



ZERO-EMISSION FLEET TRANSITION PLAN



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List of Acronyms

- ADA** - Americans with Disabilities Act
- BEB** - battery electric bus
- BESS** - battery energy storage system
- CAE** - Community Access Enterprise
- CDOT** - Colorado Department of Transportation
- CFE** - Clean Fleet Enterprise
- CTE** - Clean Transit Enterprise
- dHEB** - diesel-hybrid electric bus
- DRCOG** - Denver Regional Council of Governments
- EV** - electric vehicle
- FCBE** - fuel cell electric bus
- FTA** - Federal Transit Administration
- FFTP** - Facilities and Fleet Transition Plan
- FY** - Fiscal Year
- GHG** - greenhouse gas
- HB** - House Bill
- MEP** - mechanical, electrical, and plumbing
- MPFF** - Mobility Plan for the Future

- RTD** - Regional Transportation District
- RTP** - Regional Transportation Plan
- SB** - Senate Bill
- SOP** - System Optimization Plan
- ZE** - Zero-Emission
- ZEB** - Zero-Emission Bus
- ZEV** - Zero-Emission Vehicle



Agency Introduction

The Regional Transportation District (RTD) is the transit agency for the greater Denver, Colorado metro area. RTD's 2,342-square-mile service area encompasses approximately 3.1 million people in 8 Colorado counties, including all of Boulder, Broomfield, Denver, and Jefferson counties, parts of Adams, Arapahoe, and Douglas counties; and a small portion of Weld County, as shown on **Figure 1**.¹ RTD's services include bus, rail, shuttles, Americans with Disabilities Act (ADA) paratransit services, demand-responsive services like FlexRide, special event services, and vanpools. RTD operates more than 100 total fixed routes, with 60.5 million annual regular fixed-route service miles for all service types. The agency had 65.2 million annual boardings in 2023 including 41 million on fixed route bus.

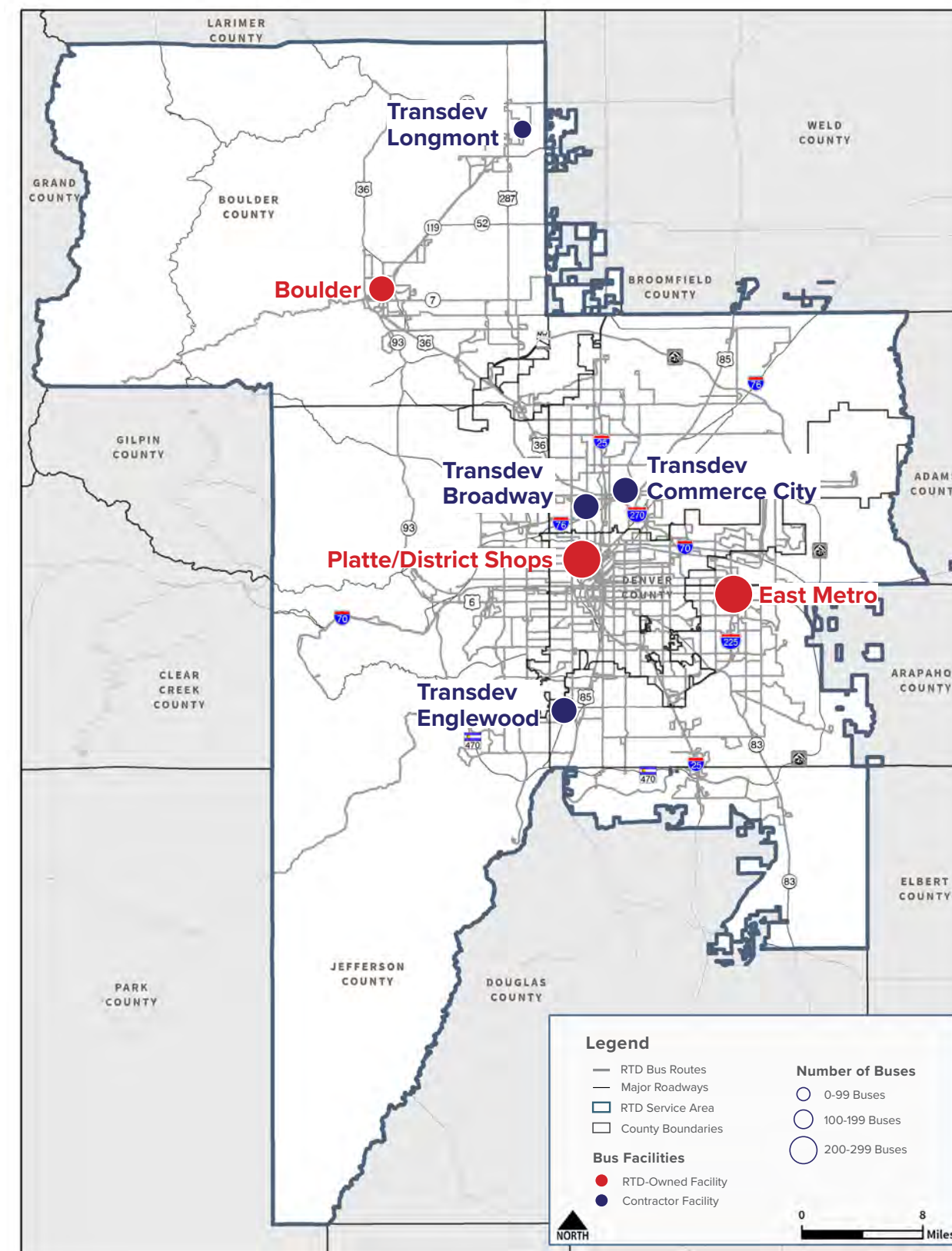
RTD's fleet consists of approximately 1,000 RTD-owned buses, with 59 percent of these buses operated by RTD, and 41 percent operated by private carriers. Ninety-six percent of the fleet is powered by diesel engines, while the remaining 4 percent represents battery electric buses (BEBs) that serve the 16th Street Free MallRide. The agency has 8 major bus operations and maintenance facilities. RTD owns Platte, District Shops, East Metro, and Boulder facilities, while RTD contracts with Transdev to provide bus service out of facilities in Longmont, north

Denver, Commerce City, and Englewood. Transdev owns the Commerce City and Englewood facilities and leases the Longmont and north Denver facilities. RTD's currently budgeted number of employees is 3,457 (1,193 salaried and 2,264 represented).

RTD is governed by a 15-member, publicly elected Board of Directors. Directors are elected to 4-year terms and each Director represents a district that contains approximately 200,000 residents.



Figure 1: RTD Routes and Facilities



¹ All RTD agency statistics are from Q1 2024 unless otherwise noted.



Zero-Emission Fleet Transition Plan Overview

Goal

- Achieve **net-zero emissions** from RTD’s facilities and fleet by 2050

Guiding Principles

- Community Value**
Partnerships. Sustainability.
- Customer Excellence**
Service Quality. Equity.
- Employee Ownership**
Opportunity. Safety.
- Financial Success**
Stewardship. Assets.

Parameters

Facilities	Bus Fleet	Overall
<ul style="list-style-type: none"> • Transit asset management alignment • Infrastructure compatibility with future fuels and/or technologies • Maximize long-term facility transition needs • Regulatory compliance 	<ul style="list-style-type: none"> • 1:1 bus fleet replacement • System Optimization Plan (SOP) and DRCOG Transportation Plan alignment 	<ul style="list-style-type: none"> • Employee growth constellations • Fiscal accountability • Favorable customer experience • Operational effectiveness and efficiency

In April 2023, the RTD Board of Directors adopted a Zero Emission Policy with the goal of achieving net-zero emissions (ZEs) by 2050. To achieve the 2050 goal, RTD has developed the Facilities and Fleet Transition Plan (FFTP) to guide the organization with the transition from a diesel fleet service to a low/no-emission bus operation and facilities upgrade strategy.

The FFTP was developed in two phases. The first phase involved an in-depth analysis comparing five potential bus fuels/technologies that could be considered to meet the 2050 goal, including renewable diesel, diesel hybrid, compressed natural gas, fuel cell hydrogen, and battery electric. RTD staff then identified the preferred fuels/

technologies, along with strategies to implement them, and determined that the transition would be segmented into near-term (2025–2035) and long-term (2036–2050) strategies. The near-term strategy focuses on facility modifications to support an expanded BEB fleet at the Platte facility and the replacement of diesel with diesel-hybrid electric buses (dHEBs) at all RTD-owned facilities. The long-term strategy focuses on a full fleet transition to ZE buses at all RTD-owned facilities, depending on how ZE technologies (battery electric and fuel cell hydrogen) advance.

In the second phase of the FFTP, technical plans were developed outlining how the preferred fuels/technologies should be integrated into and inform facility improvements, fleet procurements, workforce development, and near-term financing and funding strategies. The FFTP culminated in this document, the ZE Fleet Transition Plan, positioning RTD to begin the process of meeting its 2050 net-zero goal. Per Federal Transit Administration (FTA) requirements, this ZE Fleet Transition Plan includes the following:

- ▶ Policy and Legislation Impacts
- ▶ Evaluation of Existing and Future Facilities
- ▶ Long-Term Fleet Management Plan
- ▶ Utility and Fuel Provider Partnerships
- ▶ Workforce Impacts
- ▶ Current and Future Resources to Meet Costs

The ZE Fleet Transition Plan is supplemented by the Facilities Transition Blueprint, included as Appendix A, which details the strategy and actions that RTD should take to meet its 2050 goal.

