



Metro

*Los Angeles County Metropolitan Transportation Authority
One Gateway Plaza
3rd Floor Board Room*

Agenda - Final

Wednesday, March 22, 2023

2:00 PM

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Advanced Transit Vehicle Consortium

*Karen Bass / Doug Mensman (Chair)
Ara Najarian (Vice Chair)
Kathryn Barger / Dave Perry
Michael Cacciotti*

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(ALSO APPLIES TO BOARD COMMITTEES)

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Notwithstanding the foregoing, and in accordance with the Brown Act, this agenda does not provide an opportunity for members of the public to address the Board on any Consent Calendar agenda item that has already been considered by a Committee, composed exclusively of members of the Board, at a public meeting wherein all interested members of the public were afforded the opportunity to address the Committee on the item, before or during the Committee's consideration of the item, and which has not been substantially changed since the Committee heard the item.

In accordance with State Law (Brown Act), all matters to be acted on by the MTA Board must be posted at least 72 hours prior to the Board meeting. In case of emergency, or when a subject matter arises subsequent to the posting of the agenda, upon making certain findings, the Board may act on an item that is not on the posted agenda.

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- a. Disorderly behavior toward the Board or any member of the staff thereof, tending to interrupt the due and orderly course of said meeting.
- b. A breach of the peace, boisterous conduct or violent disturbance, tending to interrupt the due and orderly course of said meeting.
- c. Disobedience of any lawful order of the Chair, which shall include an order to be seated or to refrain from addressing the Board; and
- d. Any other unlawful interference with the due and orderly course of said meeting.

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Requests can also be sent to boardclerk@metro.net.



323.466.3876

x2 *Español (Spanish)*

x3 *中文 (Chinese)*

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x6 *日本語 (Japanese)*

x7 *русский (Russian)*

x8 *Հայերէն (Armenian)*

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The Committee Meeting begins at 2:00 PM Pacific Time on March 22, 2023; you may join the call 5 minutes prior to the start of the meeting.

Dial-in: 888-251-2949 and enter
English Access Code: 8231160#
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Public comment will be taken as the Board takes up each item. To give public comment on an item, enter #2 (pound-two) when prompted. Please note that the live video feed lags about 30 seconds behind the actual meeting. There is no lag on the public comment dial-in line.

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La Reunion de la Junta comienza a las 2:00 PM, hora del Pacifico, el 22 de Marzo de 2023. Puedes unirse a la llamada 5 minutos antes del comienzo de la junta.

Marque: 888-251-2949 y ingrese el codigo
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Please include the Item # in your comment and your position of "FOR," "AGAINST," "GENERAL COMMENT," or "ITEM NEEDS MORE CONSIDERATION."
Email: BoardClerk@metro.net
Post Office Mail:
Board Administration
One Gateway Plaza
MS: 99-3-1
Los Angeles, CA 90012

CALL TO ORDER

ROLL CALL

1. **SUBJECT: MINUTES** [2023-0181](#)

RECOMMENDATION

APPROVE Minutes of Meeting held December 8, 2022.

Attachments: [ATVC Minutes - December 8, 2022](#)

2. **SUBJECT: ORAL REPORT ON ZEB MASTER PLAN UPDATE** [2023-0093](#)

RECOMMENDATION

RECEIVE oral report on ZEB Master Plan Update.

Attachments: [Presentation](#)

3. **SUBJECT: ZEB ALTERNATIVE DELIVERY PROJECT SCOPE
DEFINITION** [2023-0189](#)

RECOMMENDATION

RECEIVE oral report on ZEB Alternative Delivery Project Scope Definition.

Attachments: [Presentation](#)

- SUBJECT: GENERAL PUBLIC COMMENT** [2023-0209](#)

RECEIVE General Public Comment

Adjournment

Consideration of items not on the posted agenda, including: items to be presented and (if requested) referred to staff; items to be placed on the agenda for action at a future meeting of the Committee or Board; and/or items requiring immediate action because of an emergency situation or where the need to take immediate action came to the attention of the Committee subsequent to the posting of the agenda.



Metro

Los Angeles County
Metropolitan Transportation
Authority
One Gateway Plaza
3rd Floor Board Room
Los Angeles, CA

Board Report

File #: 2023-0181, **File Type:** Minutes

Agenda Number: 1.

**ADVANCED TRANSIT VEHICLE CONSORTIUM
MARCH 22, 2023**

SUBJECT: MINUTES

RECOMMENDATION

APPROVE Minutes of Meeting held December 8, 2022.

ADVANCED TRANSIT VEHICLE CONSORTIUM

Los Angeles County Metropolitan Transportation Authority
(Meeting will be virtual only)

December 8, 2022

10:00 a.m.

MINUTES

**Regular Board Meeting
ATVC Board of Directors**

Virtual Meeting

Called to Order at: 10:00 A.M

Directors Present:

Doug Mensman (Chair)
Ara Najarian
Dave Perry
Ben Benoit

Officers

Conan Cheung, President
Jess Montes, Vice President
Nalini Ahuja, Chief Financial Officer
Collette Langston, Board Clerk

1) APPROVED minutes of Board Meeting held March 1, 2018.

