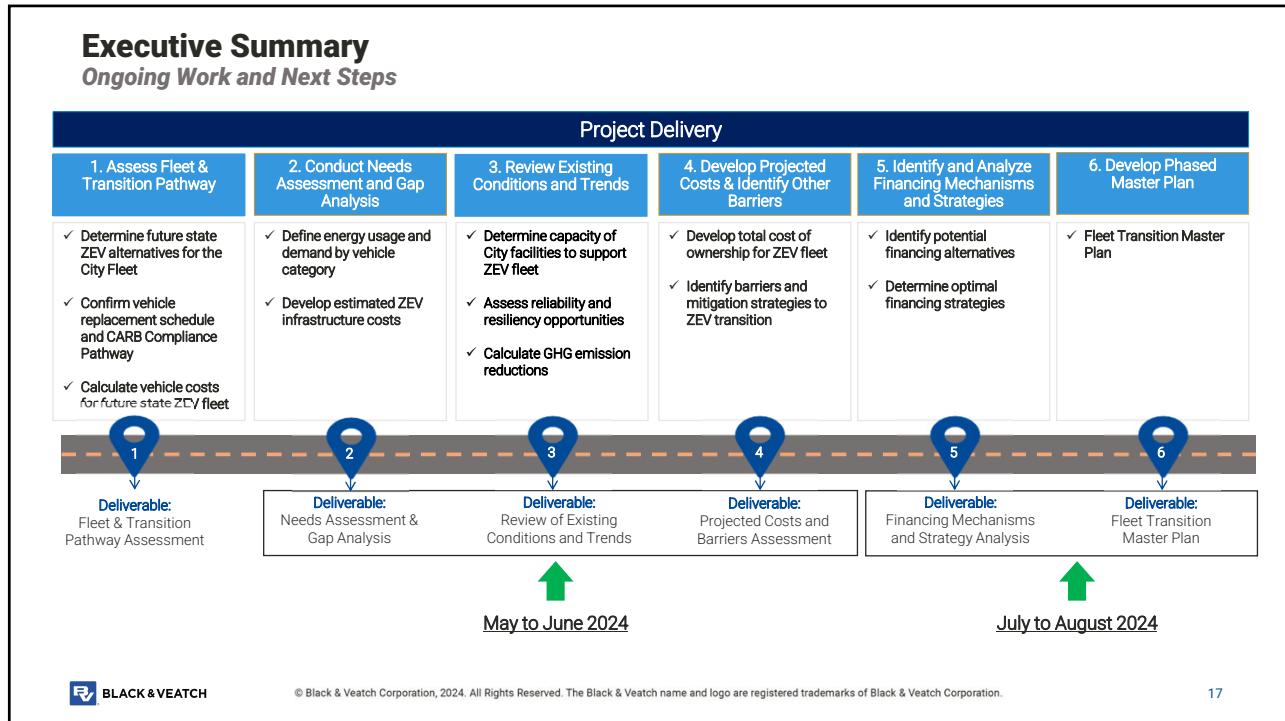


Notes:

1. Costs excludes EV charging infrastructure and installation
2. Costs include EV incentives and rebates (Option 1 - Total Rebates: \$3.2M, Option 2 - Total Rebates: \$7.0M)



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