Per the RTD Board of Directors’ 2023 Zero Emission Policy, the FFTP will be reevaluated annually to incorporate evolving ZE technology considerations, market factors, and RTD bus facility infrastructure changes, while also measuring progress toward the Board’s Policy.





Policy and Legislation Impacts

Overview

This section examines federal, state, and local policies and legislation that influence decision-making and implementation strategies for RTD’s facilities and fleet transition. Understanding these policy drivers is crucial for establishing a clear decision-making framework and ensures that RTD’s transition aligns with key policy requirements while supporting its mission to improve lives through connection. Additionally, it helps RTD achieve its vision of being a trusted leader in mobility and delivering excellence and value to customers and the community.

Federal Policies and Funding

Infrastructure Investment and Jobs Act/Bipartisan Infrastructure Law (2021)

FTA’s Grants for Buses and Bus Facilities Program, funded by the 2021 Infrastructure Investment and Jobs Act provides funding to eligible recipients operating fixed-route bus services to implement low- and no-emission transition plans by replacing, rehabilitating, or purchasing buses, as well as constructing bus-related facilities. Program funding is provided through formula allocations and competitive grants, as detailed in **Table 1**.



Table 1: FTA Low- or No-Emission Bus Funding Opportunities

Program Name	Program Description
Grants for Buses and Bus Facilities Formula Program (49 U.S.C. 5339(a))	Provides formula funding to states and transit agencies through a statutory formula to replace, rehabilitate, and purchase buses and related equipment and to construct bus-related facilities.
Grants for Buses and Bus Facilities Competitive Program (49 U.S.C. 5339(b))	Provides competitive grant funding to states and direct recipients to implement low- and no-emission transition plans. Eligible activities include replacement, rehabilitation, and purchase of buses and related equipment, and construction of bus-related facilities.
Low- or No-Emission Grant Program (49 U.S.C. 5339(c))	Provides funding to state and local governmental authorities for the purchase or lease of zero-emission and low-emission transit buses, as well as the acquisition, construction, and leasing of required supporting facilities.



Lessons Learned from Fiscal Year (FY) 24 FTA Low- or No-Emission Bus Project Awards

FY24 awards from the 5339(b) and 5339(c) competitive programs totaled approximately \$1.5 billion across 117 funded projects in 47 states². Sixty-three percent of selected FY24 vehicle projects met one or both of the following key selection factors³:

- ▶ **Reduction of Customization and Joint Procurement:**
 - Supporting efficient vehicle procurements and strengthening the American transit vehicle manufacturing industry by reducing vehicle customization.
 - Participating in a joint procurement with at least three total transit agencies.
- ▶ **Use of Certain Contract Terms:**
 - Using contract terms that provide funding to vehicle original equipment manufacturers earlier in the production process by using advance or progress payments.

In addition, FY24 award selections continued to prioritize projects that address climate change, fleet composition, workforce involvement and development, high-quality job creation, and support of disadvantaged communities/ Justice40.

The RTD FFTP also emphasizes these selection factors, with key elements related to these factors highlighted throughout this ZE Fleet Transition Plan.

State Programs/Requirements

Colorado House Bill (HB) 19-1261: Climate Action Plan to Reduce Pollution (2019)

The State of Colorado strongly supports moving toward a ZE future, including the implementation of low- and no-emission transit fleets. In 2019, Colorado established a statewide goal to reduce greenhouse gas (GHG) emissions by at least 26 percent by 2025, 50 percent by 2030, and 90 percent by 2050 relative to the state’s 2005 baseline emissions levels. HB 19-1261 is supported by the plans and policies listed below to meet these statewide emission reduction goals.

Colorado HB 21-1286: The Colorado Building Performance Standards Law (2021)

In 2021, Colorado’s state legislature passed HB 21-1286, the Colorado Building Performance Standards Law, which aims to improve the energy efficiency of large buildings. The bill establishes sector-wide emission reduction targets for commercial, multifamily, and public buildings 50,000 square feet and larger. Targets include a 7 percent emission reduction by 2026 and a 20 percent emission reduction by 2030 from a 2021 energy use baseline. The law directed the Colorado Energy Office to create a Building Performance Standards Task Force, which recommended primary compliance options focused on reducing fossil fuel energy use in buildings, secondary actions building owners can take toward compliance, and options for building owners to seek adjustments.

Colorado Senate Bill (SB) 21-260: Sustainability of the Transportation System (2021)

SB 21-260, Sustainability of the Transportation System, provides over \$5 billion in new funding for transportation in Colorado through the Clean Transit Enterprise (CTE), Community Access Enterprise (CAE), and Clean Fleet Enterprise (CFE). SB 21-260 also established the Greenhouse Gas Pollution Reduction Roadmap, which was recently updated in 2024 (Roadmap 2.0). These new enterprises and fees will generate approximately \$3.8 billion (detailed on the following page), with an additional \$1.5 billion expected to come from the state general fund and stimulus funding.

² Federal Transit Administration: FY24 Bus and Low- and No-Emission Grant Awards. <https://www.transit.dot.gov/funding/grants/fy24-fta-bus-and-low-and-no-emission-grant-awards>.

³ APTA TRANSform Conference (9/29/24 to 10/2/24): FTA’s Low or No Emissions and Buses and Bus Facilities Competitive Programs.



- **Clean Transit Enterprise:** SB 21-260 provided \$105 million in one-time funding for transit in 2022 and an additional \$17 million annually. SB 21-260 includes the formation of a CTE within the Colorado Department of Transportation (CDOT) to support public transit electrification. The enterprise is authorized to impose a clean transit retail delivery fee. The enterprise is also authorized to issue grants, loans, and rebates to support electrification of public transit. The CTE Board adopted its Ten-Year Funding Plan on May 25, 2022. According to the 2023 CTE Annual Report, no changes to the existing CTE Ten-Year Plan were made in 2023.⁴
- **Community Access Enterprise:** SB 21-260 also created the CAE within the Colorado Energy Office to support electric vehicle (EV) and hydrogen fueling infrastructure and low- and moderate-income adoption of EVs and electric bicycles. Like the CTE, the CAE is authorized to impose a community access retail delivery fee to fund enterprise programs. The CAE Board adopted its Ten-Year Plan on May 14, 2022.
- **Clean Fleet Enterprise:** SB 21-260 created the CFE within the Colorado Department of Public Health and Environment for “the business purpose of incentivizing and supporting the use of electric motor vehicles and other clean fleet technologies by owners and operators of motor vehicles.”⁵ In addition to a clean fleet retail delivery fee (like those for the CTE and CAE), the CFE is also funded by a clean fleet per ride fee to be paid by a transportation network company on each ride offered and accepted by the transportation network company to fund its transportation network company fleet programs. The CFE Board adopted its Ten-Year Plan on May 26, 2022.

transit options, including large transit buses, cutaways, and transit vans.

Colorado Transit Zero Emission Vehicle Roadmap (2021)

Building on the high-level goals outlined within Colorado’s 2020 EV Plan, CDOT published its Transit Zero Emission Vehicle Roadmap (Roadmap) in 2021. This Roadmap serves as an adaptable and comprehensive guide for key stakeholders, transit agencies, and the State of Colorado to implement the state’s ZEV goals associated with transit operations. The Roadmap outlines a transit electrification strategy that works to stage, support, and incentivize transit agencies to transition toward approaches that produce the greatest fuel economy, minimize GHG emissions and local air pollutants, and set the stage for a ZE future.

Colorado SB 24-230: Oil & Gas Production Fees (2024)

SB 24-230 builds on the state-level transit funding established by SB 21-260 (as detailed previously). SB 24-230 will raise approximately \$110 million annually for transit through a new fee on oil and gas production. Seventy percent of this funding is dedicated to operations and service, and it will be allocated by a formula developed by the CTE (SB 21-260). An additional 10 percent of the annual fund will be used for a competitive grant program that can support transit capital improvements or operations. The final 20 percent is dedicated to passenger rail expansion. Overall, this new funding marks the first time that Colorado’s transit agencies can rely on state dollars to enhance operations and service frequency.

RTD Programs/Requirements

Reimagine RTD (2022)

This effort was a multiyear effort to evaluate and forecast the changing mobility needs of the region, better position RTD to meet those needs, and collaborate with agency partners to build a cohesive vision for regional mobility. Reimagine RTD serves as a key input to the FFTP and includes two major components: 1) System Optimization Plan (SOP) and 2) Mobility Plan for the Future (MPFF).

- **System Optimization Plan:** The SOP evaluated

travel patterns, demographics, and transit routes, and it recommended modifications to RTD’s fixed-route services to better meet the region’s near-term mobility needs within existing workforce and financial constraints. The implementation of the SOP is planned in a phased manner through 2027 using RTD’s standard service changes that occur three times per year. The SOP’s service changes, along with associated facility and fleet impacts, are a key input into the FFTP.