BB	AJN	DM (CHAIR)	DP
A	Y	Y	Y

2) NOMINATED and VOTED for Ara Najarian for the vacancy of Vice Chair.

BB	AJN	DM (CHAIR)	DP
A	Y	Y	Y

3) RECEIVED Lessons Learned from Municipal Operators

Martin Tompkins, Executive Director/CEO of Antelope Valley Transit Authority (AVTA), gave a detailed presentation on AVTA's electric fleet. A main key point is that working with the service providers while formulating their plan proved to be highly beneficial. Additionally, confirming that operators and technicians are fully trained before implementation was advantageous.

Doren Barnes, CEO of Foothill Transit, presented on their hydrogen and electric fleet. The transition to hydrogen from CNG has shown to be easier and does not require the Foothill Transit to rethink how they do business. Transitioning to electric required a bit more thought process change due to concerns regarding whether batteries would be fully charged and where the charging stations would be located.

BB	AJN	DM (CHAIR)	DP
P	P	P	P

BB = B. Benoit	DM = D. Mensman	AJN = A.J. Najarian	DP = D. Perry
LEGEND: Y = YES, N = NO, C = CONFLICT, ABS = ABSTAIN, A = ABSENT, P = PRESENT			

4) RECEIVED LA Metro ZEB Program Update

- CARB ICT Requirements
- Metro ZEB Resolution
- Approach for Transition
- Technology Options Considered
- G & J Line Status
- Challenges & Lessons Learned

BB	AJN	DM (CHAIR)	DP
P	P	P	P

5) RECEIVED LA Metro ZEB Delivery Options

- Battery Electric Buses
- Hydrogen Fuel Cell Buses
- Alternative Delivery Options

BB	AJN	DM (CHAIR)	DP
A	P	P	P

6) RECEIVED LA Metro ZEB Funding Secured to Date

BB	AJN	DM (CHAIR)	DP
A	P	P	P

7) RECEIVED Next Steps

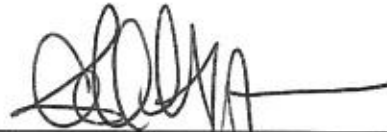
- New Solicitation for ZEB's & Chargers
- Collaboration with OSI on Alternative Delivery Method
- Evaluate Optimum Program Delivery Plan

BB	AJN	DM (CHAIR)	DP
A	P	P	P

Next meeting will be scheduled for April 2023.

ADJOURNED AT 12:00 P.M.

Prepared by: Jessica Vasquez Gamez
Administrative Analyst, Board Administration



Collette Langston, Board Clerk



Board Report

File #: 2023-0093, **File Type:** Motion / Motion Response

Agenda Number: 2.

**ADVANCED TRANSIT VEHICLE CONSORTIUM
MARCH 22, 2023**

SUBJECT: ORAL REPORT ON ZEB MASTER PLAN UPDATE

ACTION: ORAL REPORT

RECOMMENDATION

RECEIVE oral report on ZEB Master Plan Update.

EQUITY PLATFORM

Operations collaborates with the Office of Equity and Race to identify and mitigate any concerns to ensure equitable outcomes relative to service.

Prepared by: Jesus Montes, Senior Executive Officer, Vehicle Acquisition,
(213) 418-3277
David Faulk, Deputy Executive Officer, Vehicle Engineering & Acquisitions, (213)
922-3293

Reviewed by: Conan Cheung, Chief Operations Officer, (213) 418-3034

Stephanie N. Wiggins
Chief Executive Officer



ZEB Master Plan Update

Advanced Transit
Vehicle Consortium (ATVC)
Board Briefing

March 2023

Contents

- BACKGROUND
- ACHIEVEMENTS
- LESSONS LEARNED
- CHALLENGES
- ZEB FUNDING SECURED TO DATE
- NEXT STEPS



California Innovative Clean Transit (ICT) Regulation

- Adopted in December 2018
- Requires all public transit agencies to gradually transition to a 100 percent zero-emission bus (ZEB) fleet.
- Beginning in 2029, 100% of new purchases by transit agencies must be ZEBs, with a goal for full transition by 2040.
- A ZEB Rollout Plan is required from each transit agency, approved by its Board, to show how it is planning to achieve a full transition to zero-emission technologies by 2040.

Source: California Air Resources Board

Metro's ZEB Board Resolution

File #: 2017-
0525

REVISED
REGULAR BOARD MEETING
JULY 27, 2017

Motion by:

**DIRECTORS BONIN, GARCETTI, NAJARIAN, HAHN and SOLIS
AS AMENDED BY SOLIS, KUEHL and BARGER**

FRIENDLY AMENDMENT BY FASANA

July 27, 2017

Strategic Plan for Metro's Transition to Zero Emission Buses

LA Metro has developed a comprehensive plan to deliver a complete transition to zero emission electric buses by 2030. The transition plan is contingent on two primary factors: continuous advancements in electric bus technology (which must increase range, reduce bus weights, reduce charging times, extend battery life cycles), as well as a drop in prices as the technology develops.

