CARB Long-Term Heavy-Duty Investment Strategy

Work Group
July 12, 2023

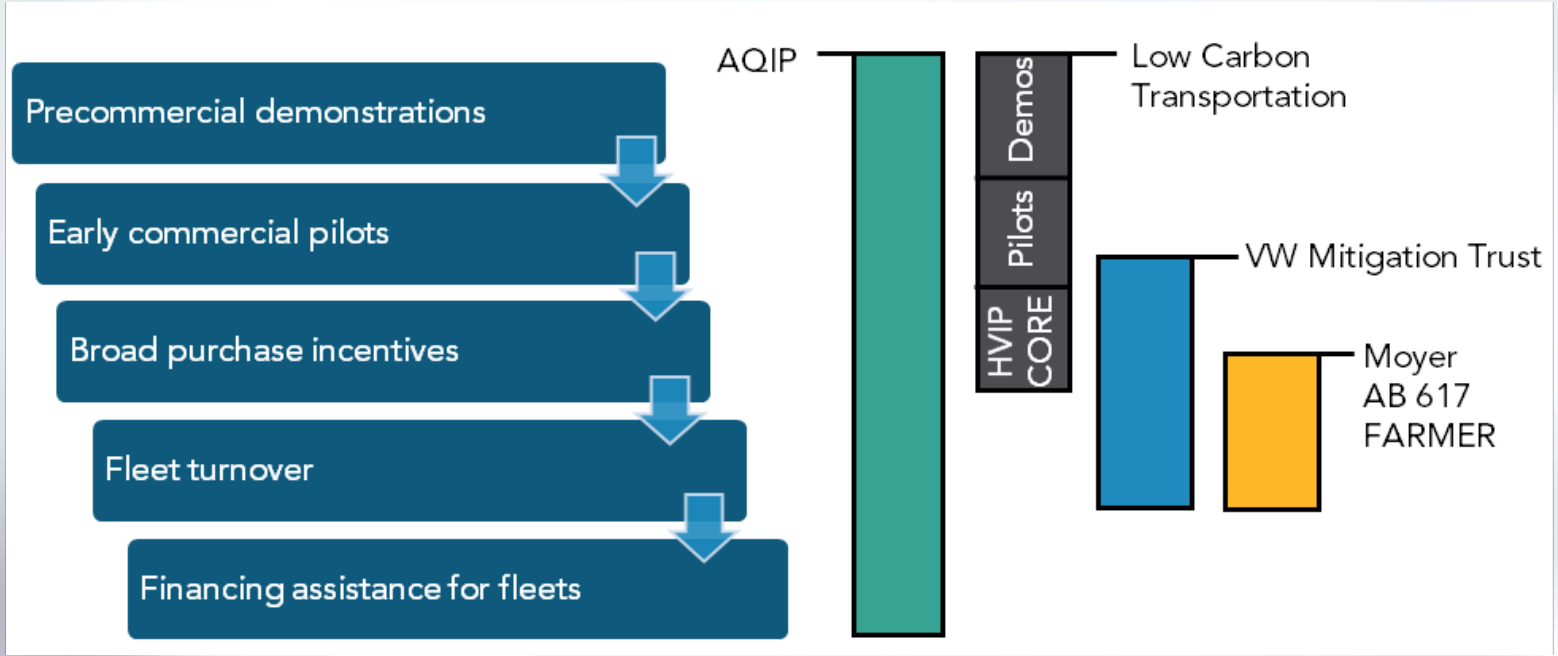
Agenda

- Introductions, Background, and Purpose
- Heavy-Duty Investment Strategy Overview
- Technology Status Updates
- Market Readiness Updates
- Metrics of Success
- Priority Funding Areas
- Industry Examples
- Next Steps