- **Mobility Plan for the Future:** The MPFF identifies strategies to address the future mobility needs of the region. Ongoing industry advancements and societal shifts have altered how and when people travel, how cities function, and how mobility factors into broader visions and goals. The MPFF set a framework for the FFTP by understanding current capabilities, configurations, and future trends, preparing RTD to make informed decisions when considering opportunities for zero emission bus (ZEB) adoption. Key MPFF elements that set the groundwork for the FFTP include the Bus Facility Condition Assessment and the New Bus Maintenance Facilities Assessment.

RTD Board’s Zero Emission Policy (2023)

The RTD Board of Directors adopted a Zero Emission Policy on April 25, 2023, with the intent to achieve net ZEs by 2050, as measured by Scope 1 and Scope 2 emissions as defined by the Greenhouse Gas Protocol. RTD’s Board also committed to reevaluate this policy annually after receiving a transition plan to measure progress toward this policy

RTD Transit Asset Management Plan (2022)

In compliance with FTA requirements, as well as national best practices, RTD updated the Transit Asset Management Plan in 2022. The update included an overall Asset Management Policy and an overview of the conditions of RTD facilities. Both of these plans helped inform recommendations for the FFTP.

Title VI of the Civil Rights Act of 1964

Title VI of the Civil Rights Act of 1964 prohibits recipients of federal financial assistance (including transit agencies) from discriminating on the basis of race, color, or national origin in their programs or activities. To comply with Title VI, transit agencies must ensure that the level and

quality of public transportation service are provided in a nondiscriminatory manner, promote full and fair participation in public transportation decision-making without regard to race, color, or national origin, and ensure meaningful access to transit-related programs and activities by persons with limited English proficiency.

Title VI also mandates that transit agencies conduct an equity analysis during the facility siting and vehicle assignment process to ensure decisions are made without regard to race, color, or national origin. For facility siting, Title VI program requirements involve comparing the equity impacts of various siting alternatives and engaging in outreach to potentially affected communities. If it is determined that the proposed project location would cause a disparate impact based on race, color, or national origin, the project can proceed at that location only if there is a substantial and legitimate reason for the choice and no alternative sites would result in a lesser disparate impact on the basis of race, color, or national origin. For vehicle assignments, Title VI requires transit agencies to develop policies that ensure equitable distribution of transit amenities and vehicle resources across the agency’s service area to ensure that minority and low-income community members receive equitable levels of service.⁶

Colorado 2020 EV Plan (and 2023 Plan Update)

Colorado’s recently updated 2023 EV Plan identifies several specific programs, strategies, and targets for achieving transit-related emissions goals in tandem with the broader electrification goals for Colorado’s transportation system as a whole. As part of a high-level target of complete electrification for the state’s medium- and heavy-duty vehicle sectors, the 2023 EV Plan establishes a goal of transitioning 100 percent of transit vehicles to zero emission vehicles (ZEVs) by no later than 2050 and sets an interim target of at least 1,000 transit ZEVs by 2030. The goal pertains to various

⁴ CDOT Clean Transit Enterprise: 2023 Annual Report. <https://www.codot.gov/programs/innovativemobility/assets/cte/cte-annual-report-cy2023.pdf>

⁵ <https://cdphe.colorado.gov/motor-vehicle-emissions/clean-fleet-enterprise>

⁶ https://www.transit.dot.gov/sites/fta.dot.gov/files/docs/FTA_Title_VI_FINAL.pdf





Regional and Local Programs/ Requirements

DRCOG Metro Vision Regional Transportation Plan (RTP) (2021)

Denver Regional Council of Governments (DRCOG) adopted the 2050 RTP in 2021 after a two-year planning process. The 2050 RTP, which directly addresses the Colorado Greenhouse Gas Transportation Planning Standard, helps DRCOG and its many partners implement the shared aspirational vision of Metro Vision and sets the long-range vision and investment framework for the region’s multimodal transportation system. The RTP identifies multimodal capital projects and programs for various planning horizons between 2020 and 2050. RTD-focused priorities in the 2050 RTP include a new bus maintenance facility, bus rapid transit investment for multiple regional corridors, and RTD Base System and FasTracks O&M projects.

Mobility Choice Blueprint (2019)

In 2019, the Mobility Choice Initiative, consisting of RTD, DRCOG, CDOT, and the Denver Metro Chamber, was established. The purpose of the initiative was to work toward a future mobility vision for metro Denver to leverage current assets and new technologies to respond to regional challenges—congestion, pollution, crashes, etc.— and provide a cohesive transportation system that works for everyone. The plan details the benefits and challenges of deploying ZE mobility for all transportation modes. The plan also lists Mobility Electrification as a key objective, encouraging the use of electric powertrains in automobiles and transit vehicles.

Xcel Energy’s 2024-2026 Transportation Electrification Plan (2024)

Xcel Energy has partnered with a diverse group of Colorado stakeholders to create a plan for achieving the state’s ambitious clean transportation goals, including having 940,000 EVs on the road by 2030 and remaining a top US state for EV adoption. Xcel’s transportation vision is complementary to the state’s vision. Partnering with supporting organizations, Xcel aspires to enable one out of five vehicles in the areas it serves to be electric by 2030, leading to cleaner air and billions of dollars in customer savings. By 2050, Xcel will provide the infrastructure and energy to run all vehicles in its service area with carbon-free electricity or other clean energy, as part of its

vision to become a net-zero energy provider. In relation to the FFTP, Xcel’s coordination with RTD is critical for understanding power needs, informing rate structures (e.g., demand charges and off-peak charging), and informing Scope 2 emissions analysis to understand source generation and how this impacts RTD’s goal of achieving net ZEs for RTD facilities and fleet vehicles by 2050.





Evaluation of Existing and Future Facilities

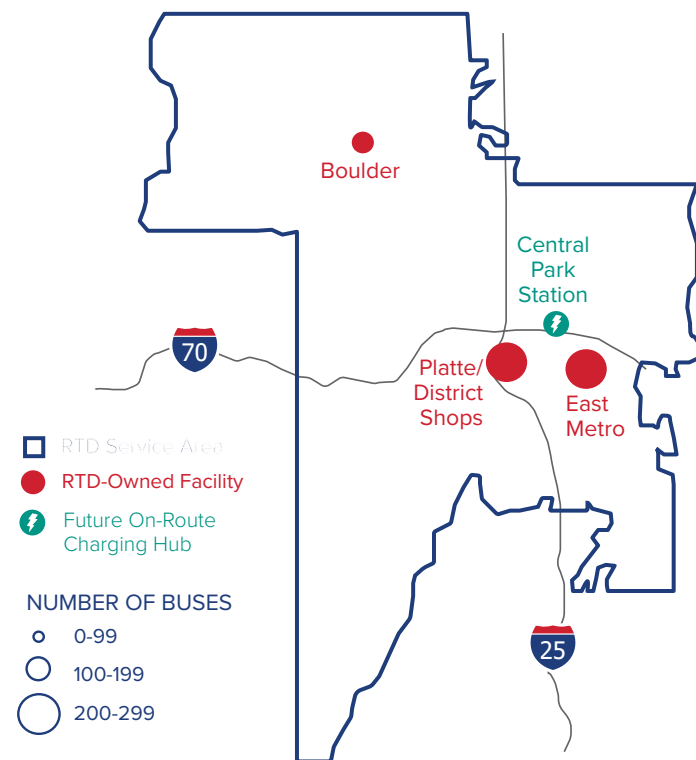
Overview

As part of the FFTP, RTD completed a comprehensive evaluation of its existing and planned bus facilities to determine the overall timeline and strategy associated with RTD’s transition to BEBs and dHEBs. RTD-owned and RTD-operated facilities, shown on **Figure 2**, include Boulder, Platte/District Shops, and East Metro. Central Park Station is also included since it will serve as an on-route charging hub for BEBs operating out of Platte in the future.

Facility design and construction for each facility will occur in four general phases over the near term (2025–2035): Design Procurement, Design, Permitting/Construction Bids, and Construction. The timing of each phase is driven by when each facility is expected to receive vehicles and undergo other preparations for putting the vehicles into service (for example, workforce development and training).

Table 2 summarizes the key functions of each RTD-owned and RTD-operated facility included in the near-term strategy. Since RTD does not own the contracted facilities, those facilities were not included in the near-term strategy. It is assumed that the facility owner and contractor will determine the specific improvements, timelines, and other details as transition opportunities arise.

Figure 2: Locations of RTD-Owned and RTD-Operated Bus Facilities



Near-Term Facility Strategy/Plan (2025–2035)

A collaborative process with RTD determined the specific order in which facilities will be transitioned: District Shops, East Metro, Platte, Central Park Station, and Boulder. RTD’s existing procurement schedule largely drove this order. Since District Shops will need to be able to maintain new fuels/technologies, it is essential that it is also retrofitted early in the transition.

Table 2: Summary of RTD-Owned Bus Facilities to be Retrofitted

Facility	Function	Address
District Shops	Maintenance	1900 31st Street Denver, CO 80216
East Metro	Bus Operating Facility	14100 East Colfax Avenue Aurora, CO 80011
Platte	Bus Operating Facility	3333 Ringsby Court Denver, CO 80216
Central Park Station	Transit Station	8200 Smith Road Denver, CO 80207
Boulder	Bus Operating Facility	1707 Exposition Drive Boulder, CO 80301

Division Fleet Assignments

Table 3 summarizes the technologies that each division will be retrofitted to support and provides a general reference for resulting required code and recommended modifications at each location.