G Line Electrification

- January 2021 – Start of 100% Electrified Service
- 40 New Flyer Xcelsior artics (320kWh battery capacity)
- 3 million miles accumulated
- En-Route Charging
 - Opportunity chargers deployed at 3 locations on route
 - Four 450kWh and four 600kWh Siemens opportunity “fast” chargers
- Depot Charging
 - Ten 150kWh depot chargers also installed at D8



J Line Service

Infrastructure In Progress – completion by Fall 2025:

- Design anticipate to be completed April 2023, construction complete by Fall 2025.
 - El Monte Transit Center (EMTC):
 - 4 Opportunity (450kWh) chargers
 - Division 9:
 - 125 depot chargers (40 x 150kWh chargers for 120 parking spots)
 - 3 “Fuel Lane” rapid chargers (450 kWh) + 2 portable units
 - Harbor Gateway Transit Center (HGTC):
 - 5 Opportunity chargers
 - Construction starts in April 2023, provisions for charging masts complete by Fall 2023
 - Division 18:
 - 71 depot chargers for 223 parking spots
 - 5 rapid chargers
 - 60% Design completed, anticipate Design Build procurement to be issued Summer 2023



J Line Service - Buses

Ordered:

- 100 40-foot Buses Ordered from BYD (K9M)
- 5 60-foot Articulated Buses Ordered from BYD (K11M)

Deployed:

- 4 40-foot BEBs (BYD K9M) currently in service
- 1 40-foot BEB (BYD K9M) scheduled for deployment Summer 2023
- 5 60-foot BEBs (BYD K11M) articulated buses scheduled for deployment Summer 2023

Pending Delivery

- 95 40-foot BEBs (BYD K9MD) scheduled for delivery Winter 2023 through Winter 2024

J Line Service

Temporary Chargers – 2023 through 2025

- Acquisition planning for temporary chargers under development
 - Target deployment date Fall 2023
- Limited Service Currently Underway
 - 4 40-foot BYD K9M buses
- Projected Service
 - 1 additional 40-foot BYD K9M bus by Summer 2023
 - 5 60-foot BYD K11M buses by Summer 2023
 - 95 additional 40-foot BYD K9MD buses starting delivery in Winter 2023 to Winter 2024

Other Accomplishments

- 145 BEBs ordered: one of largest BEB procurements to date in CA/USA.
- 44 BEBs in service, and by end of 2023, largest BEB fleet in US
- In January 2023, the Metro Board authorized RFP for procurement of up to 1,000 more BEBs and associated charging infrastructure
- \$413.1 million in additional ZEB-related federal and state grant funding to date, including one of the largest Low-Emission/No-Emission grants in this federal program's history (\$104.1 million awarded in 2022)
- Significant investments in workforce development including \$4.96 million in grant funding for training
- Incorporate Manufacturing careers policy and advanced BEB training for operators and maintainers

Funding Secured to Date

GRANT TYPE	AMOUNT	PURPOSE	SCHEDULE			
			Original Award	Allocate By	Award a Contract by	Fully Spent By
STIP-RIP	19,132,000	buses & charging infrastructure	12/19/2019	6/30/2023	12/30/2023	12/30/2026
STIP-RIP	17,096,000	buses		6/30/2023	6/30/2024	6/30/2027
STP-RIP	500,000	charging infrastructure		6/30/2024	12/31/2024	12/31/2027
STIP-RIP	40,749,000	buses		6/30/2025	12/31/2025	12/31/2028
CRRSAA-STIP	38,189,000	charging infrastructure		6/30/2023	12/31/2023	12/31/2026
TIRCP	159,100,000	Div 9/18/J Line buses & charging infrastructure	7/7/2022	6/30/2025	12/31/2025	12/31/2028
LCTOP	39,098,039	Charging Infrastructure	7/1/2020			
FTA LoNo	104,200,000	Div 9/18 buses & charging infrastructure. \$4.96 mil. workforce development set-aside at post-completion.	8/15/2022	9/30/2025		
ALL GRANTS	413,064,039					

Technology Lessons Learned



Technology Still Nascent – And Expensive

- ZEBs and Charging Equipment sensitive to heat/overtemperature
- Diagnostic tools for failure investigations not mature



Technical Support Is Not Local

- Most expertise is abroad
- Response times are long



Electric Grid Is Fragile

- Risk of black/brown-outs during high energy usage
- Utilities under pressure

**Technical
Challenges
to Meeting
2030 Goal**

Challenges

- Performance
- Utility/Grid
- Costs



Performance Challenges

- Range issues from still immature technology, requiring more buses or opportunity chargers
- Potential cost overruns due to earlier adoption (more buses, more infrastructure)

