



Board of Director's Retreat Agenda

Meeting Date/Time: October 25, 2022, 12:30 – 4:30pm

Members: Kathleen Mozak (Chair), Mike Allemang (Treasurer), Jesse Miller (Secretary), Chris Allen, Simi Barr, Rich Chang, Ryan Hunter, Eric Mahler, Susan Pollay, Kyra Sims

Location: Ann Arbor District Library
 Virtual attendance available [via Zoom](#)
 Passcode: 983308

Agenda Item	Info Type	Details	Page #
1. OPENING ITEMS			
1.1 Approve Agenda	D	Mozak	
1.2 Public Comment	O		
1.3 General Announcements	O		
2. PROPULSION: MOVING US FORWARD			
2.1 Intro and Process Overview PPT pg. 16	O	Carpenter	2
2.2 Summary of Background Report PPT pg. 40	O	Stantec	
2.3 Observations from CEO	O	Carpenter	
2.4 Q/A for Board Members & Discussion	O	All	
2.5 Wrap Up & Next Steps	O	Carpenter	
3. LEGISLATIVE AGENDA: FOCUSED ON OUTCOMES			
3.1 Advocacy: Why, What, and How	O	Carpenter	4
3.2 Advocating at the Local Level & Q/A (2:45-3:30)	O	Doug Tisdale	
3.3 Exercise: Board Member Suggestions (Goals & Tactics)	O	Carpenter	
3.4 Wrap Up and Next Steps	O	Carpenter	
4. EMERGENT ITEMS			
5. CLOSING ITEMS			
5.1 Public Comment	O		
5.2 Adjournment			

Monitoring, D = Decision Preparation, O = Other

Zero-Emission Bus Propulsion Options

Meeting: Board of Directors

Meeting Date: October 25, 2022

INFORMATION TYPE
Decision Preparation
RECOMMENDED ACTION(S)
Receive for information.
PRIOR RELEVANT BOARD ACTIONS & POLICIES
<p>Policy 1.2.2: <i>“Public transportation options minimize energy use and pollution, and conserve natural resources.”</i></p> <p>Policy 2.0 requires prudent assessment of costs, benefits, and risks.</p>
BACKGROUND
<p>Board Ends policy 1.2.2 requires the CEO to seek ways to reduce the amount of pollution created by agency operations. As bus exhaust is the agency’s greatest contribution to pollution and carbon emissions, the CEO has prioritized a review of new propulsion technologies that could reduce or eliminate those emissions. That preliminary information is being presented at the Retreat. Future work will review other vehicles and agency facilities.</p>
ISSUE SUMMARY
<p>The CEO has commissioned an exploratory research report on zero-emissions bus propulsion systems. The CEO is presenting this information to the Board, staff, and the public for public education purposes and to gather informed feedback prior to reaching conclusions.</p> <p>In early 2023, the CEO intends to provide the Board with a recommendation about whether and how to pursue new bus propulsion technologies. The CEO cannot implement a change of this scale without Board approval. The Board will ultimately need to support any new direction in the form of votes to: 1) amend the agency’s Capital Budget, 2) approval of a federally-required Transition Plan, and 3) authorization of grant applications that include facility construction elements. A recommendation to the Board is expected in February 2023. No decision is being sought before then. Deferment for 12 months is a possibility.</p> <p>At the retreat, the authors of the research report, Stantec, will provide an overview and answer Board questions. After the retreat, the CEO is conducting listening sessions with staff and the public. More information is available on-line. The CEO expects to continue discussions with the board for several months.</p>

IMPACTS OF RECOMMENDED ACTION(S)

- **Budgetary/Fiscal:** Considerable. There are competing needs for the agency's limited local match funds. Competing projects from the Long-Range Plan include passenger terminals, bus rapid transit, and garages.
- **Social:** Elimination of tailpipe or all emissions would have a benefit to public health.
- **Environmental:** Although buses contribute relatively small amount of total GHG emissions, changes to bus propulsion are likely the largest contribution TheRide can make.
- **Governance:** While propulsions systems are a technical Means, the Board has reserved final decision on Capital Budget decisions.

ATTACHMENTS

A large research report was previously distributed to the Board and is available to the public at www.TheRide.org.