Further consideration by RTD into the potential of fuel cell electric buses (FCEBs) at East Metro and Boulder divisions, as well as potential BEBs and FCEBs at Englewood and Longmont divisions, is discouraged in the near-term due to difficulties in implementing those fuel technologies at those locations.

Table 3: Summary of Near-Term Fuels/Technologies, by Division

Facility	Near-Term (2025–2035)	Potential Long-Term (2035–2050)
Platte	dHEBs, 90 BEBs ¹	BEBs/FCEBs
Central Park Station	On-Route Charging for BEBs	On-Route Charging for BEBs at other park-n-ride facilities
East Metro	dHEBs	BEBs/FCEBs
Boulder	dHEBs	BEBs/FCEBs
District Shops	Improvements for BEBs	Infrastructure for BEBs/FCEBs
Transdev Englewood	dHEBs	BEBs/FCEBs
Transdev Broadway	dHEBs	BEBs/FCEBs
Transdev Commerce City	dHEBs	BEBs/FCEBs
Transdev Longmont	dHEBs	BEBs/FCEBs

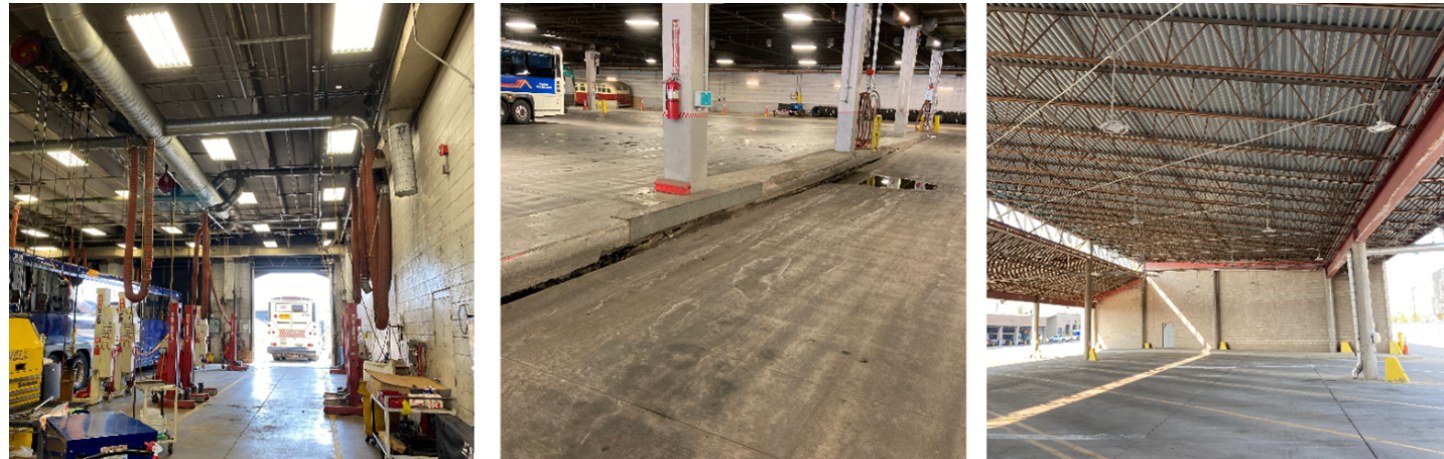
¹ Note: Platte will be retrofitted to support 90 BEBs, while only 75 BEBs will be procured by 2035.

To meet RTD’s net ZE goal, a Facilities First framework must be applied; that is, elements of the transition to alternative fuels will be determined by the operational readiness of RTD’s facilities. In the next decade, pursuant to the near-term strategy, Platte and Central Park Station will undergo upgrades to accommodate BEBs, and all RTD-owned facilities will be retrofitted to support dHEBs.

To support dHEBs (or any vehicle that has a lithium-ion battery, per code), facilities are expected to undergo fireproofing improvements, as required by code. Minimum recommendations include sensor upgrades, sprinkler modifications, and exhaust ventilation modifications.

To support BEBs, Platte will need utility-scale infrastructure improvements outside the facility to accommodate new power demands (subject to Xcel Energy energy’s timelines) and electrification infrastructure on-site (charging cabinets, switchgear, and transformers). Similar improvements, but at a much smaller scale, will be needed for Central Park Station.

Figure 3: Platte - Existing Conditions



The timing of these improvements informs vehicle procurement and delivery decisions, workforce training practices, costs, and emission forecasts.

Mechanical, electrical, and plumbing (MEP) systems improvements can also reduce GHG emissions at each facility (**Figure 3**). MEP system improvements can be costly and cause some operational disruptions; however, if RTD does not implement these improvements, it will have challenges meeting its net-zero goals. Additional considerations and requirements that RTD must weigh as part of the facilities transition include compliance with the Model 2024 International Building Code, environmental clearance under the National Environmental Policy Act, and Title VI requirements from the Civil Rights Act of 1964. Additional details on facility upgrades, MEP system improvements, applicable codes and standards, and relevant federal requirements are included in Appendix A, the Facilities Transition Blueprint.

Facility Implementation Schedule and Milestones

Figure 4 illustrates the systemwide facility implementation schedule, with the following major milestones:

1. Construction of both BEB and dHEB-related improvements is expected to be complete at Platte in Q2 2031.
2. Construction of improvements at East Metro is expected to be complete in Q4 2028.
3. Construction of improvements at Boulder is expected to be complete in Q2 2035.

Figure 4: RTD Near-Term Facility Implementation Schedule (2025–2035)

Division	2025				2026				2027				2028				2029				2030				2031				2032				2033				2034				2035			
	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4	Q1	Q2	Q3	Q4				
Platte (BEB)																																												
Platte (dHEB)																																												
District Shops (dHEB)																																												
East Metro (dHEB)																																												
Boulder (dHEB)																																												
Central Park (Layover Charging)																																												

Note: P = Phase (e.g., P1= Phase 1)

Long-Term Facility Strategy/Plan (2036–2050)

The long-term facilities strategy considers a progressive transition from the primarily dHEB solution accomplished in the near term, to a complete ZE facilities and fleet transition with alternative technologies by 2050. The evolution of fuels/technologies and market availability are critical factors that will guide RTD’s decision-making. RTD’s annual refresh of the FFTP will reflect these updates and inform policy decisions to guide RTD to a net-zero future.





Long-Term Fleet Management Plan

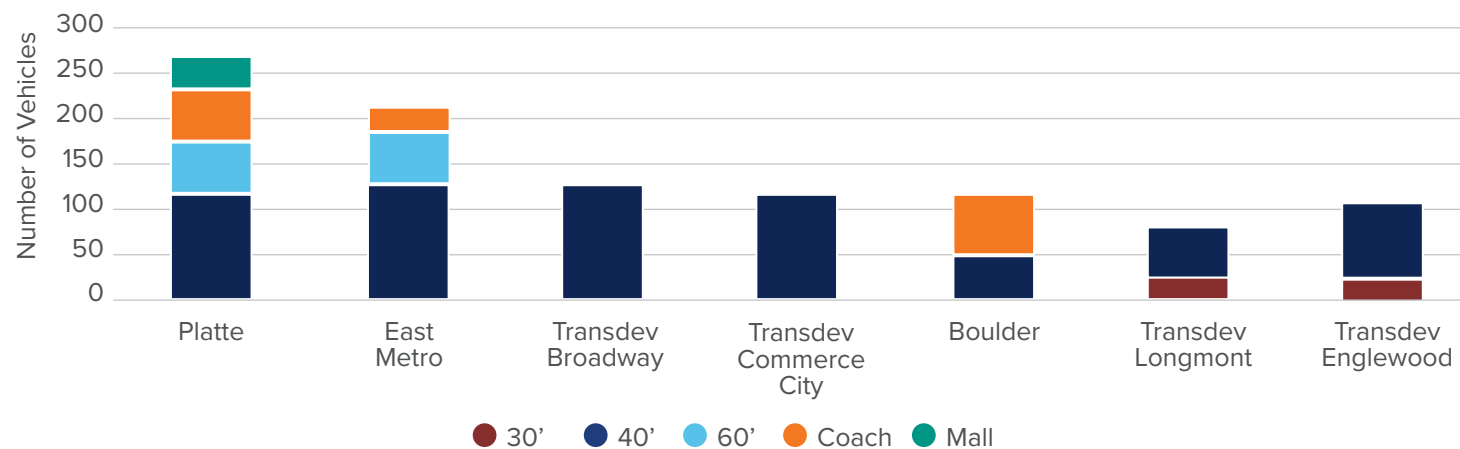
Overview

Through the FFTP, RTD has developed a fleet procurement plan with a proposed vehicle procurement schedule by technology type, division, and vehicle length, both for RTD-owned facilities and for contractor-operated facilities. This plan is intended to serve as a guide for how vehicle procurements may occur at RTD and contracted facilities to progressively achieve readiness for receiving dHEBs and/or BEBs.

Current RTD Fleet

RTD's current fixed-route fleet includes 30-foot, 40-foot, and 60-foot diesel transit buses; 45-foot diesel coach buses; and 45-foot BEBs used exclusively for the 16th Street MallRide. **Figure 5** shows the number of assigned buses operated by bus type (length) at each facility. Not all assigned vehicles are currently actively used, largely due to service reductions during the COVID pandemic and RTD's plan to right-size the fleet to align with SOP service. Currently, there are approximately 1,000 buses in the fleet, and with the implementation of the SOP, the fleet will eventually be reduced to approximately 700 buses (inclusive of a 20 percent spare ratio).

