San Francisco Bay Ferry

WATER EMERGENCY TRANSPORTATION AUTHORITY

Seamus Murphy
Executive Director

San Francisco Bay Ferry
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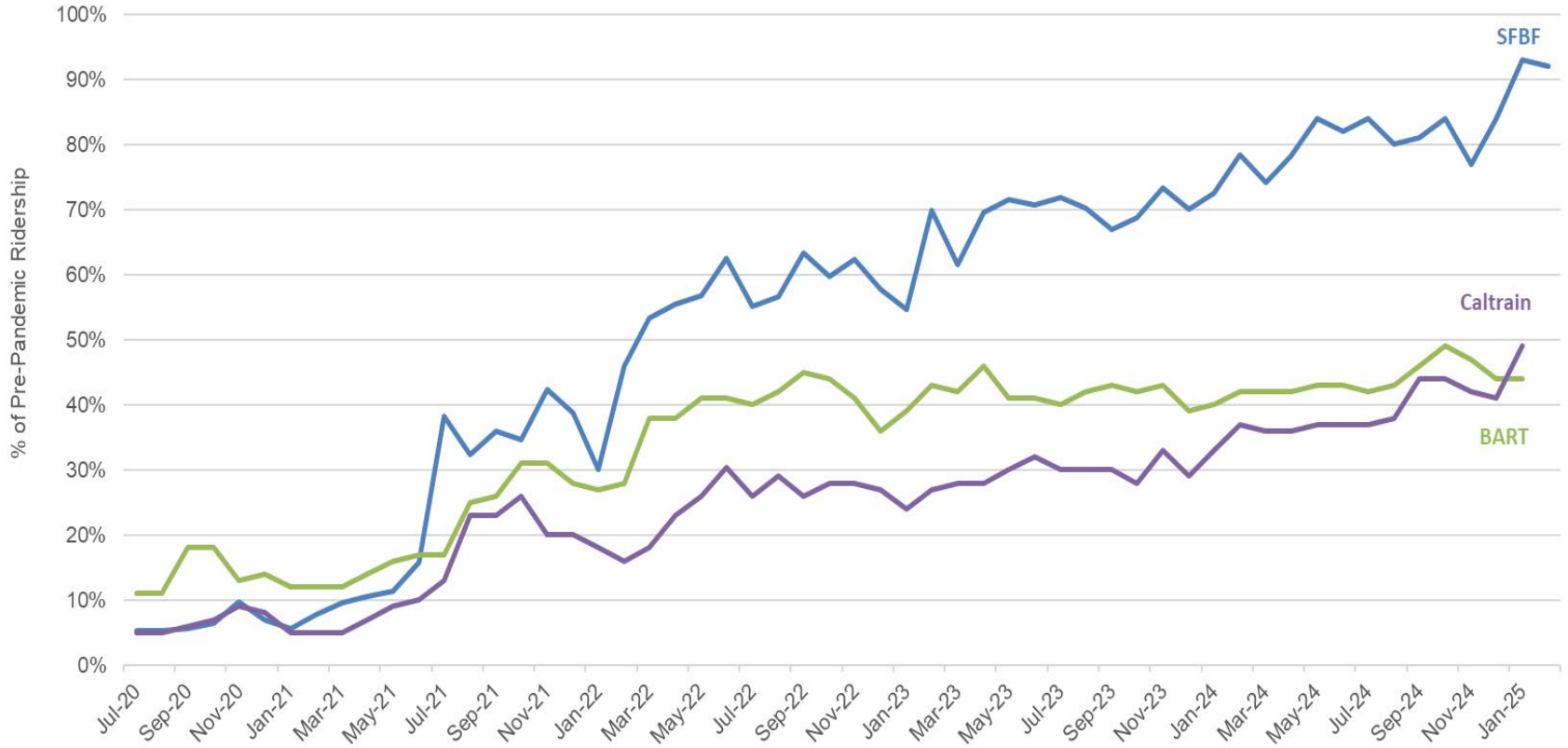
Overview

- Formed by State Legislature in1999
- Five member Board of Directors (3 Governor, 1 Assembly, 1 Senate)
- Tasked with operating and expanding Bay Area ferry service and managing waterborne emergency response
- Growing Ridership base: Anticipate 3 million riders this Fiscal Year
- 7 routes, 8 terminal,19 vessels (5 under construction)

Ridership Recovery

Revised service and fare structure in July 2021:

- Increased frequencies
- Closed gaps in service schedule to accommodate off-peak travel
- 30% fare reduction to align with other public transit options within same travel corridor



100% recovery of pre-covid ridership as of FY 25/26
98% customer satisfaction - highest in U.S.

Rapid Electric Emission-free Ferry (REEF) Program

Zero-Emission Transition

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- Cleanest ferry system in the US
- Global progress, US lagging
- Scarce regional operating funds
- Regulation
- Expansion
- Historic capital funding levels
- Highest-rated US transit service
- Environmental Justice

2025	18	11	3.5 M
2050	35	21	6.0 M

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SF Bay Ferry CARB Compliance Plan