Performance
in 2020's
remains
insufficiently
developed

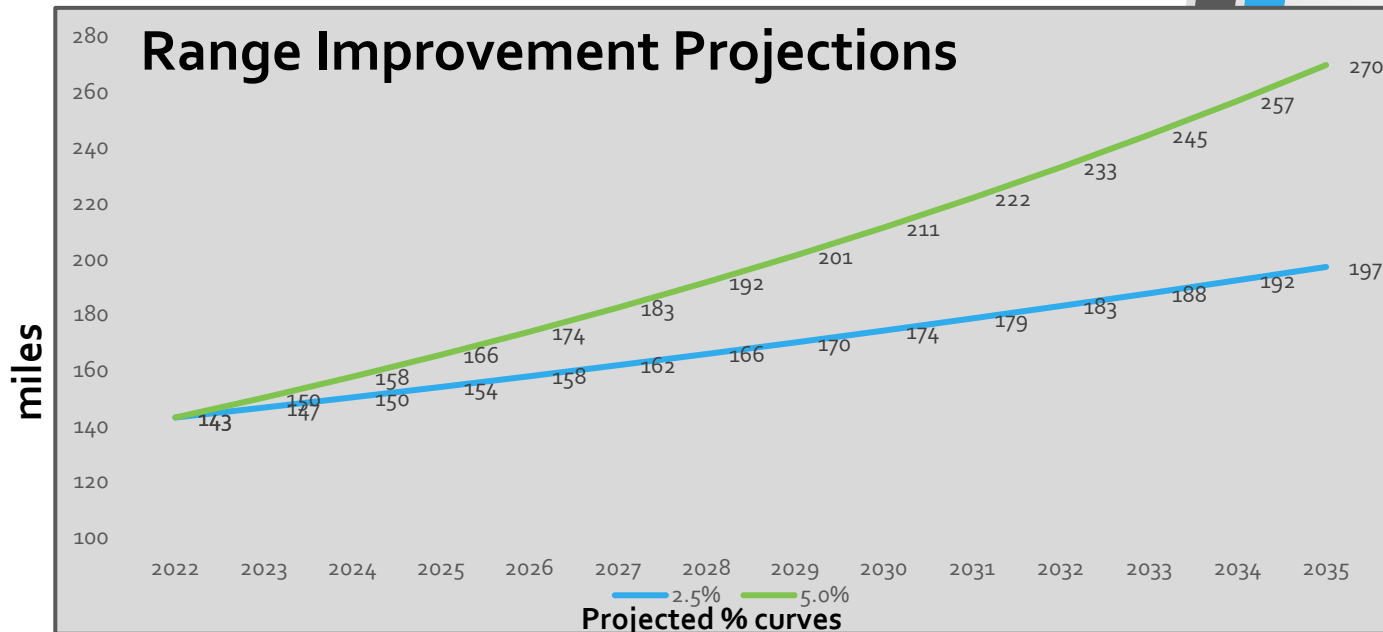


Performance Challenges

Technology Advancement in relation to a 2035 Transition:

- As BEB range improves, Metro will come close to parity with CNG – resulting in fewer opportunity chargers
- 2035 allows for more time for needed LADWP/SCE improvements
- Supply chain, labor and technical support issues should abate by 2035

Post-2030
Technology
Improvement
Trends Affords
Future Program
Opportunities



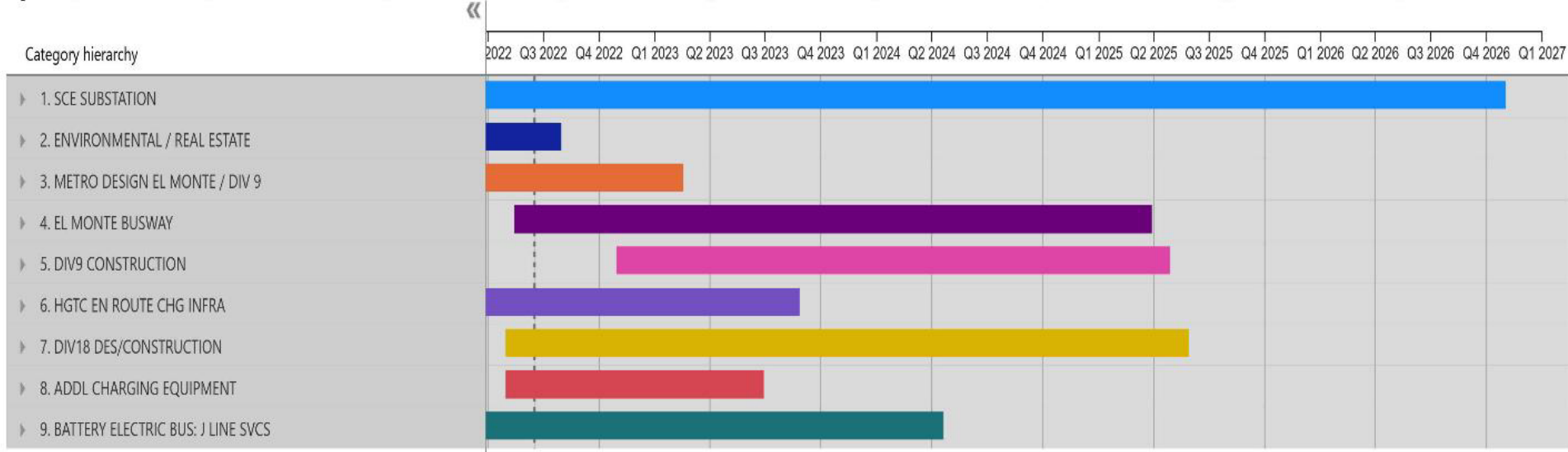
Utility/Grid Challenges

- Grid Capacity is limited, additional capacity requires 3-7 years
- Grid is fragile – frequent brown/blackouts, resilience strategies under development