Figure 5: Current RTD Buses at Each Facility



Fleet Procurement Plan Summary

Based on a fuel/technology screening process and input received from RTD staff at a fuel/technology Screening Workshop in June 2024, RTD's fleet procurement plan for the near term (2025–2035) primarily focuses on replacing the existing diesel fleet with BEBs (at Platte) and dHEBs at other RTD-owned and contractor-owned facilities. The number of BEBs procured for Platte is informed by the number of service blocks that were modeled to be successfully operated by BEBs. The timing of bus deliveries will align with the operational readiness of each division. At RTD-owned facilities, readiness for fleet deliveries will be contingent on when infrastructure upgrades to these facilities can be completed, while the readiness of contractor-operated facilities will be contingent on when contracts are rebid. **Figure 6** and **Table 4** present a comprehensive summary of the strategy, including facility readiness, annual deliveries, and annual fleet mix.

Figure 6: Fleet Procurement Plan Summary

Schedule Key	+ BEB Construction Activities		● dHEB Construction Activities			★ Contractor Contract Renewal		✓ Contract Divisions Ready to Accept dHEBs			
	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
RTD Division	RTD-Owned Division Construction Schedules*										
Platte (BEB)						+	+				
Platte (dHEB)						●	●				
East Metro (dHEB)			●	●							
Boulder (dHEB)										●	●
Contractor Division	Contractor Division Bus Acceptance Readiness Schedule										
Broadway				★	✓						
Commerce City					★	✓					
Englewood						★	✓				
Longmont		★	✓								

Table 4: Annual Bus Procurement and Fleet Composition by Technology

Procurement Data	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035
Annual Bus Procurements	Diesel	59	0	166	42	0	0	14	0	0	0
	dHEB	0	0	50	106	55	71	27	0	0	142
	BEB	0	0	0	0	0	22	53	0	0	0
	Total	59	0	216	148	55	93	94	0	0	142
Fleet Composition	Diesel	96%	96%	89%	77%	70%	63%	54%	54%	55%	52%
	dHEB	0%	0%	6%	19%	26%	34%	37%	37%	36%	39%
	BEB	4%	4%	4%	4%	4%	3%	9%	9%	9%	9%

* Years indicated are approximate calendar years during which dHEB or BEB facilities/infrastructure construction is expected to occur and may include the entirety of or a part of the calendar year indicated. Phasing of construction activities enables phased vehicle deliveries prior to full buildout.

** Fleet composition percentages represent year-end (Q4) fleet composition.

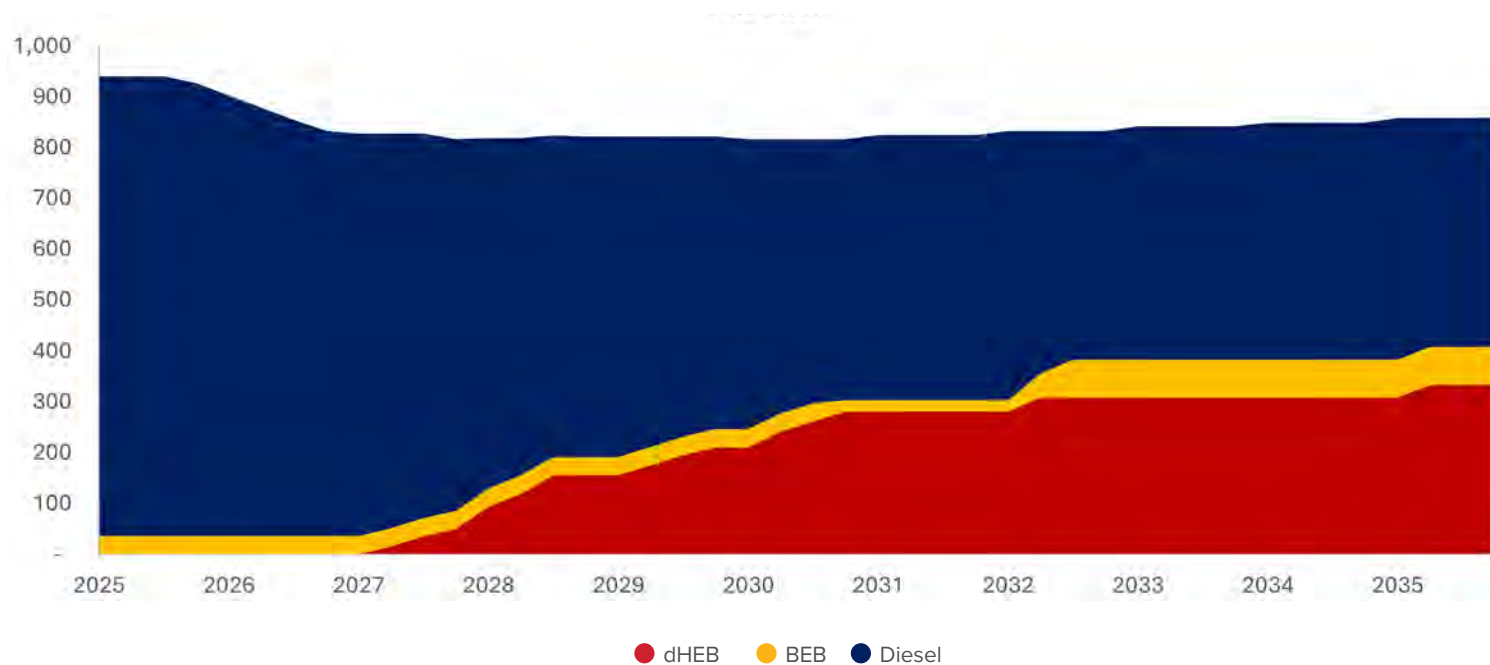
Near-Term Fleet Procurement Plan/Strategy (2025–2035)

The fleet procurement plan will follow a Facilities First approach, with fleet procurement driven and catalyzed by the operational readiness of RTD's facilities. In the near term, one RTD-owned facility, Platte, will transition its infrastructure to support BEBs. Some of the remaining fleet will transition from diesel to low-emission diesel-hybrid technology based on facility readiness.

The dHEB procurement strategy generally assumes vehicle delivery to whichever facility has most recently become ready to accept the vehicles. Once a new facility is ready, the buses will be delivered to that new facility. The overall vehicle numbers in this strategy align with RTD’s current procurement plan. It is assumed that vehicles may be shuffled to other facilities as needed.

Figure 7 shows the systemwide fuel/technology fleet mix through 2035. By 2035, the overall fleet mix will be 9 percent BEB, 39 percent dHEB, and 52 percent diesel.

Figure 7: RTD Fleet Inventory by Fuel/Technology



Additional fleet procurement schedule details regarding the expected deliveries per year by fuel/technology, as well as the total 2035 fleet inventory by facility, are available in Appendix A, the Facilities Transition Blueprint.

Long-Term Fleet Procurement Plan/Strategy (2036–2050)

RTD’s long-term goal is to transition its bus fleet to 100 percent ZE technologies by 2050, which will require all new buses delivered after 2036 to be ZEBs. However, both ZE technologies (BEB and FCEB) are currently significantly more expensive than diesel buses. Other current constraints include limited range for BEBs, which results in diesel buses needing to be replaced by BEBs on a more than 1:1 basis to achieve the same level of service limited availability and high cost of hydrogen fuel for FCEBs; and lack of FCEB options for some buses in the RTD fleet. These technologies are projected to continue to mature, both technically and commercially, leading to more options, better performance, and lower costs for both BEBs and FCEBs over the long term. However, there is still significant uncertainty as to the relative pace of improvement for each technology. As such, it is difficult at this time to determine the most appropriate ZE fleet mix for RTD between 2036 and 2050.

The near-term strategy includes initial deployments of BEBs and a potential FCEB pilot to allow RTD to gain experience with these technologies. As RTD learns from these initial deployments, it will also continue to monitor technical and commercial developments in the ZE market to inform long-term fleet procurement plans—whether to commit to only BEB or FCEB, or to pursue both technologies for different parts of RTD’s fixed-route service. Given lead times for both bus purchases and supporting infrastructure upgrades, decisions about the long-term ZE fleet strategy will need to be firmed up in the early 2030s.





Utility and Fuel Provider Partnerships

Overview

RTD and its electric utility provider, Xcel Energy, are currently coordinating to meet the needs of RTD’s facilities transition. Specifically, to support BEBs, Platte will need utility-scale infrastructure improvements outside the facility to accommodate new power demands (subject to Xcel Energy’s timelines) and electrification infrastructure on-site (charging cabinets, switchgear, and transformers). Similar improvements, but at a much smaller scale, will be needed for Central Park Station to enable on-route charging. During a Q3 2024 coordination meeting between Xcel Energy and RTD, Xcel Energy staff indicated the following related to the Platte facility:

- ▶ The system near Platte is constrained.
- ▶ A peak load above 2 megawatts would likely require improvements on Xcel Energy’s system.
- ▶ Overnight charging is preferred.
- ▶ Xcel Energy already plans a new substation before 2030 for the area near Platte, along with the reconfiguration of existing feeders.