Developing a Legislative Agenda

Meeting: Board of Directors

Meeting Date: October 25, 2022

INFORMATION TYPE
Other
RECOMMENDED ACTION(S)
Receive for information and discuss.
PRIOR RELEVANT BOARD ACTIONS & POLICIES
The Board has no policies pertaining to advocacy or lobbying per se, although 2.9: External Relationship comes close.
ISSUE SUMMARY
<p>Many elements of the Long-Range Plan and TheRide’s other goals will require support and actions by outside bodies such as municipal councils, regulatory agencies, and the state and federal governments. This retreat will include an initial discussion about TheRide’s goals and tactics in advocating for outside decisions that help us to advance our goals (Ends). The CEO is seeking feedback from Board members about goals and tactics for a emerging advocacy agenda. Board members can prepare by thinking about what advocacy goals they might suggest adding to those identified in the Long-Range Plan, and tactics. <i>Local advocacy is intertwined with Board efforts to link with Legal Owners, so board/staff roles will also be discussed.</i> It is expected that this initial discussion will be followed by further discussions at regular board meetings, the finalization of goals, tactics, and roles, and implementation of advocacy activities.</p> <p>This retreat will include a special outside guest. Mr. Doug Tisdale is an elected transit board member in Denver, Colorado, a former elected municipal official, and is heavily involved in national transit issues. He is also a graduate of the UM School of Law. He will be providing an outside perspective on advocating for transit at a local level.</p> <p>Later in the year, the discussion of advocacy will continue and include presentations of federal and state advocacy. An annual transit legislative conference is helping each March in Washington D.C. and the CEO hopes to have board members accompany him to meetings with elected federal representatives in 2023.</p>
BACKGROUND
<p>Per the Board’s Annual Plan of Work, the CEO is presenting preliminary information regarding the development of an advocacy/legislative agenda. No decisions are expected today.</p> <p>The Long-Range Plan provides some preliminary direction on advocacy goals (p. 90) including audiences (municipal governments, UM, companies, RTA, MDOT, FTA, Congress, etc.), goals (fundings, land use and tax regulations, and infrastructure). See Attachment 1 for more details.</p>

IMPACTS OF RECOMMENDED ACTION(S)

- Budgetary/Fiscal: N/A
- Social: N/A
- Environmental: N/A
- Governance: While advocacy and lobbying is a Means delegated to the CEO, linking with Legal Owners is a role of the Board.

ATTACHMENTS

Attachment 1: Long-Range Plan Chapter 10: Advocacy and Partnerships

Attachment 2: Example Legislative Agenda – 2018 Hampton Roads Transit (Virginia)

Attachment 3: Doug Tisdale Bio

10 Advocacy and Partnerships

To successfully implement this long-range plan, TheRide will need support from many outside groups and individuals that provide or influence the funding, regulation, infrastructure, ridership demand, and public support for public transit.

TheRide will need to build robust relationships and communication channels to align priorities, build trust, and maximize the chances of success, as summarized in Figure 34. Key groups TheRide will need to collaborate with include:

- **Local:** Municipal governments, elected officials, advocates, businesses, non-profits, transit riders, and the general public are all potential assets as TheRide pursues its agenda. Building broad support at the local level will help ensure trust and support are available when TheRide makes proposals. It is notable that in a community with many advocacy groups, the Ann Arbor-Ypsilanti area does not host a transit activist/advocacy group. The local groups listed often share goals with TheRide, which enables collaboration on transit-supportive projects and provides an effective means of increasing organizational capacity.
 - **The University of Michigan:** As the self-governing dominant employer and driver of transportation and economic activity in TheRide's service area, relationships with the University of Michigan will always be important.
 - **Private Companies:** Increasingly, private, for-profit companies are becoming more involved in transportation decisions that affect their business, workers, or reputation. Toyota, for example, has been funding part of TheRide's FlexRide program.
- **Regional:** The Washtenaw Area Transportation Study (WATS), SEMCOG, and the RTA are all part of the conduits delivering state and federal funding to TheRide and Washtenaw County and coordinating transit-supportive transportation investments in the county. They also have some potential to create new funding sources. Strong alignment with these groups will be important.
- **State:** Strong relationships with state official, MDOT staff, and the Michigan Public Transit Associations (MPTA) will be important. This will be important to protect existing state funding, encourage more funds, and assure transit-supportive regulation. Bus-on-shoulder operations (freeways), HOV lanes, and park and ride lots on state land near interchanges would be appropriate to consider advancing for MDOT's consideration.