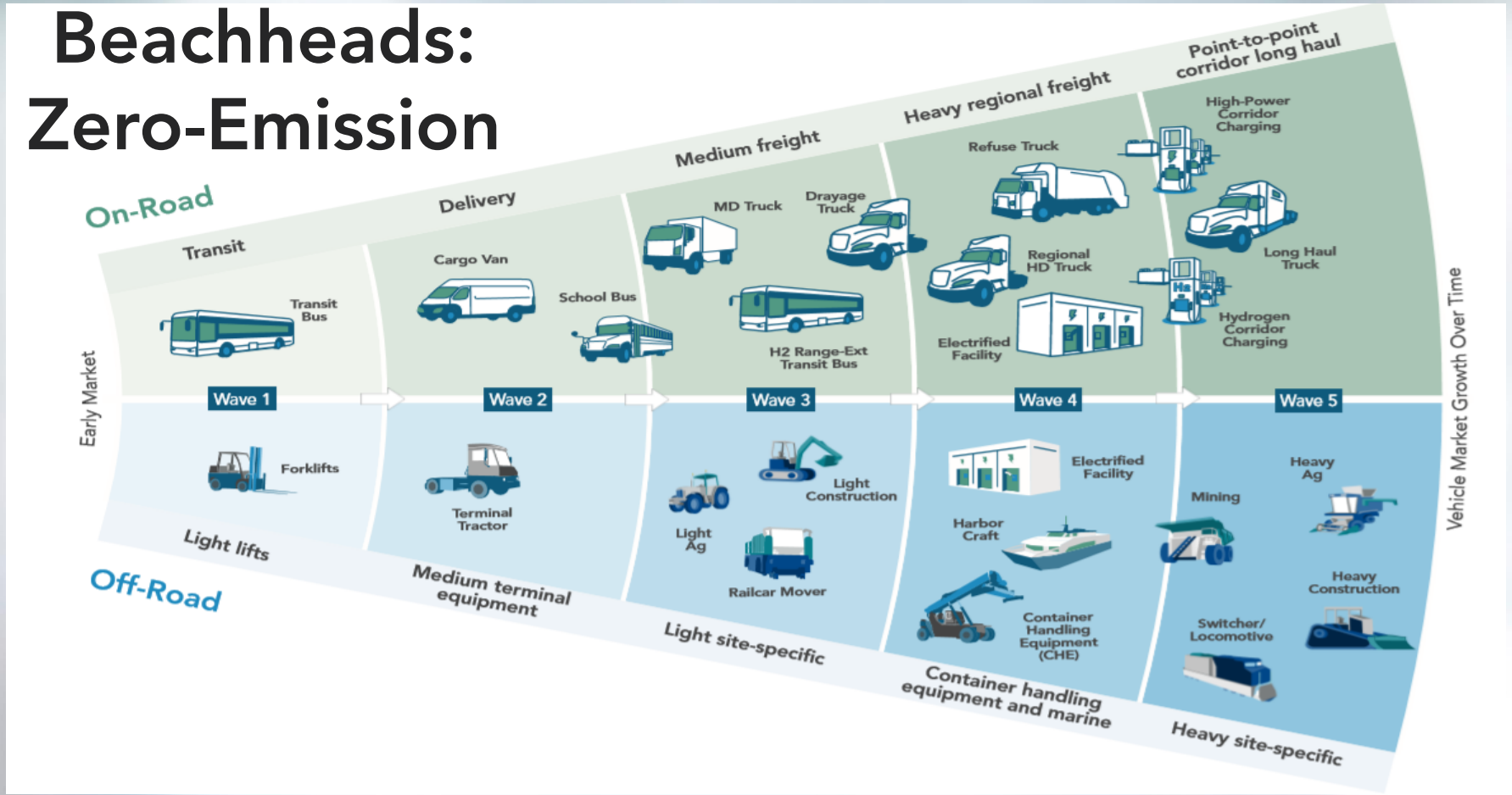
Long-Term Heavy-Duty Investment Strategy

- Annual three-year investment strategy for Clean Transportation Incentives
- Roadmap for transforming the heavy-duty transportation sector
- Outlines priorities for investment
- Focus on equity and small businesses
- Includes annual report on the State's school bus fleet