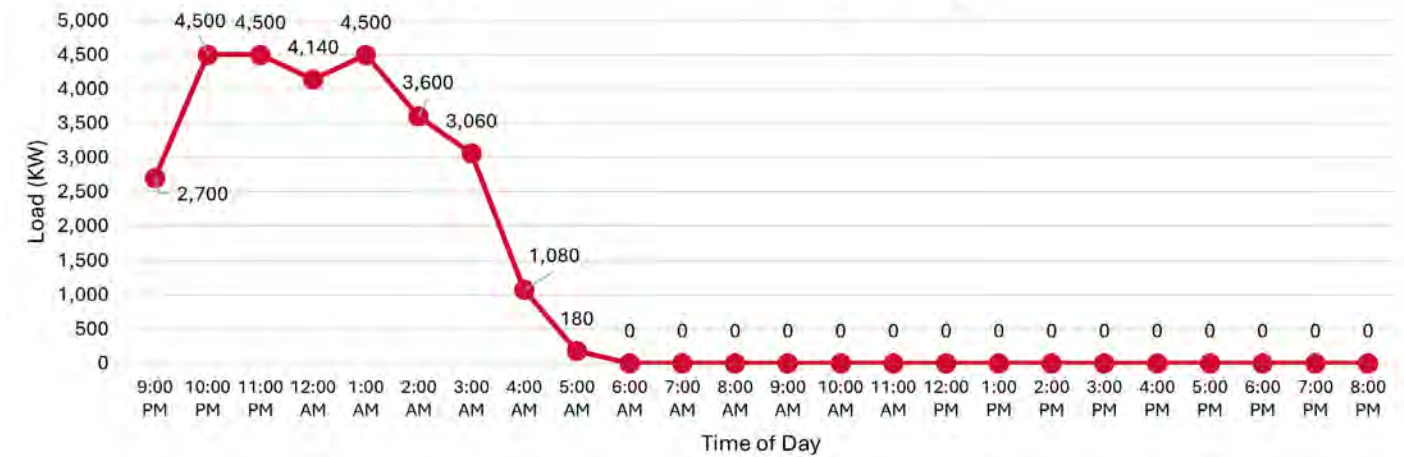
The RTD FFTP also included preliminary charge management modeling for Platte, which revealed

that overnight charging of BEBs would result in a peak load of approximately 4.5 MW at Platte, as shown on **Figure 8**. RTD has provided Xcel Energy this expected overnight charging load requirement data, along with a projected in-service date of 2031. In addition, RTD requested that Xcel provide requirements needed to meet the indicated peak load and in-service dates along with the required date in which to submit a formal application for new service to ensure that the 2031 deadline is met. As of Q4 2024, Xcel’s distribution planning team is reviewing this information, and coordination between RTD and Xcel will continue.

Resiliency Considerations and Solar/Photovoltaics Options

RTD’s reliance on Xcel Energy will increase as its ZEB fleet grows, which makes service continuity vulnerable to power outages and, therefore, requires some level of backup. As part of the FFTP, RTD has conducted a high-level evaluation of resiliency options. Existing

Figure 8: Platte Division Overnight Charging Load Modeling Results



conditions at each facility may necessitate different options for different facilities, at least in the near term. Resiliency options generally include backup power generators (permanent and mobile), on-site battery energy storage systems (BESS), and redundant utility feeds. Appendix A, Facilities Transition Blueprint, includes additional comparisons of these backup power resilience options. RTD is also exploring the option of coupling a solar energy generation system with BESS and a microgrid so that solar energy can be used for typical overnight charging during an outage. A BESS, microgrid, and photovoltaics would also enable peak-shaving, whereby solar energy would be used to reduce reliance on the grid during high-demand periods.

With the transition from diesel buses to dHEBs, RTD will continue its partnership with its diesel fuel provider. One option for reducing GHG emissions immediately is to replace diesel fuel with renewable diesel sourced from bio feedstocks. RTD has identified a supplier in Wyoming and is evaluating the feasibility and cost effectiveness of integrating this fuel into the fleet. Since renewable diesel is a “drop-in” fuel, it can be used in existing storage tanks and engines.



Workforce Impacts

Overview

As RTD transitions to dHEBs and BEBs, it is essential that staff is prepared to operate and maintain the new fleet. This workforce and training analysis outlines the approach used to estimate the staffing levels and proposed training for RTD to achieve its near-term (2025–2035) facilities and fleet transition objectives and the required staffing levels, associated training demand, and proposed schedule to prepare the workforce at each division (aligned with the near-term strategy’s facility construction and fleet procurement schedule). Considerations to evolve the training plan to meet RTD’s long-term (2036–2050) goals and recommendations for enabling successful delivery are also discussed.

Near-Term Workforce Plan/Strategy (2025–2035)

RTD Staffing Levels and Staff Training Requirements

Over the next decade, staffing will shift due to attrition, promotions, and other staffing changes. The RTD FFTP analysis determined that 285 new recruits will be needed for the near-term strategy. Almost 25,000 total 8-hour training days will also be needed for all staff, including existing, promoted, and new staff, to maintain and operate the new dHEB and BEB fleet. Appendix A, the Facilities Transition Blueprint, presents a detailed breakdown of

training assumptions and training hour estimates by facility. Staff training will occur in three general phases:

- ▶ The **pre-delivery** phase completes all preparations in advance of commencing training.
- ▶ The **training delivery** phase is the operations and maintenance training provided to maintain and operate the dHEB and BEB fleets.
- ▶ The **post-training** phase primarily consists of checking in with newly trained employees to confirm that the new knowledge has been retained and that employees are competent in putting their training into practice.

Training Deployment Strategy

RTD also considered several strategies related to bus deployment, with the preferred strategy dictating how training will be deployed. **Table 5** summarizes the deployment options that RTD considered.

Table 5: Deployment Strategy Options

Approach	Description
Technology-Driven	<ul style="list-style-type: none"> ▶ Provides a phased introduction of technology. ▶ Introduces the technology across all bus divisions before proceeding to the next technology. ▶ The implementation of a technology across all divisions determines when buses of a different fuel type can operate from that division.
Decision-Driven	<ul style="list-style-type: none"> ▶ Provides a phased conversion of each bus division. ▶ Introduces all technologies at a division before moving to the next division. ▶ Allows training and implementation to happen one division at a time.
Vehicle-Driven	<ul style="list-style-type: none"> ▶ Allows replacement of buses with new technology as buses are retired. ▶ May require multiple divisions to simultaneously upgrade vehicles and undergo training.
Route-Driven	<ul style="list-style-type: none"> ▶ Introduces technology to shorter mileage routes first and then to the longer mileage routes. ▶ Is based on what technology is appropriate and the length of bus blocks. ▶ May require multiple technologies at each operating division.

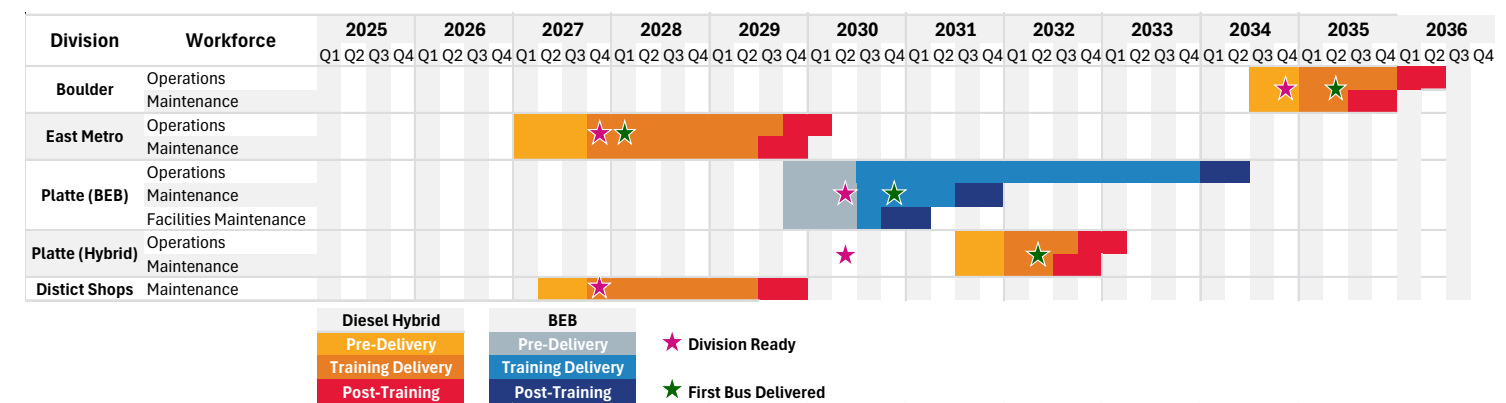
RTD’s preferred strategy is a hybrid approach founded on technology-driven and division-driven approaches, which introduces a technology to one division at a time. Staff at each division will be trained on a single fuel/technology before moving to another division or another fuel type. This approach will allow flexibility to move the fleet around as vehicles age, and it will allow division training to be integrated with the facility upgrade plan.

Workforce Training Implementation Plan

The timing and amount of training are correlated with when facilities are expected to receive vehicles and the size of the fleet at each facility. The following represent major milestones for each facility, and **Figure 9** illustrates the systemwide Workforce Training Plan:

- ▶ East Metro and District Shops will begin training for dHEB operation/maintenance first, in Q4 2027.
- ▶ Platte will begin training for BEB vehicle operation/maintenance in Q3 2030 and dHEB operation/maintenance in Q1 2032.
- ▶ Boulder will begin training for dHEB operation/maintenance in Q1 2035.