CALIFORNIA AIR RESOURCES BOARD

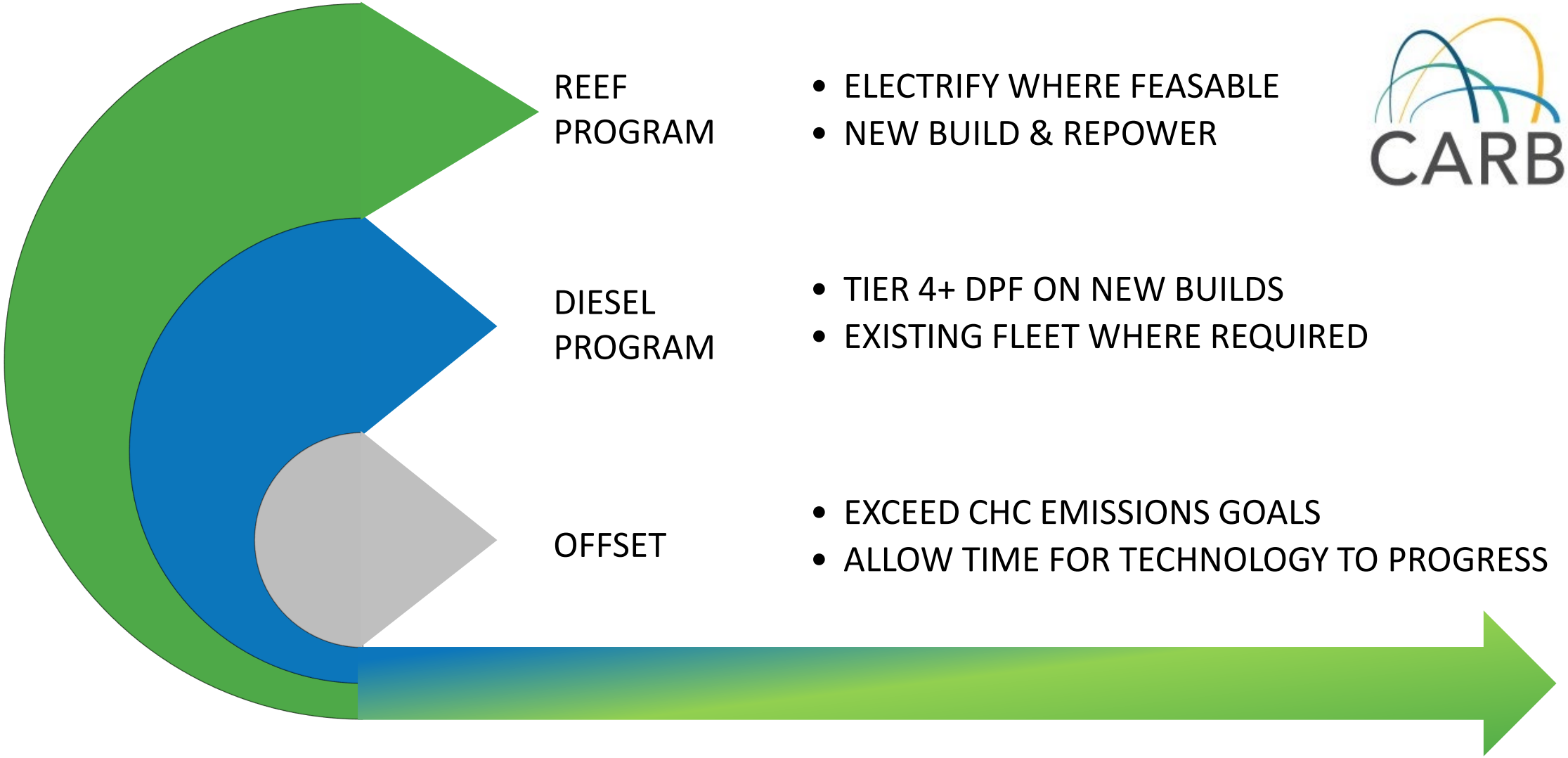
Gavin Newsom, Governor
Yana Garcia, CalEPA Secretary
Liane M. Randolph, Chair

March 6, 2025

CARB staff has reviewed WETA's ACE plan proposal and the public comments received. The E.O. has determined that the proposed ACE plan meets the criteria in California Code of Regulations, title 17, section 93118.5 (f)(1)., and approves WETA's ACE plan. This approval is the final action of the ACE application public process.

WETA's ACE Plan uses two AECS, Zero-Emission and Advanced Technology (ZEAT) deployment in vessel categories where the technology for ZEAT is not required, and fleet averaging. WETA's ACE plan proposal demonstrates equivalent or greater emissions reductions than WETA's nominal compliance baseline. The nominal compliance baseline is the emissions calculated from an applicant's direct compliance with subsections (e)(10), (e)(12), and (e)(13) for the time period of January 1, 2023, through December 31, 2034.