Utility / Grid Improvements

Draft Concept Plan: J Line (Silverline) Infrastructure and Bus Delivery

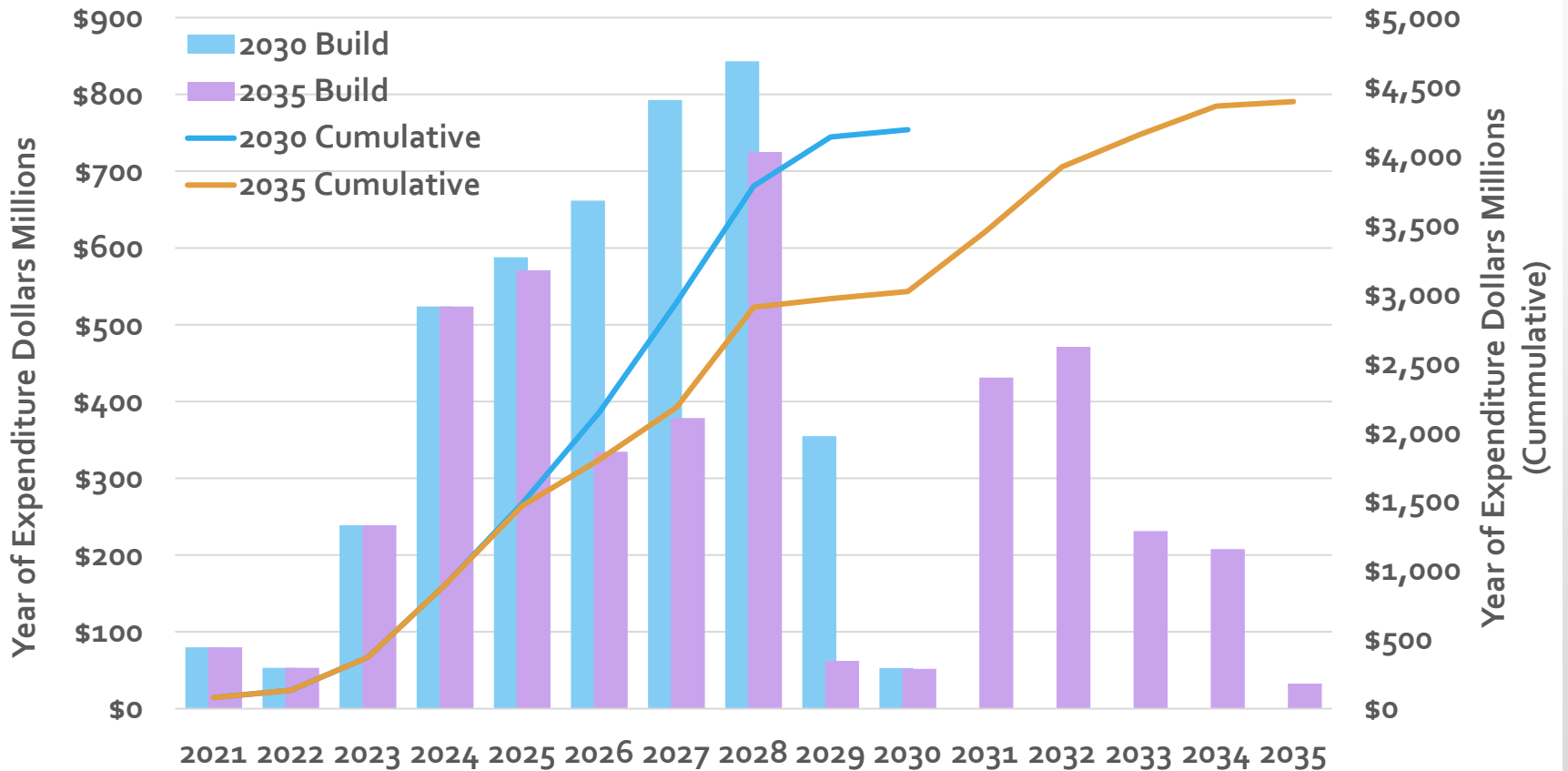
Legend: 1. SCE SUBSTATION 2. ENVIRONMENTAL / REAL ESTATE 3. METRO DESIGN EL MONTE / DIV 9 4. EL MONTE BUSWAY 5. DIV9 CONSTRUCTION 6. HGTC EN ROUTE CHG INFRA 7. DIV18 DES/CONSTRUCTION 8. ADDL CHARGING EQUIPMENT 9. BATTERY ELECTRIC BUS: J LINE SVCS