Heavy-Duty Technology Progression Through CARB Incentive Programs



Beachheads: Zero-Emission



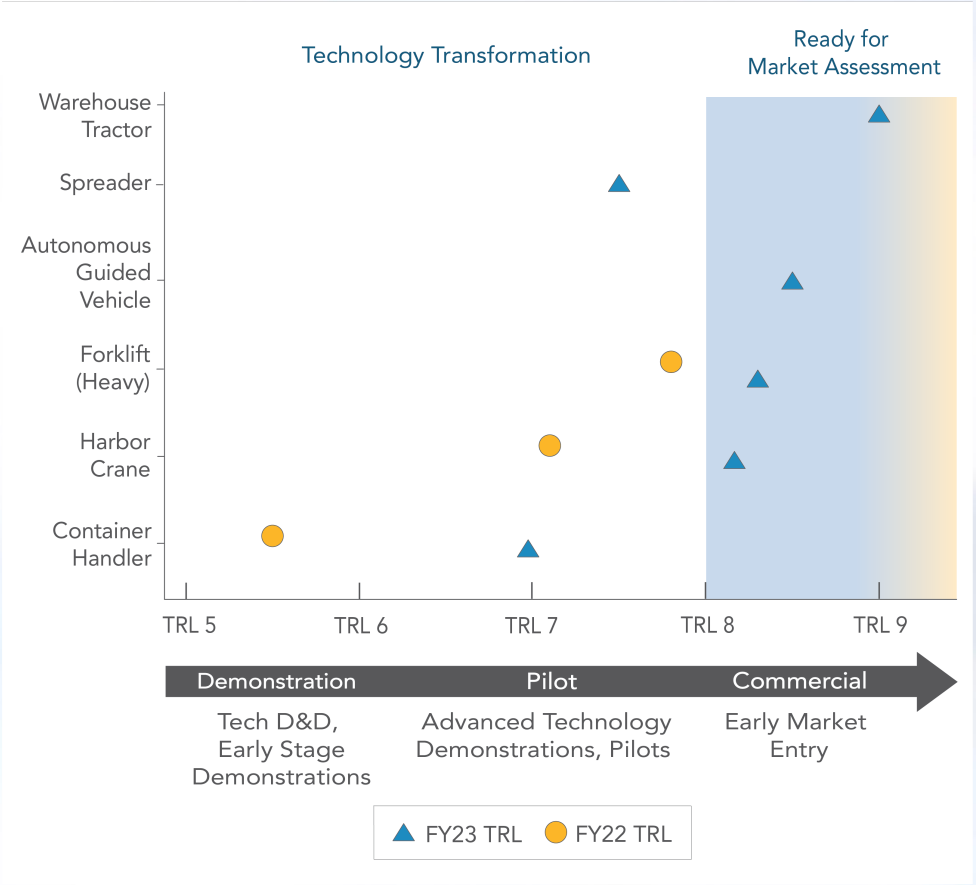
Technology Status Updates

- Tracks progress toward commercialization for each critical pathway and technology category
  - Technology applications characterized by commercialization stage: demonstration, pilot, and commercial
  - Based on “technology readiness levels”
- Complements Market Readiness Indicators

Technology Status Snapshots – On-road BEVs

- All on-road battery-electric vehicle (BEV) platforms have achieved technology readiness (TRL of 8+).
- Beginning with the FY23-24 HD Investment Strategy, platforms that have achieved technology readiness will only be evaluated for market readiness.