ALTERNATIVE CONTROL OF EMISSIONS (ACE) PLAN



REEF PROGRAM

- ELECTRIFY WHERE FEASABLE
- NEW BUILD & REPOWER

DIESEL PROGRAM

- TIER 4+ DPF ON NEW BUILDS
- EXISTING FLEET WHERE REQUIRED

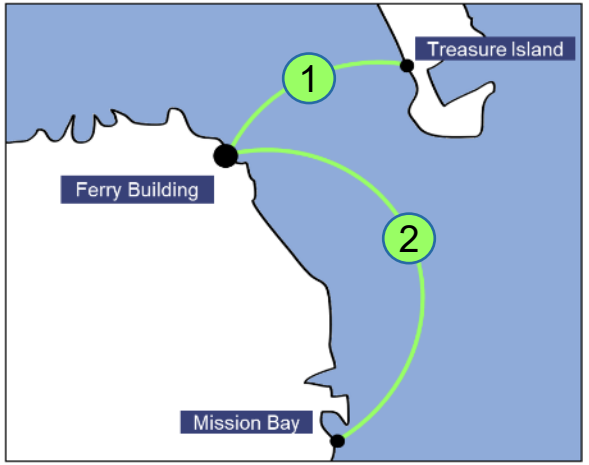
OFFSET

- EXCEED CHC EMISSIONS GOALS
- ALLOW TIME FOR TECHNOLOGY TO PROGRESS

Without the REEF Program we would have to repower or replace 90% of our fleet

Phased Transition

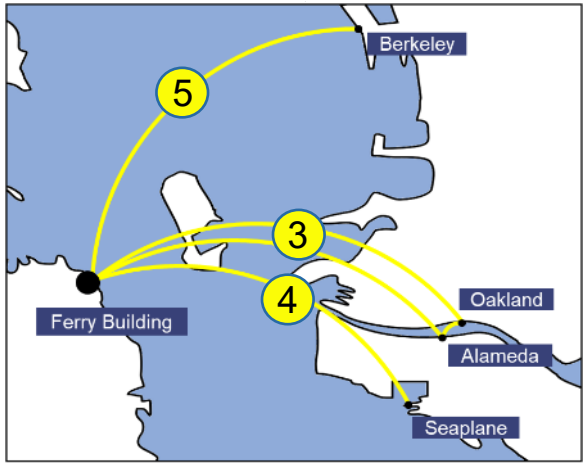
Phase 1 - Inner Central Bay



1 Treasure Island

2 Mission Bay

Phase 2 – Central Bay

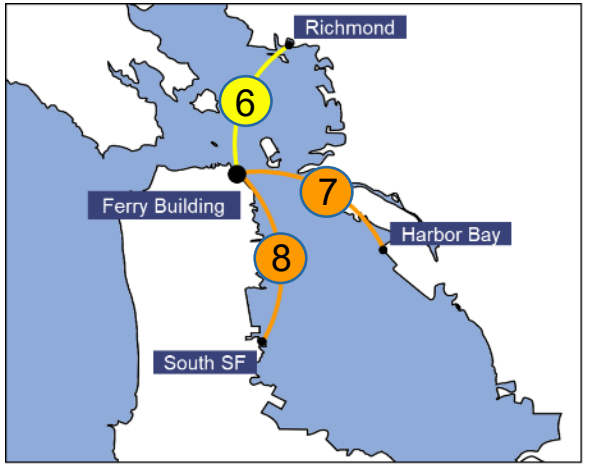


3 Oakland/Alameda

4 Seaplane

5 Berkeley

Phase 3 – Long Run Central Bay

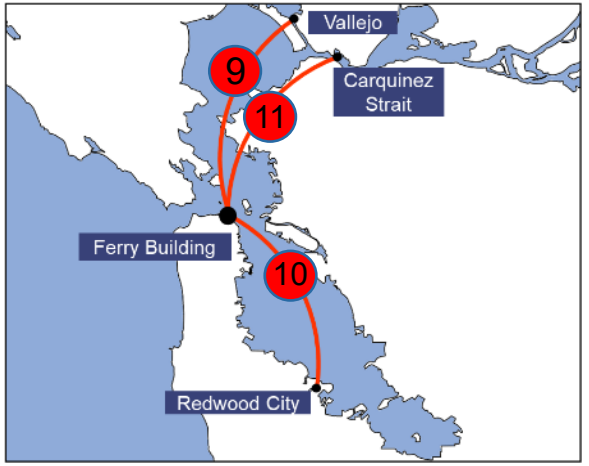


6 Richmond

7 Harbor Bay

8 South SF

Phase 4 – Long Runs



9 Vallejo

10 Redwood City

11 Carquinez

Feasible with Current Vessel Technology

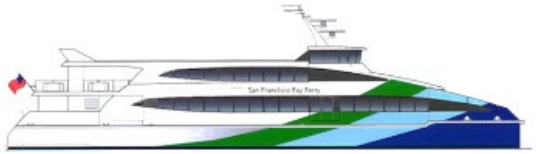
Feasible with Current Vessel Technology - Operational Changes Required

Feasible with Current Vessel Technology - Significant Operational Changes Required

Not Currently Feasible – TBD Future Technology Required

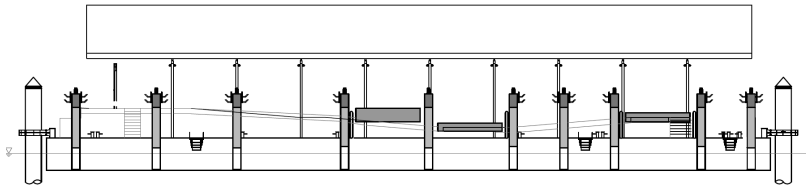
Project Overview

"Transition ferry operations on San Francisco Bay to zero-emission vessels"



6 x NEW & Converted Large Vessels

10 x NEW & Converted Medium Vessels



12 x NEW & Converted Charging Floats

5 x NEW Small Vessels

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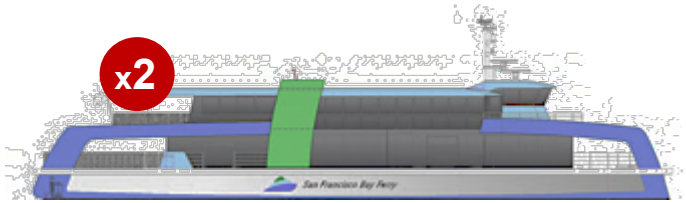
Zero-Emission Transition Funding Secured: $252M

- Federal - $131.9M
  - EPA Clean Ports
  - FTA Passenger Ferry Grant Program
  - FTA 5307/5339 formula funds
  - DOT Carbon Reduction Program
- State - $76.9M
  - Transit Intercity Rail Capital Program
  - State Transit Assistance
  - Low Carbon Transit Operations Program
  - CEC Clean Transportation Program
  - VW Mitigation Funding
- Regional - $43M
  - Regional Measure 1, 2 & 3 Bridge Tolls
  - AB 664
  - Alameda County Measure BB