Cost Challenges

2030 and 2035 – Cashflow Differences

Capital Costs



Cost Challenges

Annual Capital Costs – 2030 versus 2035

Program Capital Expenditures (YOE millions)	2030 Goal	2035 Goal
Vehicle Purchase Price	\$2,996	\$3,145
Modifications & Contingency	\$363	\$381
Charging/Fueling Infrastructure	\$830	\$867
Total Capital Costs	\$4,189	\$4,392
Average Annual Capital Costs	\$598	\$366

Summary

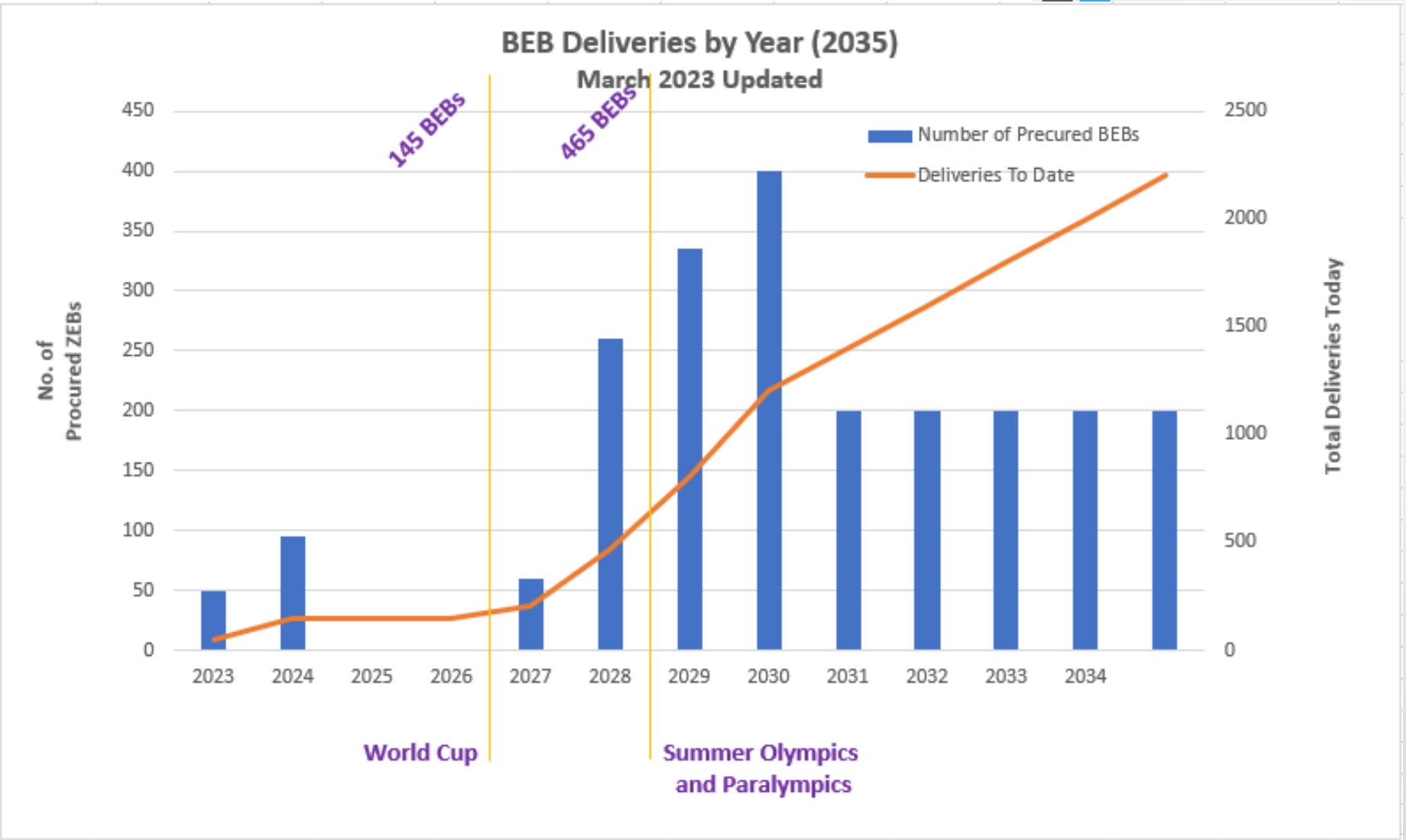
An additional five transition years:

- Gives utilities additional upgrades time to ensure Metro has needed grid capacity and reliability at divisions
- Better capitalizes on technological advancement
 - Potential cost savings due to a reduced need for infrastructure
 - Savings could be as high as \$119 million based on preliminary analysis
- Lower average annual capital cost



Summary

Summary



- Worldcup estimate of Bus availability is 145 Buses
- Olympics estimate of Bus Availability is 365-465 Buses



NEXT STEPS

- New Solicitation for ZEB's & Chargers
- Collaboration with OSI on Alternative Delivery Method



DISCUSSION

Questions?