Figure 9: RTD Workforce Training Implementation Plan



Long-Term Workforce Plan/Strategy (2036–2050)

RTD will need to refresh the workforce and training plan for the long-term as the full ZE transition is implemented. Updates to the workforce and training plan includes assessing staffing numbers, analyzing training demand, identifying training constraints, and developing an implementable training plan. The workforce strategy is reproduceable and can be applied to any alternative fuels/technologies, including hydrogen, compressed natural gas, newer battery technologies, etc. Any changes made to the vehicle procurement and facility construction schedule will require updates to the workforce plan.



Current and Future Resources to Meet Costs

Overview

RTD analyzed lifecycle costs of the near-term (2025–2035) facilities and fleet transition, along with funding sources that could be targeted to fund the transition. Analyzed lifecycle costs include capital, operating, and environmental costs, and the plan details the underlying assumptions of those cost estimates. RTD also examined funding strategies, including discretionary grants, tax incentive programs, and bond issuance considerations. Appendix A, Facilities Transition Blueprint, further details the approach, which summarizes the inputs, assumptions, and methodology of lifecycle cost and funding analyses.

Near-Term Lifecycle Costs and Funding Strategy/Plan (2025–2035)

Vehicle Acquisition Costs

Base vehicle acquisition costs differ significantly across vehicle fuel type and length. **Table 6** summarizes the vehicle acquisition costs used in the analysis. Base vehicle acquisition costs are sourced from the Washington State Cooperative Contract, under which RTD is eligible, which provides RTD with reasonable estimates of probable costs, with prices most recently updated in July 2024.

Table 6: Base Vehicle Acquisition Costs (2023 \$)

Bus Length	Diesel	dHEB	BEB
35'	-	\$795,123	\$1,001,602
40'	\$587,226	\$801,873	\$1,014,203
45' Coach	\$909,415	-	\$1,692,816
60'	\$904,471	\$1,127,593	\$1,653,708

Facility Upgrade Costs

Table 7 summarizes unit costs associated with upgrading existing bus facilities in the near-term strategy to accommodate the new fleet of vehicles. Costs pertaining to infrastructure upgrades for the facilities are based on the conceptual design cost estimates provided by WSP. The costs for all locations reflect fireproofing and fire suppression upgrades to safely accommodate the dHEB and BEB vehicles. The Platte upgrade cost also includes charging positions for 90 BEBs, along with all required supporting enhancements, such as utility upgrades. All estimates were developed as standalone projects using a traditional design/bid/build delivery.

Table 7: Facility Upgrade Costs (Millions of 2023 \$)

Cost Category	East Metro	Platte	Boulder	District Shops	Central Park Station
Direct Costs (Materials & Labor)	\$11.1	\$61.7	\$5.1	\$3.2	\$2.5
Indirect Costs (Contractor Profit, Permitting, etc.)	\$5.0	\$17.9	\$2.8	\$2.0	\$1.1
Other Contracts and Agreements (Primarily Offsite Utility Costs)	\$-	\$5.2	\$-	\$-	\$-
Professional Services (Primarily Design Development)	\$2.7	\$13.1	\$1.3	\$1.0	\$0.7
RTD Personnel (Project Management, etc.)	\$2.0	\$8.3	\$1.0	\$0.7	\$0.3
Contingency	\$3.6	\$18.6	\$1.8	\$1.2	\$0.6
Total	\$24.5	\$124.8	\$12.1	\$8.1	\$5.2

Note: Numbers do not total due to rounding

Total Lifecycle Cash Costs

The lifecycle cash costs for both capital and operating needs included in the near-term strategy are significantly higher and will require a significantly higher capital investment than if RTD were to procure only diesel buses. The diesel no-build strategy will total nearly \$1.79 billion (2025-2035). The near-term strategy will increase this by \$600 million, to over \$2.39 billion.

The higher costs of the near-term strategy include capital costs of vehicles, with both BEBs and dHEBs being more expensive than conventional diesel buses, as well as significant facility upgrade costs, especially to accommodate the BEBs, totaling \$418 million. In addition, higher maintenance, training, and fuel costs increase operating expenses by \$173 million. Total incremental cash costs will total \$591 million. However, the investment in the near-term strategy will create significant environmental benefits, measured at over \$69 million over the 11-year period using U.S. Department of Transportation values for measuring the value of environmental benefits.

Figure 10 details lifecycle costs, segmented by capital, operating, and environmental costs, by year during 2025–2035. Capital costs consist almost entirely of vehicle procurement and facility upgrade costs, with the large year-to-year changes in total capital costs corresponding to fluctuations in the number of vehicles bought each year. The near-term strategy will include 59 conventional diesel buses purchased in 2025, with the next wave of 216 bus procurements in 2027 consisting of a mix of conventional diesel buses and dHEBs.

Figure 10: Near-Term Strategy Annual Lifecycle Costs (Millions of Year of Expenditure \$)

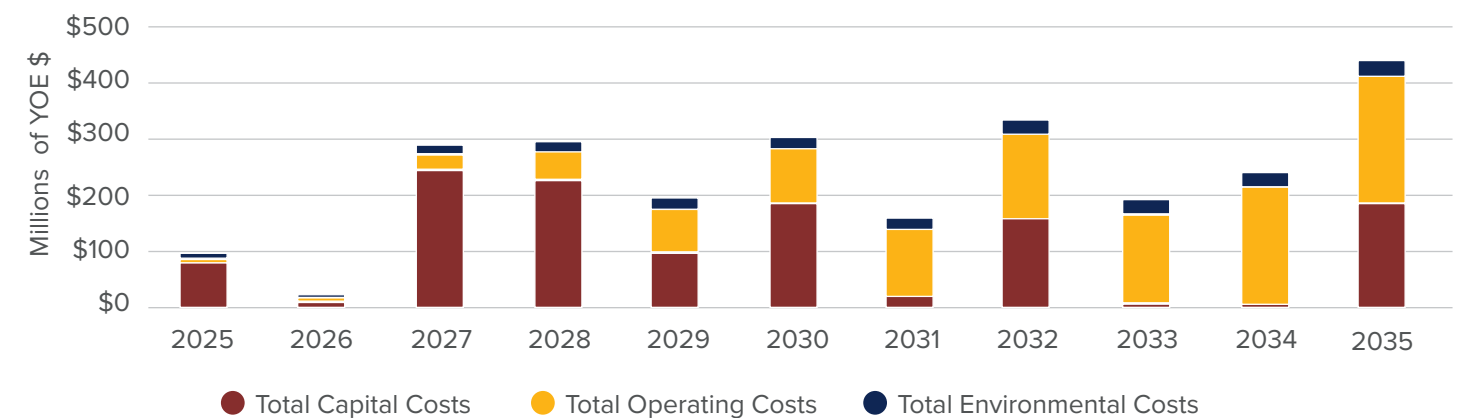
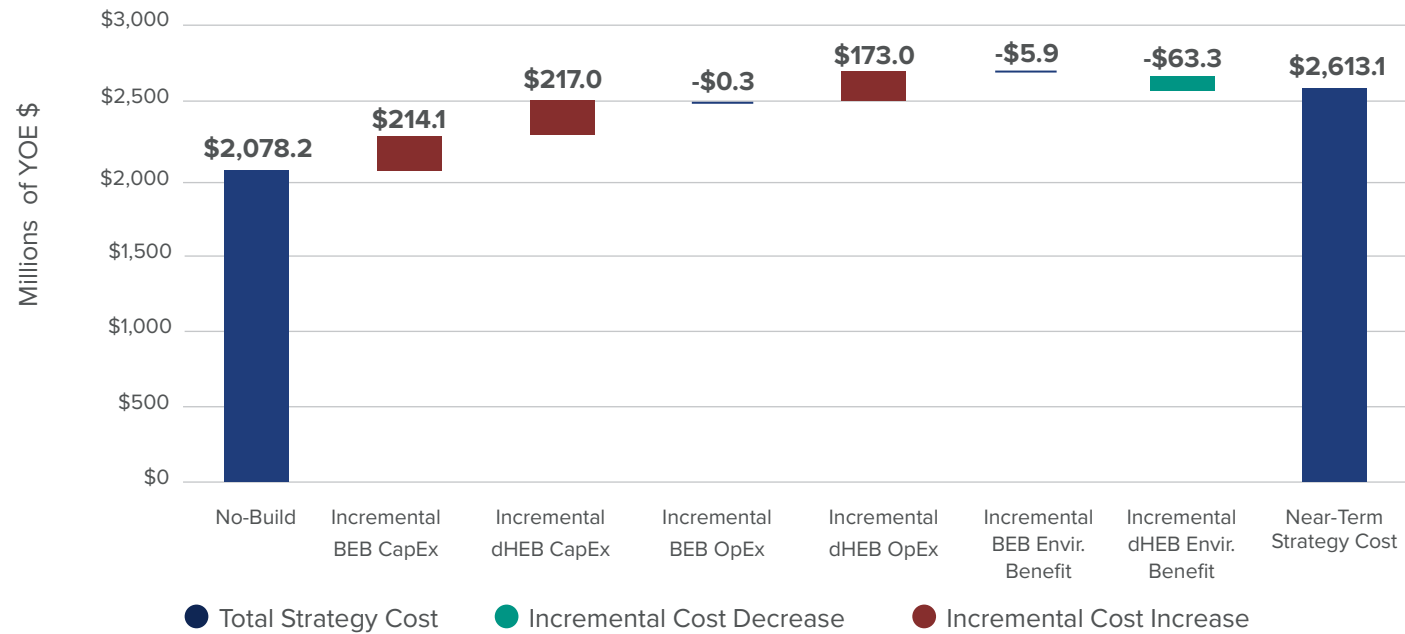


Figure 11 shows a diesel no-build strategy, along with incremental cash costs and non-cash environmental benefits that accompany the near-term transition strategy.