NEW 150 PAX Vessels



NEW 400 PAX Vessels

CONVERTED 400 PAX Vessel

NEW & CONVERTED Charging Floats

Electrification Phases 1&2

- 150-passenger battery electric ferries
  - Up to three vessels
  - $46.3M - Awarded to All American Marine, Bellingham, WA.
  - First expected early 2027
- 400-passenger battery electric ferries
  - Up to two vessels
  - $59.5M - Awarded to Nichols Bros., Seattle WA.
  - First expected early 2027
- 400-passenger battery electric ferries
  - One vessel
  - Conversion commencing 2026
- Universal Charging Floats
  - Up to three battery floats
  - $47M - Awarded to JT Marine of Vancouver WA in October 2025

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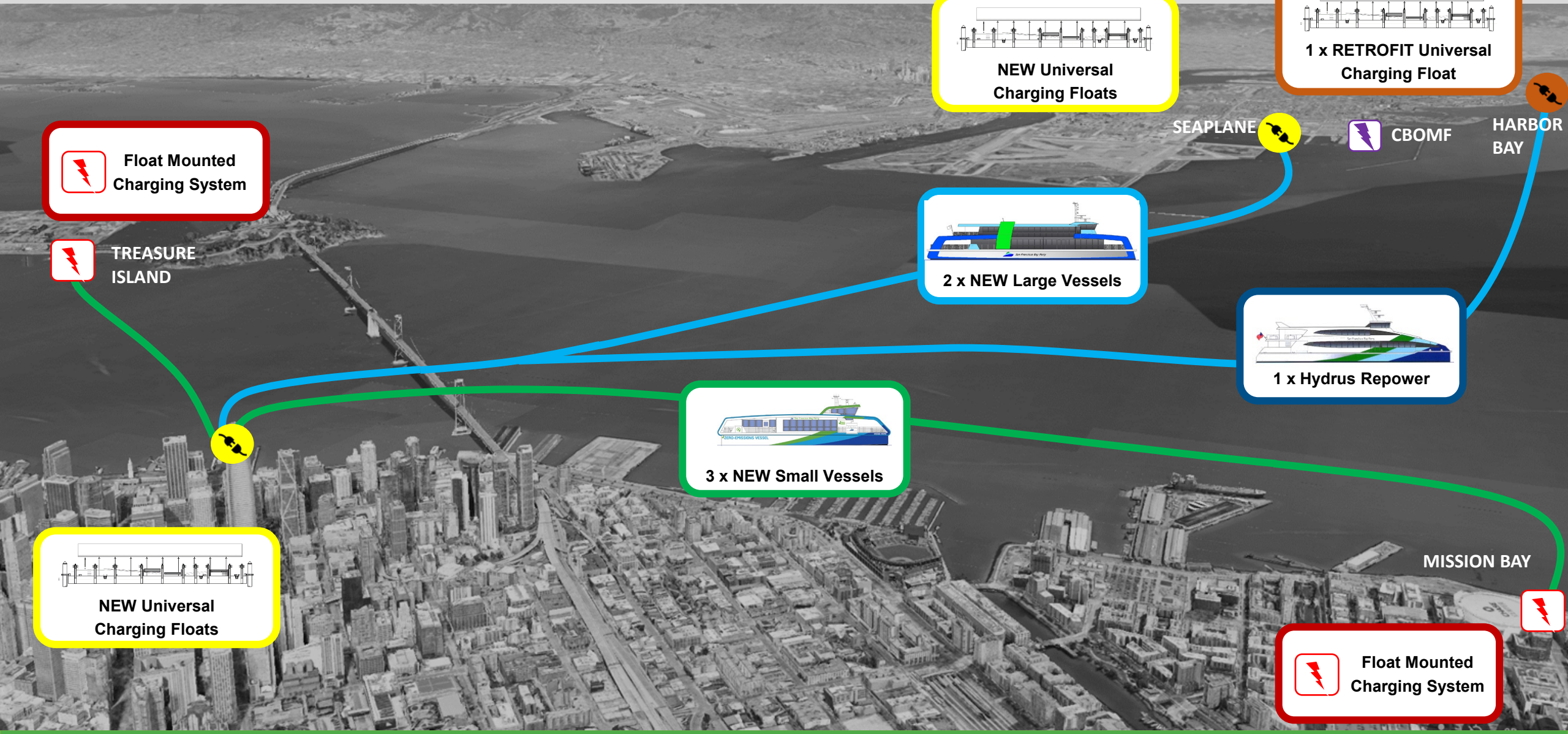
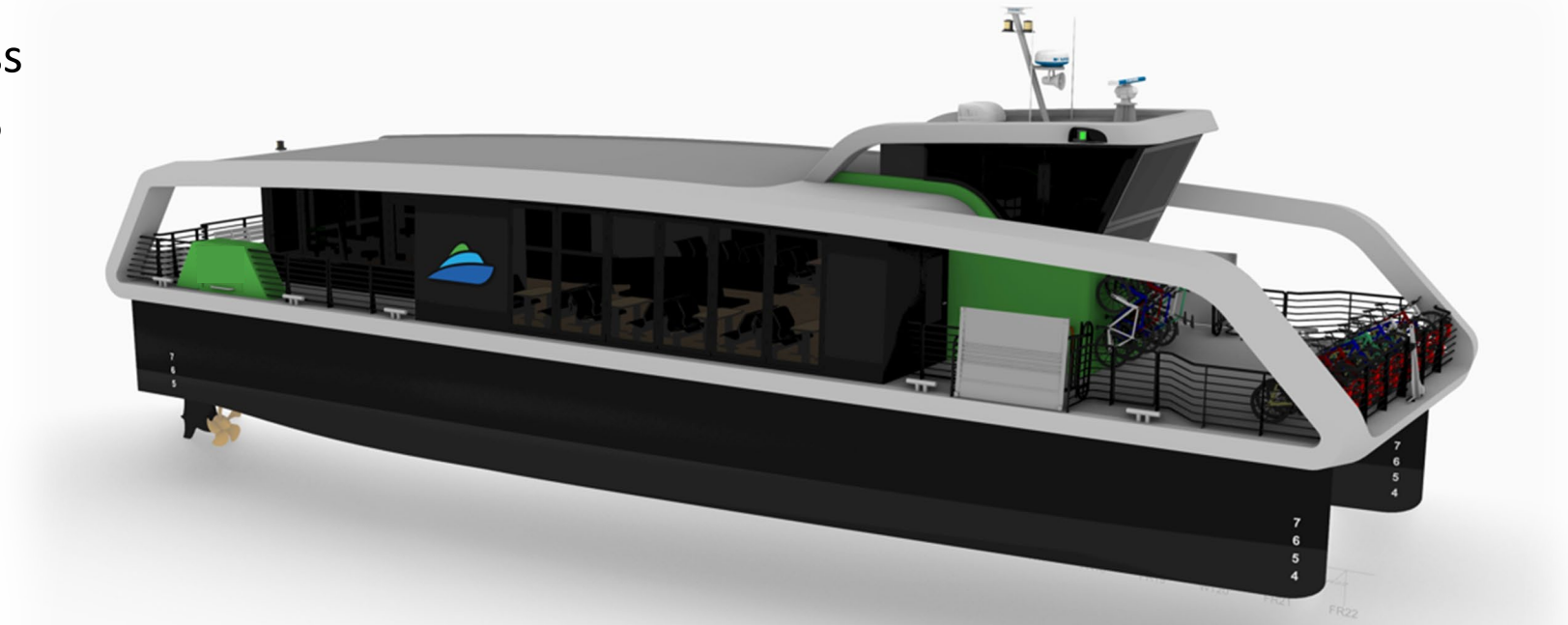
REEF PHASE 1 & 2 IMPLEMENTATION