Technology Status Snapshots – BE CHE



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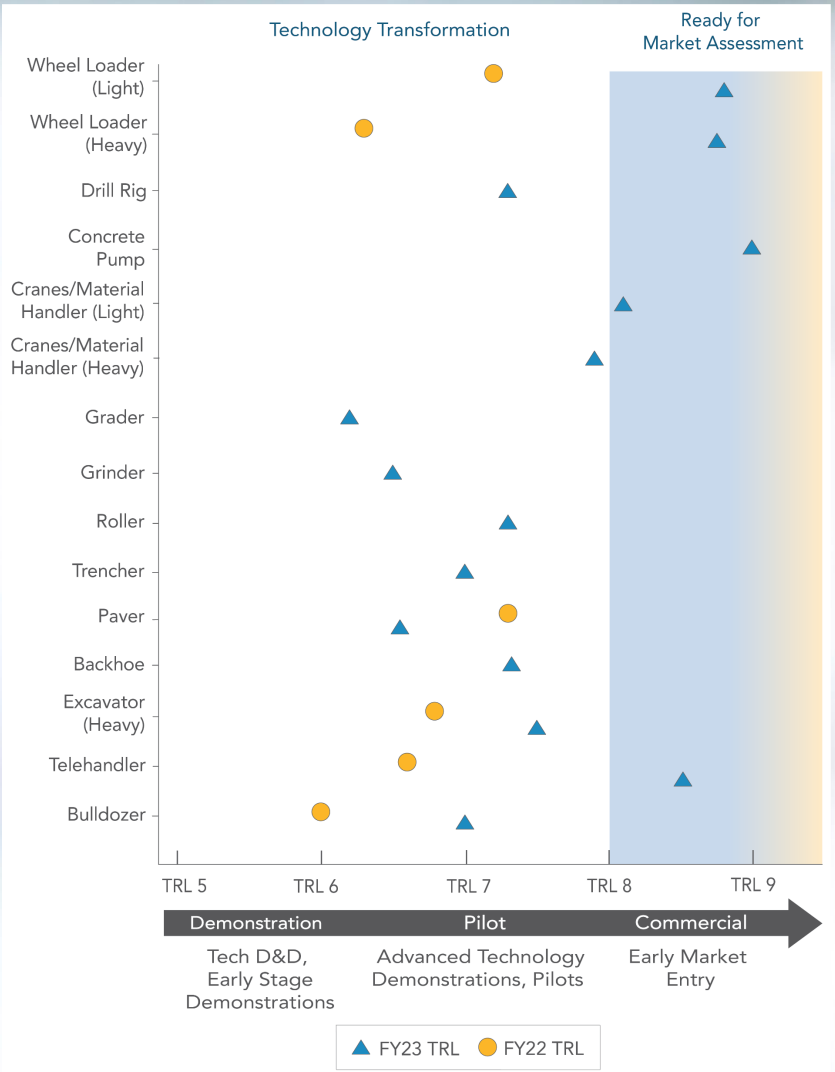
Technology Status Snapshots – BE Construction