Federal: TheRide will need to win several large competitive federal earmarks and/or grants for major capital projects (i.e., terminals, garage, BRT). In addition to well-developed, shovel-ready projects, and high-quality grant applications, TheRide will need to build strong relationships with elected officials and their staffs, and FTA staff.

The actions and decisions TheRide will need from these outside groups will fall into a few general categories:

- **Resources:** TheRide will require funding, political support, project collaboration, and other resources. Examples include: federal and state grants and funding, and local taxes. Crucially, TheRide may want to consider asking the state legislature to allow transit agencies access to more forms of taxation other than just the property tax. This could allow TheRide to shift the tax burden from residents to vehicle registrations, for example.
- **Regulations that Encourage Transit-supportive Development and Policy:** Transit demand and the quality of the passenger experience is directly or indirectly undermined by public policies that encourage car use.
 - **Transit-Supportive Land Development:** Examples of transit-supportive policies include encouraging higher-density, mixed-use, walkable urban development within TheRide’s existing service area; encouraging lower parking requirements, sidewalk construction; and encouraging growth overall.
 - **Taxes:** State and federal tax policy also matters, such as replacing a diminishing gas tax with a tax on miles driven, for example.
 - **Institutional Policy Decisions:** The University of Michigan’s internal policy decisions have a significant impact on local transportation and development decisions. To a lesser degree this also holds for other independent institutions and businesses. For example, encouraging business to provide transit passes as an employee benefit and means of offsetting parking costs.



- **Transit Supportive Infrastructure:** Some of the infrastructure that TheRide will rely on is controlled by others, and TheRide can work to influence decisions that support TheRide 2045. This includes selling land to TheRide, sidewalk construction, bus lane construction, first mile/last mile collaboration, and transit signal priority.

It is recommended that TheRide create a targeted legislative agenda including specific goals and target audiences and institutions, and to begin allocating time and resources toward advancing this agenda for outside policy changes.