150 PASSENGER REEF VESSEL

Construction Contract Status:

- Detailed Design Approved
- Production Design In Progress
- Construction starts Dec 2025



Delivery Schedule:

- 1st Vessel: 2nd Quarter 2027
- 2nd Vessel: 2nd Quarter 2028
- 3rd Vessel: 4th Quarter 2028

Charging System Requirement:

- Float Mounted Charging System or UCF
- Does Not Require UCF for Planned Routes

400 PASSENGER REEF VESSEL

Construction Contract Status:

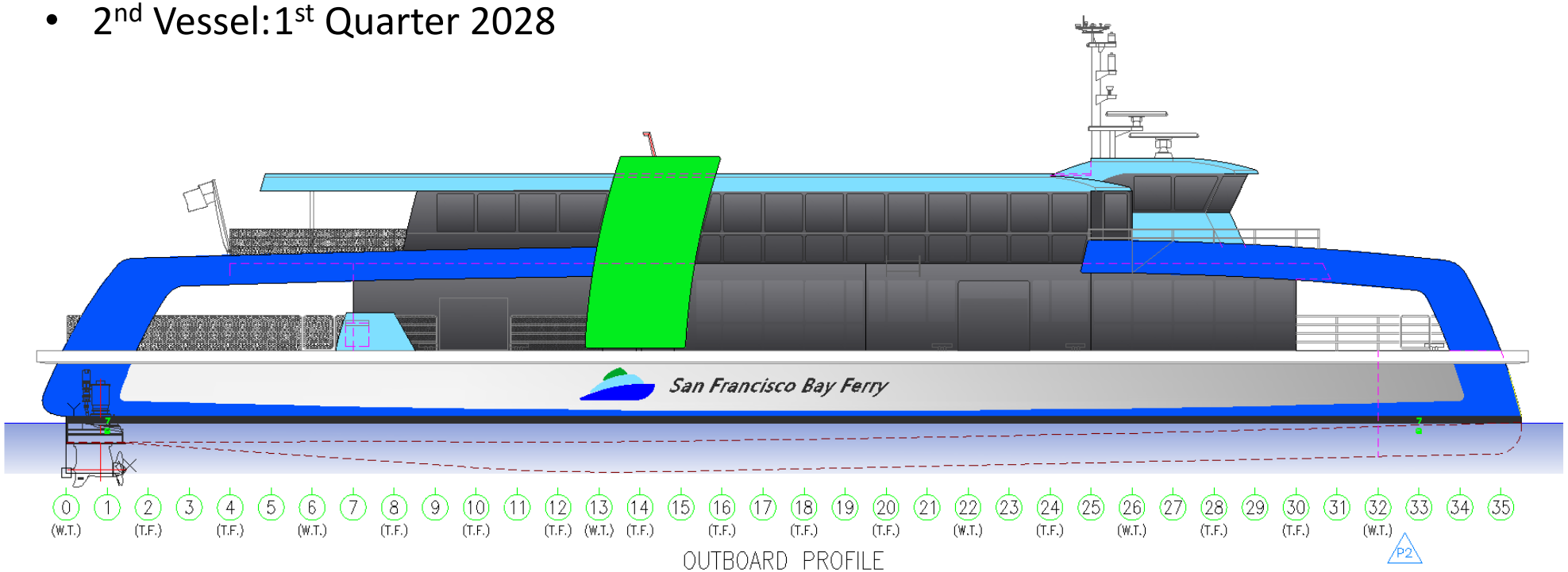
- Detailed Design in Progress
- Production Design Commenced