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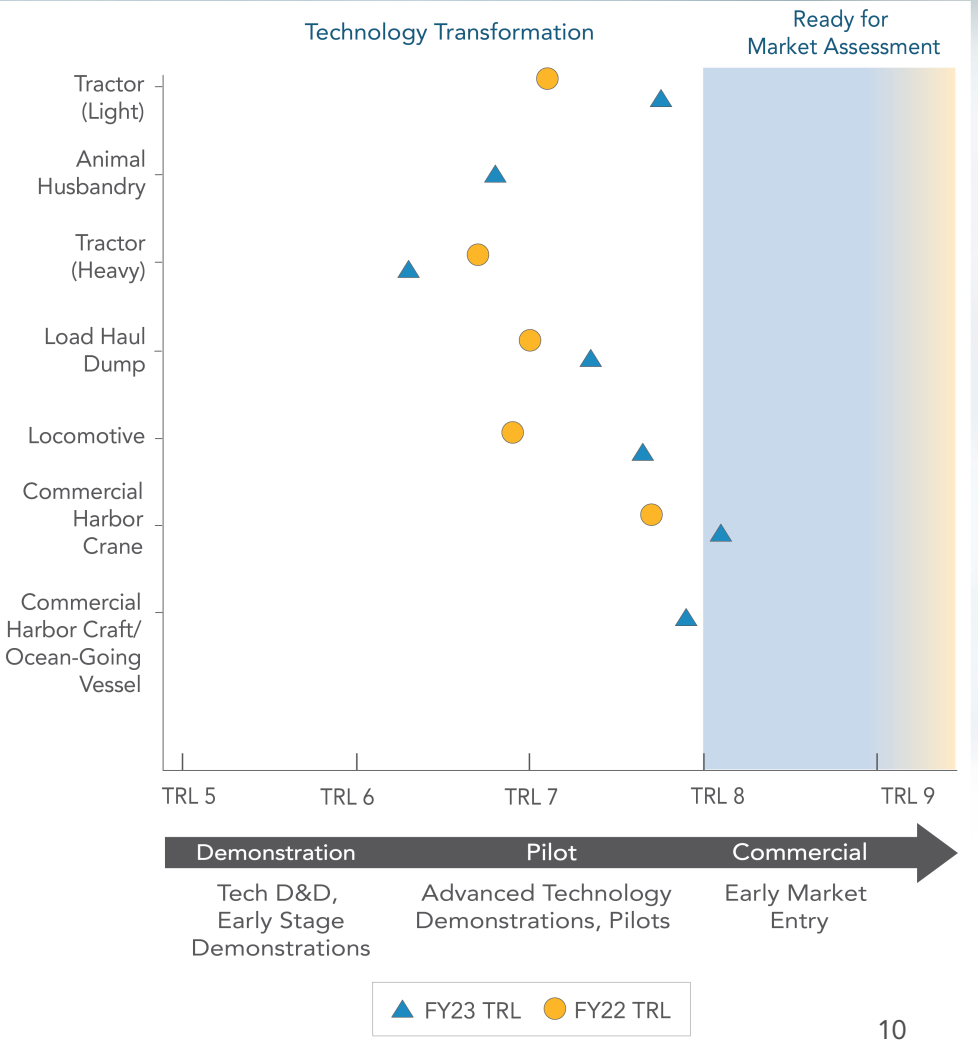