File #: 2023-0189, File Type: Oral Report / Presentation

Agenda Number: 3.

**ADVANCED TRANSIT VEHICLE CONSORTIUM
MARCH 22, 2023**

SUBJECT: ZEB ALTERNATIVE DELIVERY PROJECT SCOPE DEFINITION

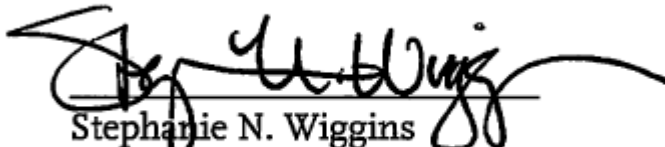
ACTION: ORAL REPORT

RECOMMENDATION

RECEIVE oral report on ZEB Alternative Delivery Project Scope Definition.

Prepared by: Shaun Miller, Senior Manager, Transportation Planning (Interim), (213) 922-4952

Reviewed by: Seleta Reynolds, Chief Innovation Officer, (213) 922-4098



Stephanie N. Wiggins
Chief Executive Officer



ZEB Program Alternative Delivery

Pre-Procurement Work Plan Project Scope

Definition

March 2023



Today's Agenda

1. ZEB Ecosystem & Service Delivery Models
2. Pre-Procurement Work Plan Status
3. Project Scope Definition Workshop Objectives & Takeaways
4. Opportunities and Risks of Including Vehicles in the Bundle
5. Project Scope Recommendation
6. Proposed Next Steps

Appendix: Alternative Delivery Project Division Bundle Selection Criteria

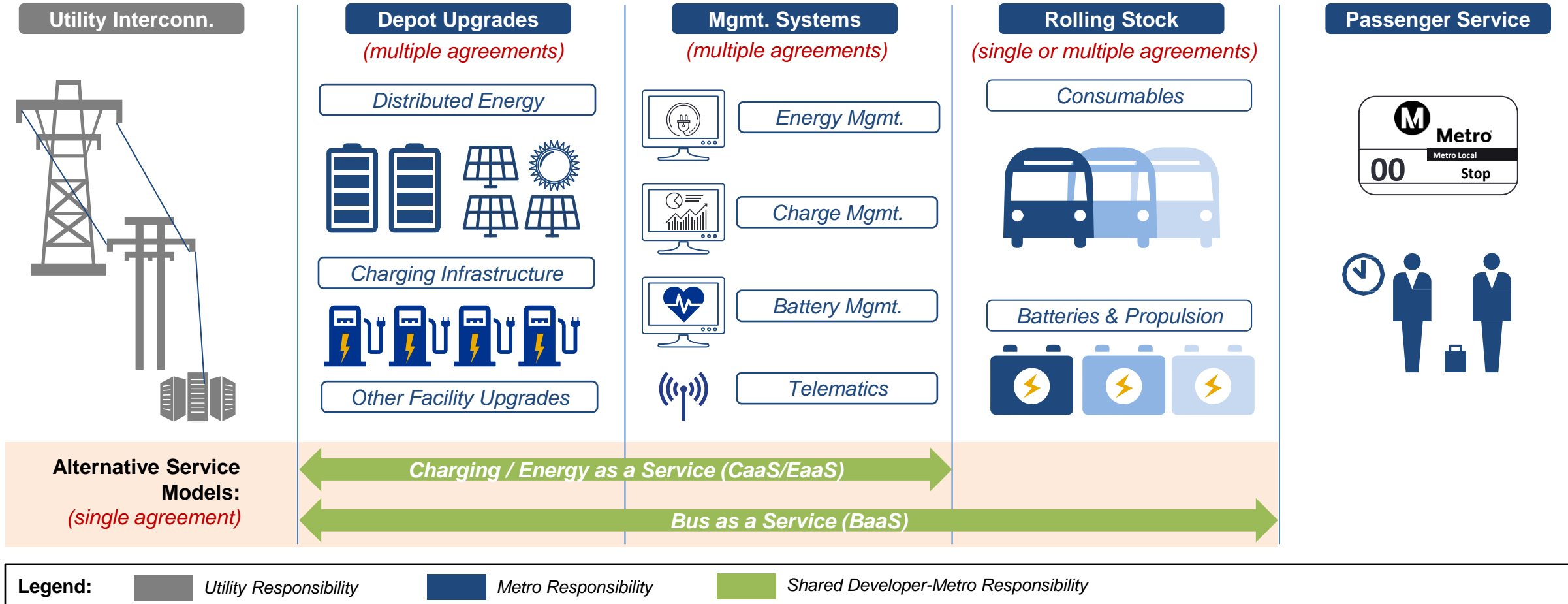


01

ZEB Ecosystem & Service Delivery Models

An Examination of the ZEB Ecosystem & Alternative Service Models

The Alternative Delivery Working Group (ADWG) examined the current ZEB ecosystem to develop a holistic view of the program's development and identify opportunities for alternative delivery to mitigate risks through service-based models, performance-based contracting, or collaborative delivery:





02

Pre-Procurement Work Plan Status

Pre-Procurement Work Plan Timeline





03

Project Scope Definition Workshop Objectives & Takeaways

Project Scope Definition Workshop Objectives & Takeaways

The project scope definition phase of the Work Plan began in November and OSI, Operations, and relevant subject matter experts within the ADWG completed a series of workshops across five project areas:

- 1. Division Bundle**
- 2. Facilities Assets & Management Systems**
- 3. Vehicle & Fleet Assets**
- 4. Utility Coordination**
- 5. Service Planning & Continuity of Service**

04

Opportunities and Risks of Including Vehicles



Opportunities & Risks by Including the Buses in the Bundle

- **Align vendor incentives (mitigate schedule delivery mismatch)**
 - Mitigates schedule delivery mismatch between vehicles and chargers
 - **Risk:** *Creates single critical path for ZEB transition (and aggregates delay risk)*
 - Pays for vehicles only when ready to receive them
 - Mitigates bus/charger/systems integration risk and upgrades throughout period of performance
- **Single vehicle contract (instead of three contracts of ~250 vehicles each)**
 - Potential economy of scale at acquisition
 - **Risk:** *Limited and challenged U.S. bus market due to Buy America & manufacturing capacity*
 - Size of the purchase could incentivize participation from non-U.S. based OEMs
 - Vehicle uniformity across the fleet and potential improved O&M performance
 - **Risk:** *Bet on future performance of a single OEM (requires extensive qualifications-based selection)*
 - Reduced agency administrative burden
- **Turnkey solution and single point of contact for full ZEB ecosystem**
 - Expands options for vehicle procurement
 - **Risk:** *Similar projects in implementation are international (though strong U.S. market interest)*



05

Project Scope Recommendation

Alternative Delivery Project Scope Recommendation

- **Division Bundles:** Proceed with Divisions 15, 13, 3 and 5 in the alternative delivery bundle as they best fit the selection criteria and minimize third-party challenges (e.g. SHPO, SCE, City of LA, etc.)
 - **Division 3** 630 W Ave 28, Los Angeles
 - **Division 5** 5425 S Van Ness Ave Los Angeles
 - **Division 13** 920 N Vignes St, Los Angeles
 - **Division 15** 11900 Branford St, Sun Valley
- Selection criteria included the current ZEB transition sequence, equity considerations, capital cost, utility territory, site quality, solar / energy storage potential, etc. *A list of the Alternative Delivery Project Division Bundle selection criteria can be found in the Appendix.*
- **Facilities Assets & Management Systems:** Include a general scope for facilities and technology assets from the meter to the vehicle (e.g. structures, DERs, management systems, charging equipment, etc.) to deliver the full CaaS ecosystem and ensure a single investment and intervention. Balance SGR upgrades and non-revenue / employee charging against cost/benefit.
- **Vehicles & Fleet Assets:** Include vehicles for further examination under the alternative delivery scope

Alternative Delivery Project Scope Recommendation Continued

- **Utility Coordination:** A key risk and schedule driver for the whole program (not only for alternative delivery). Develop programmatic utility engagement strategy (i.e. inter-agency MOU)
- **Service Planning Impacts & Continuity of Service:** Engage Service Development at least one year prior to commencement of construction to ensure temporary service plan ready six months prior

06

Next Steps



ZEB Alternative Delivery Pre-Procurement Work Plan Next Steps

- Advance to next phase of the Work
 - Frame-out general parameters of the CaaS Developer scope
 - Frame-out procurement approach for a collaborative process to engage a Developer
 - Develop alternative delivery options assessment that outlines scope and procurement strategies
 - Develop procurement options assuming vehicles included while retaining off-ramps
 - Estimate project costs and payments associated with alternative delivery options
- Advance utility strategy to streamline coordination with LADWP, prepare project-level agreement, and execute prior to any procurement
- Investigate CEQA permitting requirements and develop compliance strategy prior to any procurement



A

Appendix: Alternative Delivery Project Division Bundle Selection Criteria

Alternative Delivery Project Division Bundle Selection Criteria

- The following evaluation criteria were identified to select the preferred Division bundle (with potential backup locations) among remaining Divisions (1 / 2 / 3 / 5 / 7 / 13 / 15):

1. *Current transition sequencing / delivery schedule*
2. *DACs & equity consideration/priority*
3. *Capital costs*
4. *Utility territory*
5. *Utility coordination anticipated lead time*
6. *Available power & Utility upgrade needs (anticipated loads at Division)*
7. *Solar potential at Division location*
8. *DER readiness / real estate needs for solar/storage*
9. *ZEB fleet size / service out of Division*
10. *Site quality*
11. *Environmental approvals / permitting needed*
12. *Dependency on other Divisions during transition*
13. *Service impacts during construction*
14. *Construction optimization/complexity opportunity*
15. *Design Progress*
16. *O&M optimization/complexity opportunity*
17. *On-route charging needs*
18. *On-site labor / Metro functions at each Division*
19. *Co-location potential for other Metro functions*