Delivery Schedule:

- 1st Vessel: 3rd Quarter 2027
- 2nd Vessel: 1st Quarter 2028

Charging System Requirements:

- UCF or Equivalent Capacity
- Required Charging at Both Ends of Route



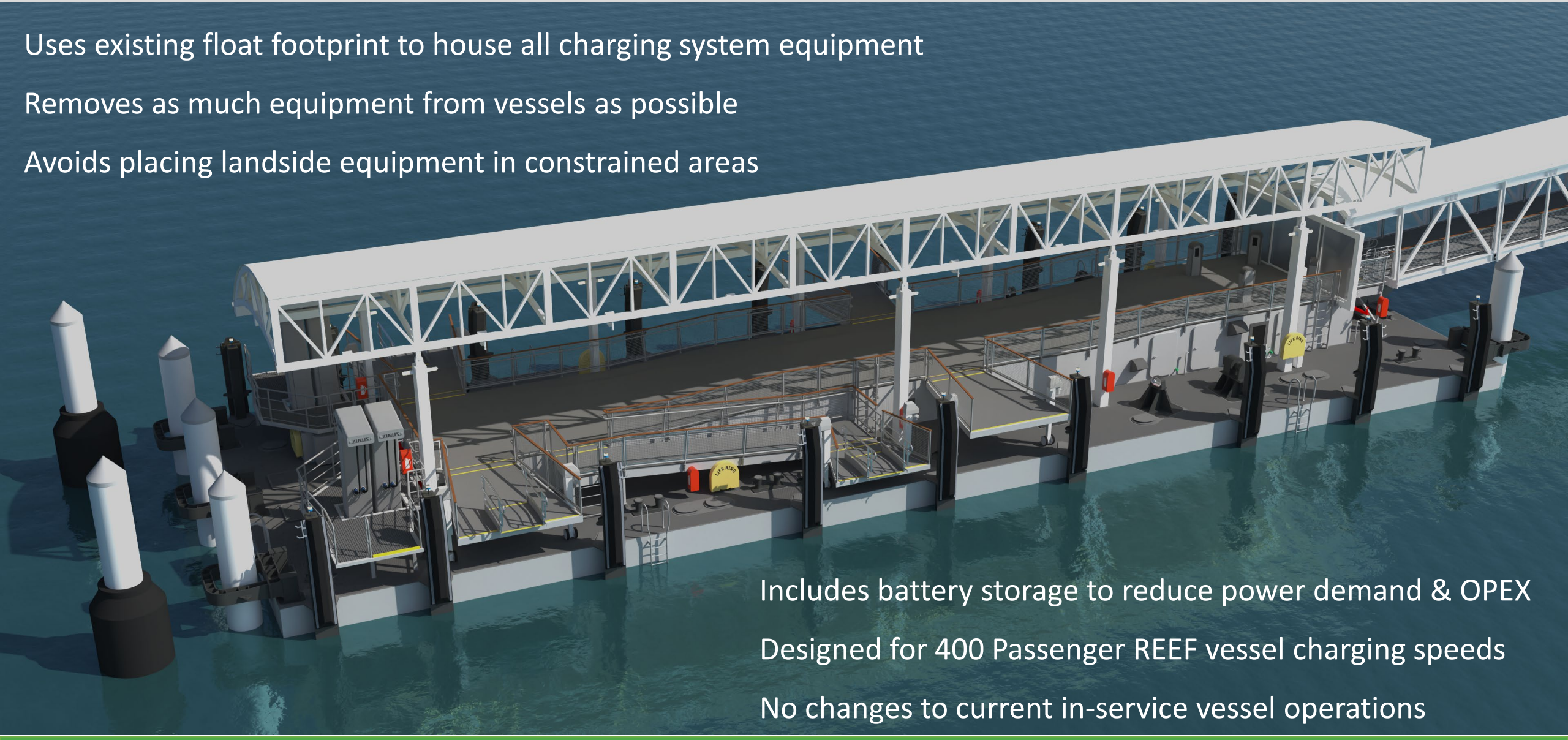
OUTBOARD PROFILE

UNIVERSAL CHARGING FLOAT CONCEPT REVIEW

Uses existing float footprint to house all charging system equipment

Removes as much equipment from vessels as possible

Avoids placing landside equipment in constrained areas

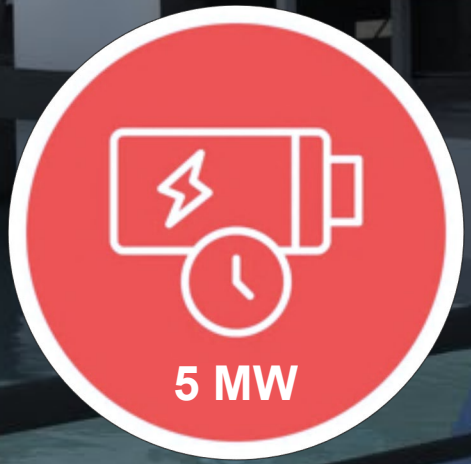


Includes battery storage to reduce power demand & OPEX

Designed for 400 Passenger REEF vessel charging speeds