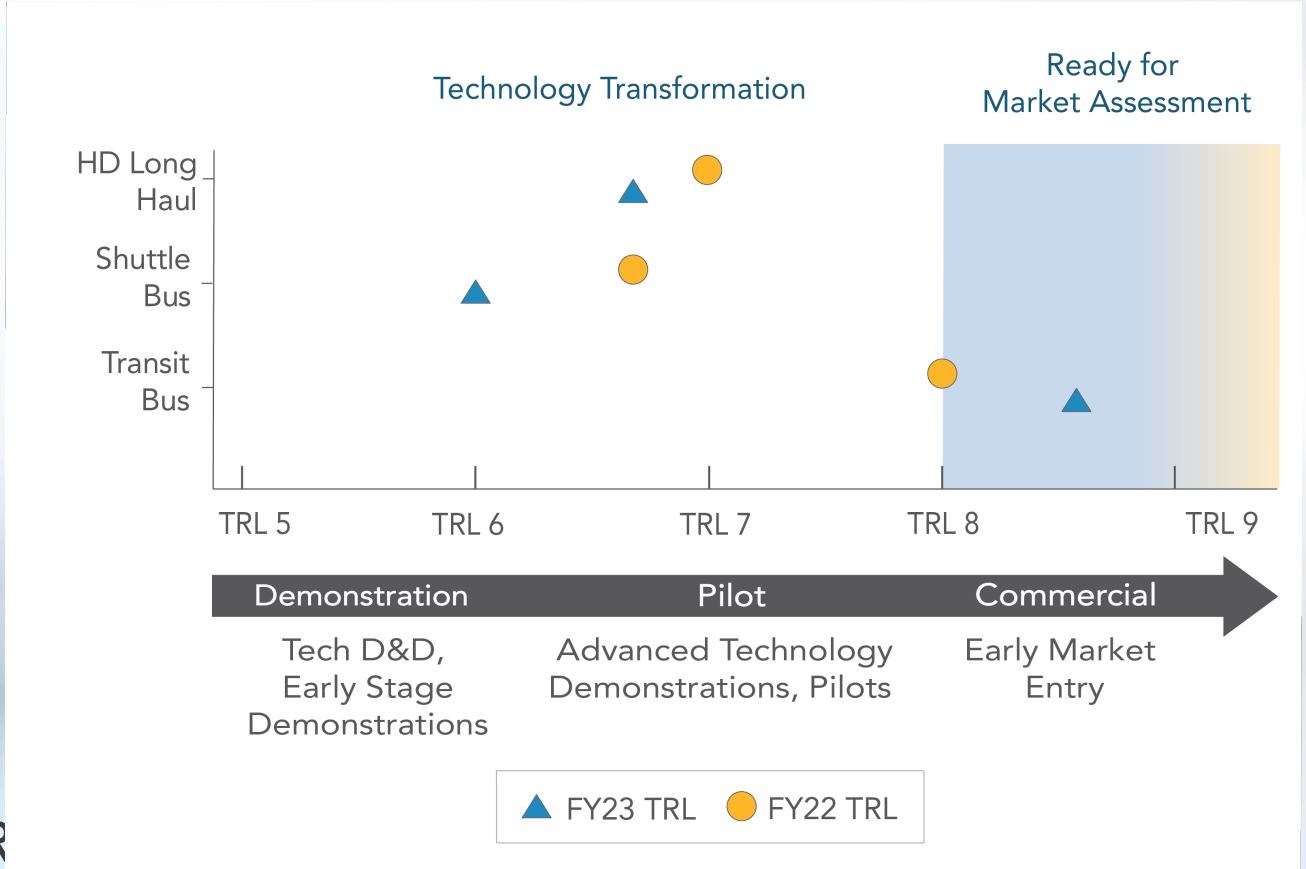
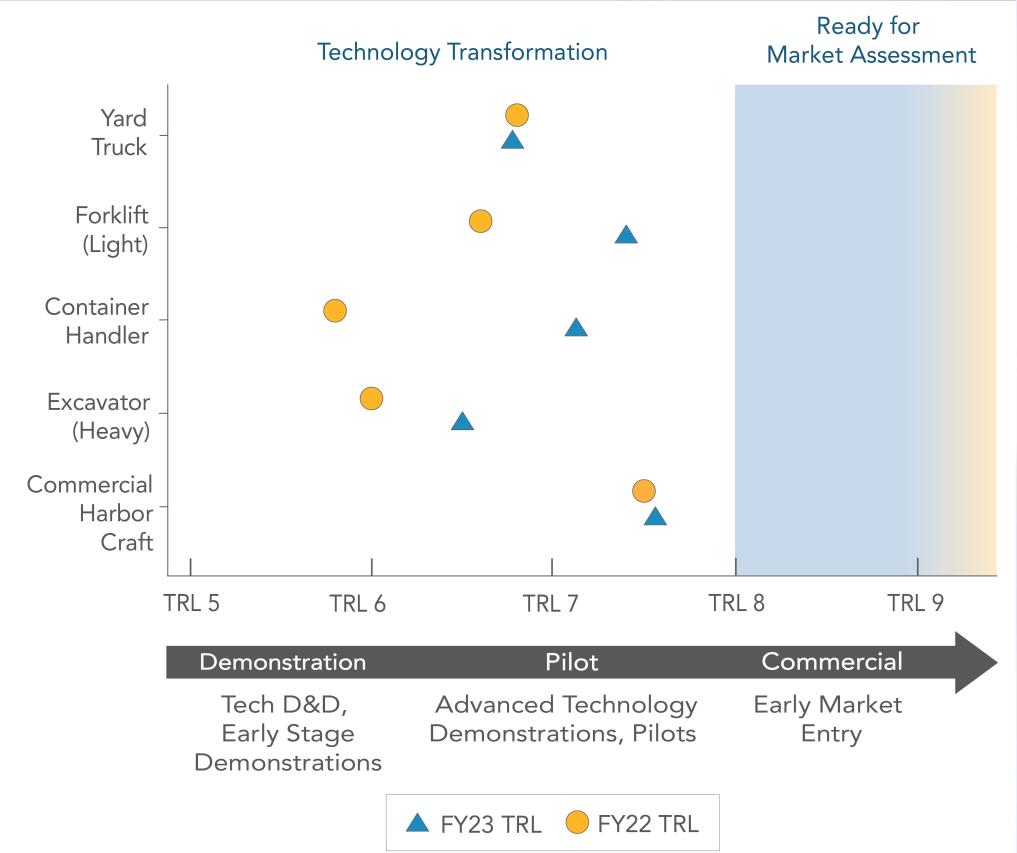
Technology Status Snapshots – BE Other Off-road