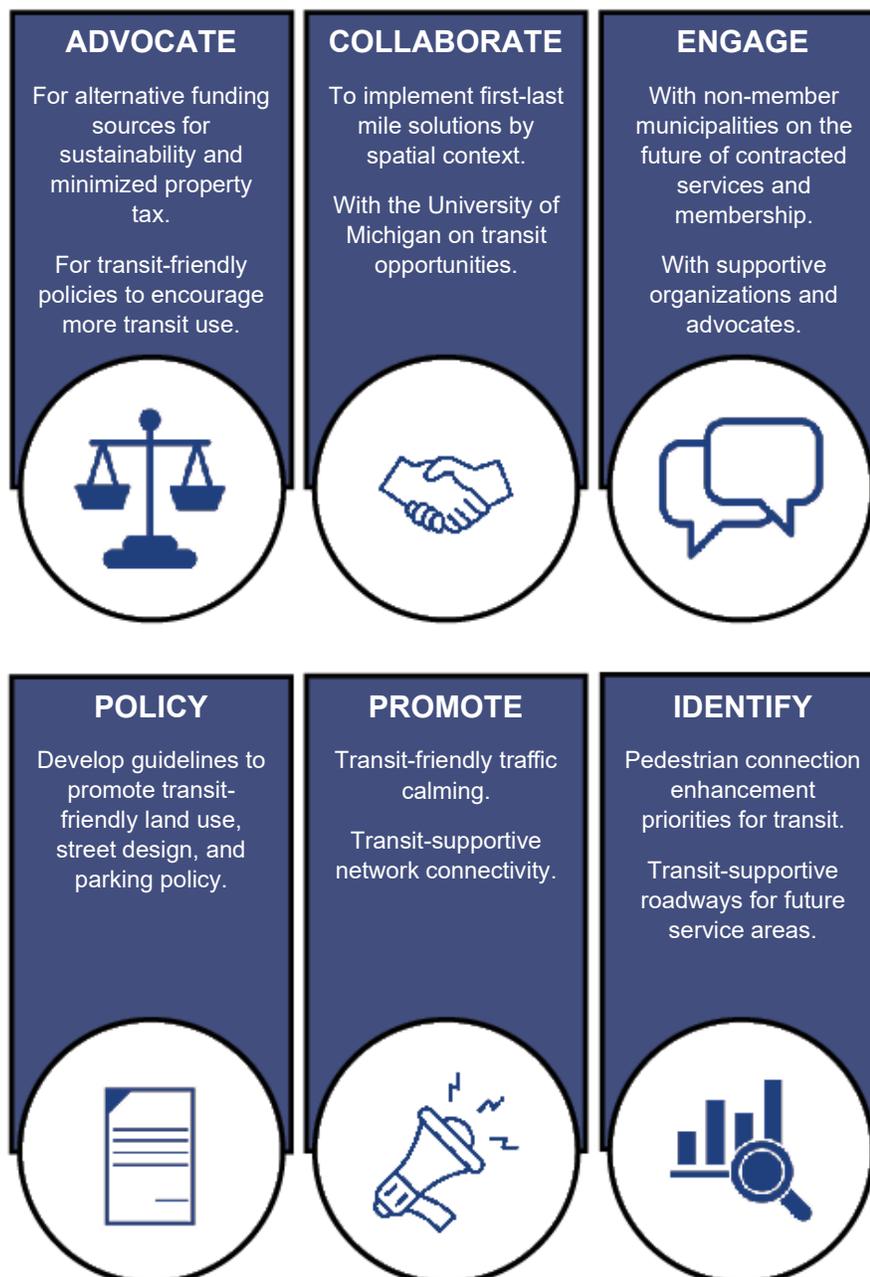


Figure 34 – TheRide Advocacy and Partnership Goals

Below is an example of a advocacy agenda from a larger transit agency in the Washington D.C. area. It is out of date and provided only to illustrate one way an agenda may appear.

<https://gohrt.com/wp-content/uploads/2020/07/Legislative-Priorities-Archive-2018.pdf>

Legislative Priorities Archive 2018

Guiding Principles

- Achieving and maintaining a State of Good Repair.
- Using smarter project and service delivery methods to efficiently connect communities across the region with transit infrastructure and services.
- Ensuring flexibility and diversity of funding sources and financing options, including new dedicated regional transit funding, with the ability to leverage resources to make each available dollar go farther.
- Balanced and equitable investments across modes and areas of the Commonwealth.
- Fostering innovation and data-driven decision making, incorporating new technologies, and using robust methods to evaluate and prioritize investments.
- Integration of transportation and land-use policies, plans and projects that foster private investments and expand access to safe and reliable transit for more segments of the Hampton Roads region.
- Connecting more workers to jobs, customers to businesses, and access to educational, retail, medical, recreational, and other opportunities that support quality of life and thriving local and regional economies.

The Commission implements its day-to-day business as Hampton Roads Transit (HRT). Providing more than 14 million trips annually on bus, ferry, light rail, and paratransit, in addition to Transportation Demand Management (TDM) solutions through its TRAFFIX program, HRT's mission is to connect Hampton Roads through high quality, safe, efficient, and sustainable transportation services.

TDCHR 2018 LEGISLATIVE PRIORITIES

Statewide Transit Capital Funding

The TDCHR supports state funding to replace previous bond funding and meet statewide transit capital needs

The TDCHR supports state funds to replace state bond funding that will be exhausted in 2019. Based on a capital improvement program for 2019 through 2023, localities served by Hampton Roads Transit would need to identify an additional \$12 million annually just to meet basic state of good repair for buses if historical state funding were not available.

The General Assembly (HB 1359) established the Transit Capital Project Revenue Advisory Board in 2016 to examine state transit capital funding needs and identify potential solutions to meet these needs. Highlights of the board's findings include the following:

- The replacement of state bond funding would only maintain historical levels of investment.
- Bond funding that was approved in 2007, used primarily for transit state of good repair, will be exhausted at the end of FY 2018.
- Virginia's economy would lose \$410 million annually in economic activity if this funding is not replaced. These losses are just related to lost capital investments – there would be additional economic losses across Virginia as daily transit operations are impacted.
- With the end of this funding, there is a projected revenue shortfall within the Commonwealth averaging \$130 million annually over the next ten years starting in FY 2019.
- 80% of funds are typically used to meet basic state of good repair, like purchasing replacement buses, and the remaining 20% for minor enhancements and some expansion.
- Virginia needs steady and reliable revenues dedicated to the statewide transit state of good repair program.
- A combination of statewide and regional sources could be considered; however, use of any regional funds should only be for transit needs that improve service across the region, as determined at the regional level.