No changes to current in-service vessel operations

Charging Equipment Overview



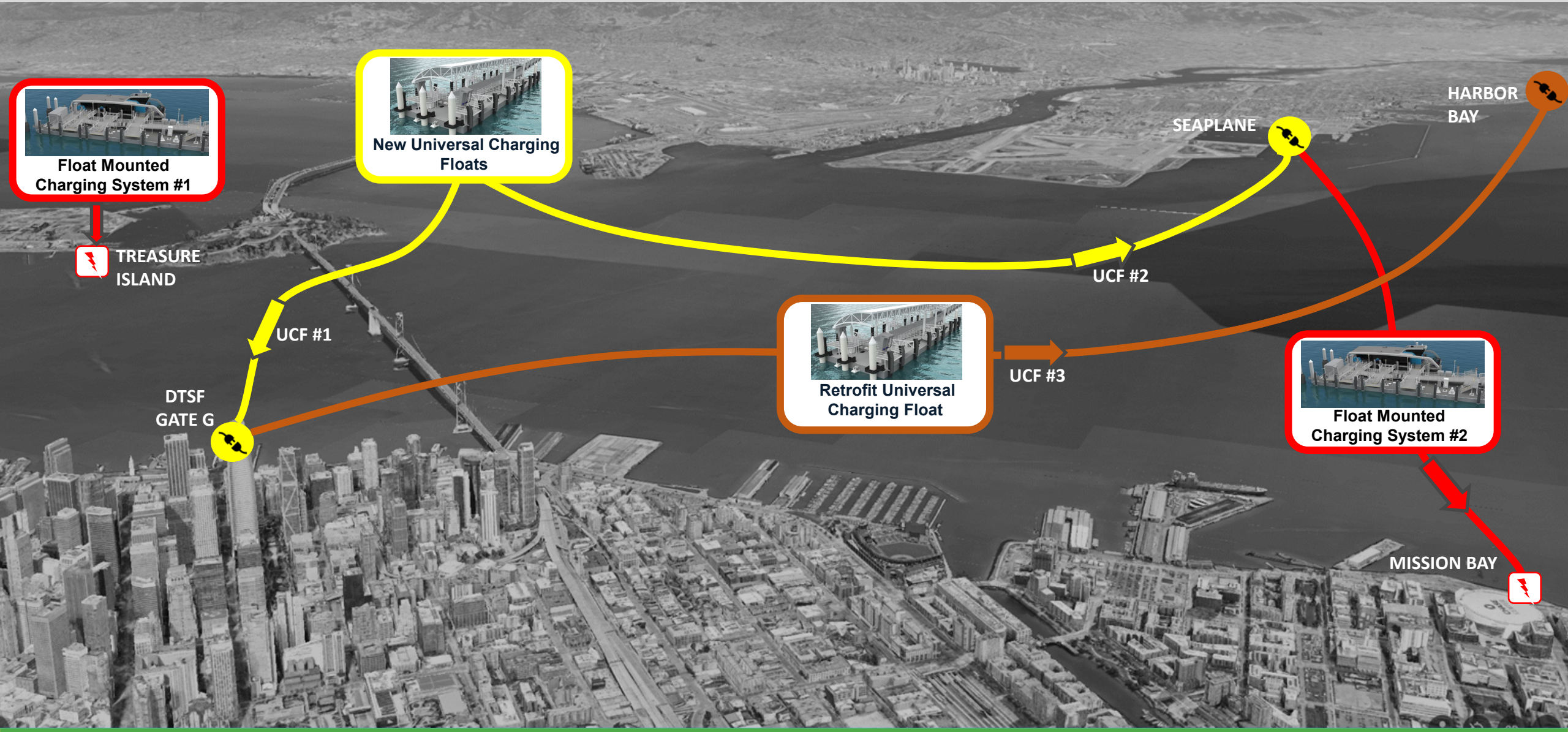
Rapid Charging
8 – 12 minutes

Zinus Charging Towers
Large Vessels use 4 Plugs
Small Vessels use 2 Plugs

MCS Based
1000 VDC

aurora marine design

CHARGING SYSTEM DELIVERY PLAN



LTO Batteries

UC Berkeley's BEACN team independently evaluated all major chemistries

Safest chemistry

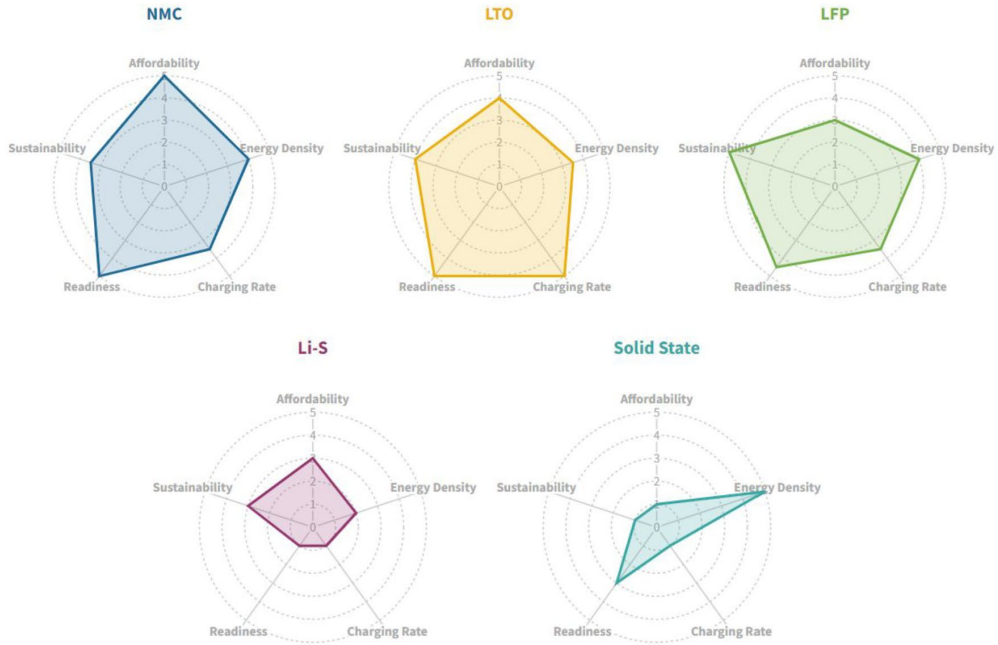
Extremely long cycle life (>20,000 cycles) enables **100% depth-of-discharge**, reducing battery size, weight, and overall lifecycle cost requirements