Technology Status Snapshots – FC On-road



Technology Status Snapshots – FC Off-road



Market Readiness Indicators

Production Capacity – Is this technology in commercial production, or is it limited to prototypes, retrofits, and upfits? Is commercial production significant?

Cost Parity – Is the total cost of ownership (TCO) of this technology comparable to internal combustion alternatives (without incentives)?

Cost Parity with Incentives – When factoring in available incentive programs (e.g., HVIP, CORE), is the TCO of this technology comparable to internal combustion alternatives?

Duty Cycle Applicability – Can this technology sufficiently meet the range, payload capacity, and power requirements of common duty cycles within this application?

Infrastructure – Is appropriate charging/refueling infrastructure commercially available? Does it face challenges such as cost, permitting, utility connection/coordination, and/or electricity/fuel prices?

Workforce/Service Network – Are professional technicians capable of repairing and/or maintaining ZEVs readily available?

On-Road BEVs Market Readiness Snapshot (2022)

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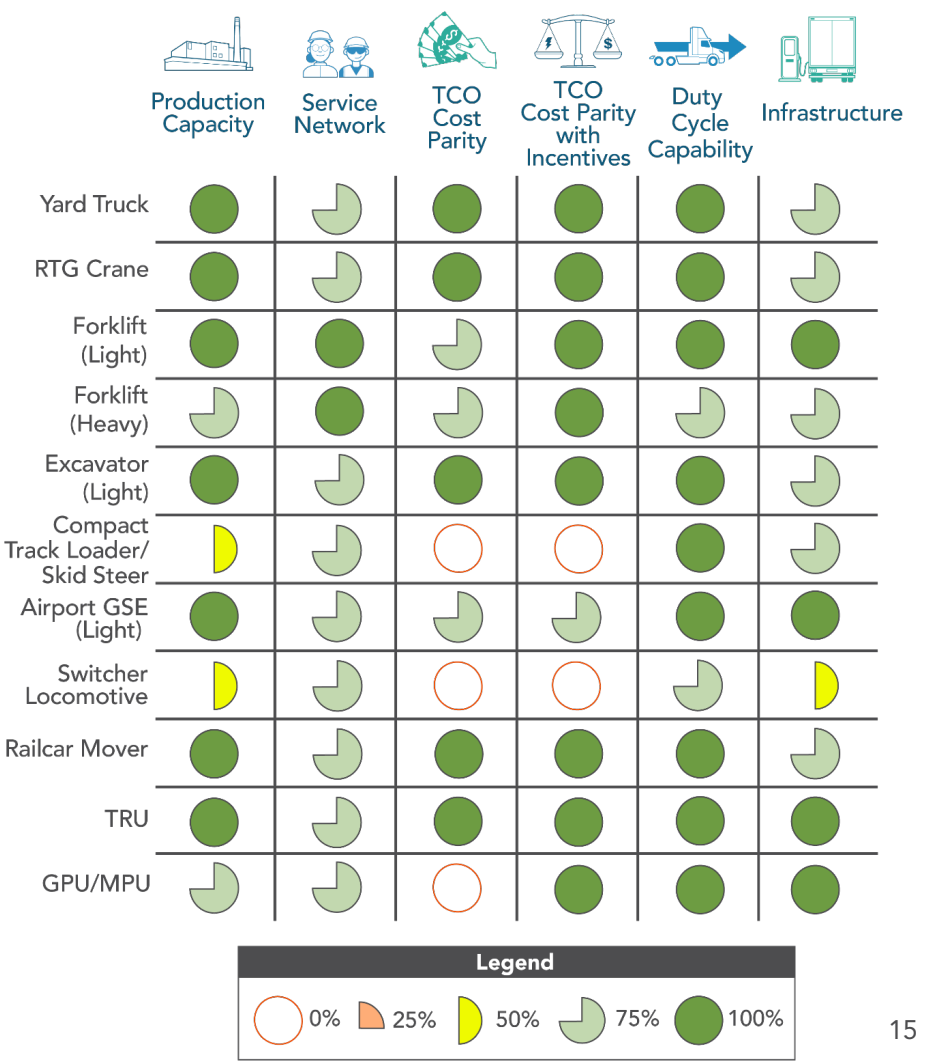
Off-Road BEVs Market Readiness Snapshot (2022)



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Metrics of Success (2022)

Creating Healthy Communities

56 PERCENT

DAC VOUCHERS

Fifty-six percent of vouchers (HVIP and CORE combined) have funded vehicles and equipment deployed in DACs, as identified in CalEnvironScreen 3.0.

41 PERCENT

SMALL AND PUBLIC FLEET SUPPORT

Forty-one percent of 2022 HVIP vouchers were given to public or small fleets (private entities with <$10 million annual revenue or fewer than 50 employees).

Supporting Technology Evolution

15+ THOUSAND

JOBS CREATED

The incentive dollars spent through HVIP have created nearly 3,500 jobs and spurred ~12,000 jobs from private investment, totaling nearly 15,500 jobs.