Figure 11: Near-Term Strategy Incremental Costs (Millions of Year of Expenditure \$)



Note: Negative costs values represent incremental operating expense decreases and environmental benefits versus diesel no-build.

Funding Plan

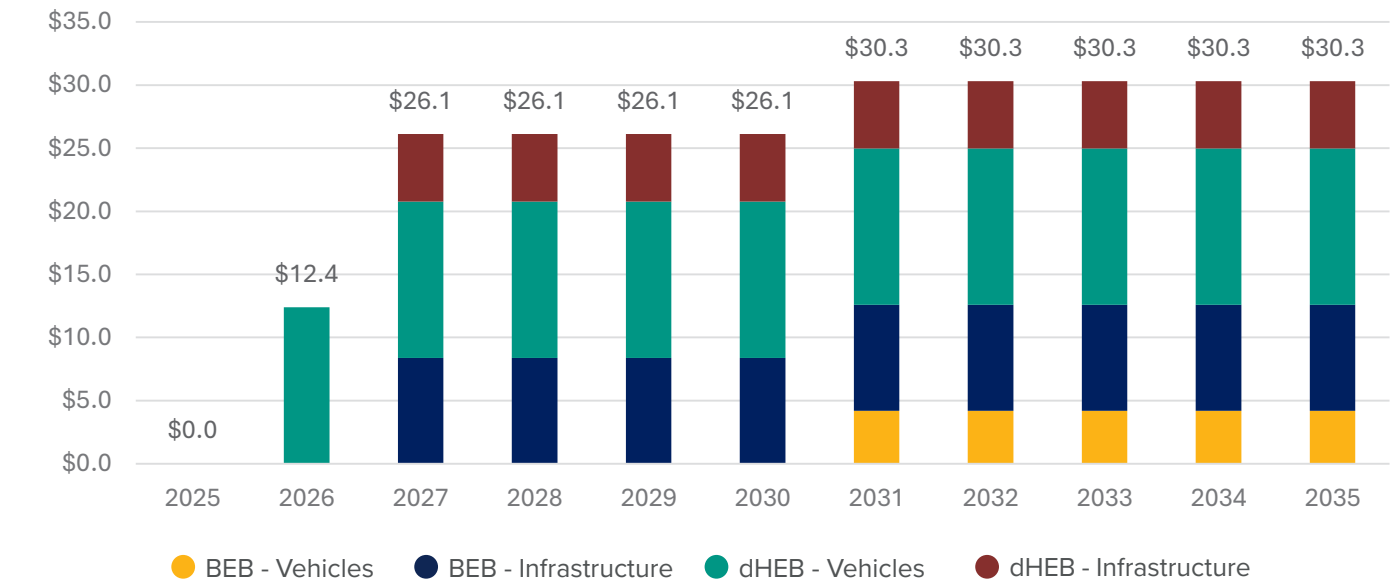
The incremental capital need between the build and diesel no-build scenarios in the baseline case is estimated to be \$418 million. This factor excludes the incremental operating and maintenance costs among the scenarios, meaning other funding sources may need to be identified. When potential discretionary grant funding of 56 million is considered for the build scenario, relative to the diesel no-build scenario, the incremental capital need is reduced to \$361 million.⁷ Discretionary grant opportunities identified by program type include:

- ▶ FTA Low-No Emissions Competitive Program – 5339(c)
- ▶ FTA Bus and Bus Facilities Program – 5339(b)
- ▶ EPA Clean Heavy-Duty Vehicles
- ▶ EPA Community Change Grants
- ▶ CDOT Clean Transit Enterprise
- ▶ Treasury Commercial Clean Vehicle Tax Credit
- ▶ Treasury Alternative Fuel Vehicle Refueling Property Credit
- ▶ OST Rebuilding American Infrastructure with Sustainability and Equity Program
- ▶ OST Reconnecting Communities Program

⁷ Grant funding analysis was based on the 2020-2024 Biden administration. Subsequent administrations may alter how federal funding is awarded and thus funding availability.

To address the remaining \$361 million capital funding gap, financing assumptions were applied beginning in the first year of vehicle procurement for dHEBs (2025) and for BEBs (2030), along with facility upgrades for dHEBs (2025) and BEBs (2026). Total debt service between 2025 and 2056 equals \$611 million based on capital market conditions as of Q4 2024. This reflects a total interest cost of \$234 million over the tenor of the bonds. **Figure 12** shows the annual debt service for 2025 to 2035.

Figure 12: Annual Debt Service 2025–2035 (Millions Year of Expenditure \$)



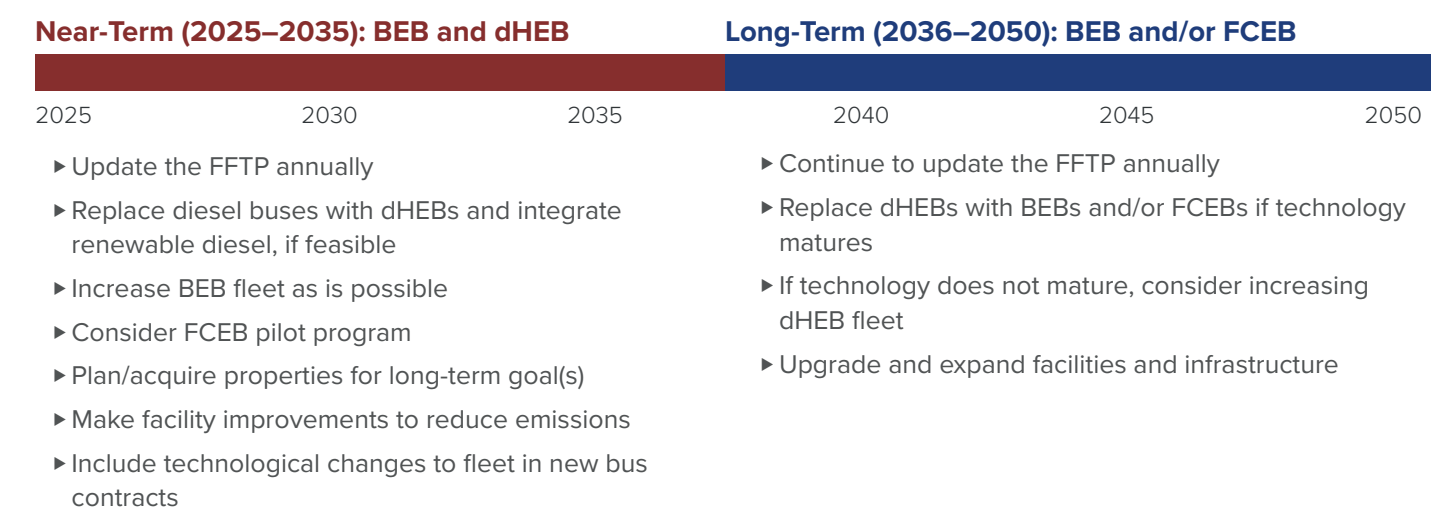
Long-Term Lifecycle Costs and Funding Strategy/ Plan Strategy (2036–2050)

RTD’s long-term strategy considers the option of replacing all retiring vehicles from 2036–2050 with BEBs and/or FCEBs, if the respective fuels/technologies have matured to an appropriate degree. In the long term, RTD may also consider the development of new bus facilities to accommodate the BEB and FCEB scenarios. RTD expects the BEB scenario to be more expensive primarily due to the significant facility upgrade costs, with BEB facility upgrades costing an estimated \$1.51 billion versus \$39 million in facility upgrades for FCEBs. The FCEB advantage of lower facility costs would be somewhat offset by the higher vehicle acquisition costs for FCEBs, with total FCEB purchases estimated to cost \$2.07 billion versus \$1.60 billion in BEB purchases. In total, the BEB scenario is expected to cost \$3.39 billion while the FCEB scenario is expected to cost \$2.44 billion.



Pursuant to the RTD Board’s authorization to evaluate pathways to achieve net ZEs for RTD’s facilities and fleet by 2050, RTD is working to transition its facilities and fleet to low- and/or no-emission fuels/technologies. The FFTP identifies near-term (2025–2035) and long-term (2036–2050) strategies to achieve the 2050 goal as shown on **Figure 13**.

Figure 13: FFTP Near-Term and Long-Term Phasing Strategy



This multi-phased strategy enables RTD to enhance its facilities, transition its fleet to low-and/or no-emission fuels/ technologies, and support workforce development, while also contributing to RTD’s Vision to be the trusted leader in mobility, delivering excellence and value to our customers and community.