Lowest lifetime emissions of all chemistries studied—LTO has the smallest long-term global warming impact due to its long life and high specific energy over lifetime

Future-proof for rapid-charge operations: Capable of sub-10-minute charging and high-power cycling with minimal degradation—ideal for high-frequency ferry service

Final Rankings

While LTO and NMC are both competitive, LTO is currently the most advantageous option for WETA

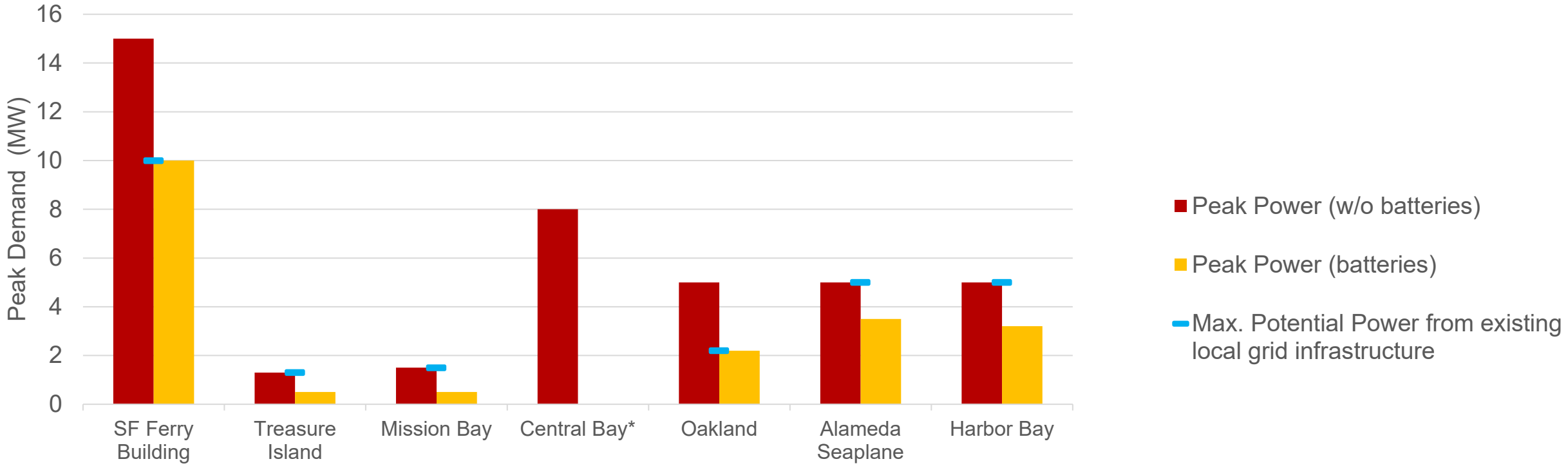


Radar Ranking Justifications
Affordability was based on benchmarking projected costs against battery size (kWh)
Energy density was ranked based on predicted implemented maritime density
Charging rate was ranked on cycle life at WETA sufficient charging rate of 3C/20 min
Readiness considered whether the batteries are currently available to WETA
Sustainability rankings were determined by env/social impact & GHG emissions
****Solid state** shows much potential and while currently not viable, could be an advantageous option in the future

Radar charts: underlying data

Shoreside Power

Predicted ZEV Electrical Peak Demand & Batteries at Each Terminal vs Grid Capacities



**Central Bay Operations & Maintenance Facility does not have planned BESS installation at this time. Working with local utility to verify available utility power.*

San Francisco Bay Ferry

Grid Upgrades and Utility Coordination

- All SF Bay Ferry terminal facilities will require:
  - Enhanced electrical connections to the local grids
  - Coordination with local government partners and utilities:

- Coordination involves:
  - Identification of available grid capacity
  - Identification of future energy demand by phase
  - Understanding utility connection requirements
  - Preliminary electrical plans for scope and cost estimation
    - Terminal upgrades
    - Local grid utility upgrades
  - Space take analysis
  - Environmental review and permitting responsibilities

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SCHEDULE OF DELIVERIES

Universal Charging Floats	Delivery	Vessels	Delivery
UCF #1 to Gate G	2nd Qtr 2027	400 Passenger REEF #1	3rd Qtr 2027
UCF #2 to Seaplane*	4th Qtr 2027	400 Passenger REEF #2	1st Qtr 2028
Gate G Retrofit to Harbor Bay	2nd Qtr 2028	Hydrus REEF	3rd Qtr 2028

Float Mounted Charging	Delivery	Vessels	Delivery
Treasure Island FMCS Install	1st Qtr 2027	150 Passenger REEF #1	2nd Qtr 2027
Seaplane* FMCS Install to Mission Bay	1st Qtr 2028	150 Passenger REEF #2	2nd Qtr 2028
		150 Passenger REEF #3	4th Qtr 2028

What's Next?

San Francisco Bay Ferry


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