345 MILLION

MILES TRAVELED

There were 345,000,000 cleaner-than-diesel miles traveled in California by HVIP-funded vehicles between 2010 and 2022.

Growing the Green Economy

320 MODELS

MANUFACTURERS

There are 67 HVIP- and/or CORE -eligible manufacturers offering 321 vehicle or equipment models.

$3.4 BILLION

TOTAL INVESTMENT

Additional public and private spending toward these purchases totaled $3.4 billion--over $3 for every $1 of voucher investment. Leveraged private spending represents purchases redirected from traditional technologies to clean technologies.

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Heavy-Duty Investment Priorities

	FY 2024-25	FY 2025-26	FY 2026-27
Demos	$55-$95 Million Focus: ZE Construction and Mining Equipment, ZE Heavier Cargo Handling Equipment, ZE Line-Haul Rail, ZE Marine, ZE Aviation	$65-$100 Million Focus: ZE Construction and Mining Equipment, ZE Heavier Cargo Handling Equipment, ZE Line-Haul Rail, Emergency and Heavy Specialty Equipment, ZE Aviation	$XX-$XXX Million Focus: ZE Line-Haul Rail, Emergency and Heavy Specialty Equipment, ZE Heavy Aviation
Pilots	$200-$325 Million Focus: ZE Ag-Construction-Heavier Cargo Handling Equipment, ZE/Hybrid Marine, Strategic Range Extenders, ZE Facilities/ Communities/Corridors	$225-$350 Million Focus: ZE Longer Range Trucking, ZE Ag-Construction-Mining-Heavier Cargo Handling Equipment, ZE/Hybrid Marine, Strategic Range Extenders, ZE Facilities/ Communities/Corridors	$XXX-$XXX Million Focus: ZE Longer Range Trucking, ZE Ag-Construction-Heavier Cargo Handling Equipment, ZE/Hybrid Marine, ZE Facilities/Communities/Corridors, ZE Light Aviation
Commercial	1,210-$1,815 Million Focus: ZE Drayage, ZE Long Haul Trucks, ZE School/Transit, ZE Heavier Cargo Handling Equipment, ZE Switcher Rail, ZE/Hybrid Marine, Financing and Insurance Assistance, ePTOs	$1,460-$2,170 Million Focus: ZE Drayage, ZE Long Haul Trucks, ZE School/Transit, ZE Heavier Cargo Handling Equipment, ZE Switcher Rail, ZE/Hybrid Marine, Heavy/Specialty ePTOs	$X,XXX-$X,XXX Million Focus: ZE Drayage, ZE Long Haul Trucks, ZE School/Transit, ZE Heavier Cargo Handling Equipment, ZE Construction and Mining Equipment, ZE Switcher Rail, ZE/Hybrid Marine, Heavy/Specialty ePTOs
Total Funding	$1,465-$2,235 Million*	$1,750-$2,620 Million*	$X,XXX-$X,XXX Million*

Industry Examples – FY22-23

- ZE Trucks Deliver for Drivers Too
- California CORE Expands to Offer New Equipment Types and Models
- Rapid Transit Bus Electrification
- ZE Rail Builds Steam
- Strong Start for ZE TRUs
- Electrification-as-a-Service Business Models Help Fleets Realize Operational Savings of ZEVs Without Upfront Purchase Cost
- California's First Zero-Emission Truck Showcase + Ride and Drive Highlights Plethora of Commercial ZE Truck Options on the Market Today

Potential Industry Examples – FY23-24

- Small fleets (ISEF, Cal Fleet Advisor, loan program, etc.)
- Drayage (port infrastructure, etc.)
- From Pilot to Scale (e.g., Frito Lay Modesto ZANZEFF project)
- Temporary/mobile charging infrastructure
- Coordination between HVIP & EnergIIZE
- Refuse (2R initiative)
- Fresno Ride & Drive (June ‘23)

Next Steps

- Second work group TBA
- Funding Plan and Heavy-Duty Investment Strategy posted in October

Contact Us

Matt Williams
Matthew.Williams@arb.ca.gov

April Schmitz
April.Schmitz@arb.ca.gov

Jason Crow– Manager
Jason.Crow@arb.ca.gov

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