Regional Transit Governance And Oversight

The TDCHR supports adding Virginia General Assembly members representing the Hampton Roads area to the membership of the Commission's governing board. The TDCHR also supports gubernatorial appointees be made with consideration given to expertise and experience in transportation, public budgeting and finance, corporate communications, or other fields relevant to supporting effective governance and oversight.

The TDCHR governing board is currently composed of 13 members. This includes one local government appointee from each city council, one citizen from each jurisdiction in the district, appointed by the Governor, and a designee of the Commonwealth Transportation Board. There are no legislative members from the Virginia General Assembly included. This structure varies considerably from other major regional transportation entities (including the Northern Virginia Transportation Commission – six

legislators, the Potomac and Rappahannock Transportation District Commission – five legislators, the Hampton Roads Transportation Accountability Commission – five legislators, and the Northern Virginia Transportation Authority – three legislators). These General Assembly members have become an essential link between state policy makers and their region in dealing with transportation issues.

The TDCHR board membership formerly included one legislator from the House of Delegates and another from the Senate of Virginia, however this changed to the current form in 2012. Adding two General Assembly members to the TDCHR governing board would provide more parity in the composition of the board in comparison to similar transportation entities in Virginia. The TDCHR also recommends gubernatorial appointees be made with consideration given to expertise and experience in transportation, public budgeting and finance, corporate communications, or other fields relevant to supporting effective governance and oversight.

Floor On Regional Gas Taxes

The TDCHR supports a price floor on regional gas tax collections.

The TDCHR supports an amendment to Virginia Code § 58.1-2295 which would establish a protective floor price for the 2.1 percent regional wholesale price per gallon gas tax, much as was done for the statewide fuels tax in §58.1-2217. A floor concept provides a more stable, dedicated revenue source that is needed for long-term financing of regional projects in Hampton Roads and Northern Virginia. It is estimated that the establishment of a floor would generate approximately \$20 million or more per year for the region.

Regional Transit Funding

The TDCHR supports dedicated regional funding for public transit in Hampton Roads.

The TDCHR supports dedicated regional funding for public transit in Hampton Roads without a reduction in funding for other transportation modes. New regional funding will enable the region to develop a fully integrated and inter-connected regional transit system by:

- Fixing what's broken or missing in the current system.
- Making targeted improvements that more effectively connect major employment, retail, education, medical, and tourism destinations across city boundaries resulting in a true regional transit system.
- Including new oversight, prioritization, and accountability provisions.

Hampton Roads is a global gateway for commerce that is vitally important to Virginia's economy. Transit plays an important role regionally, supporting more than 20,300 jobs and \$548 million annually in employment income, as well as \$93 million in consumer spending across Hampton Roads. The lack of a regional funding structure has resulted in a system of localized transit routes rather than a fully integrated and optimized regional transit system. A metropolitan area of 1.7 million people must have a truly regional transit system if it is to grow and compete in the global marketplace.

Federal Capital Investment Grant (cig) Program Funding

The TDCHR supports Congress protecting and expanding the federal Capital Investment Grant Program.

The TDCHR supports Congress protecting and expanding federal Capital Investment Grant Program (New Starts/Small Starts) funding to meet demand. The federal fixed-guideway transit funding program is particularly important as Hampton Roads looks to possible extensions of systems that provide a regional benefit such as The Tide light rail system, Bus Rapid Transit on the Peninsula, or similar services.

Federal Bus And Bus Facilities Program Funding

The TDCHR supports increased federal funding for the Bus and Bus Facilities program.

The TDCHR supports increased federal funding for the Bus and Bus Facilities program. Specifically, there is need for \$2.85 billion additional investment to the FTA Bus and Bus Facilities program. The TDCHR recognizes that buses are the backbone of transit service and continues to advocate for sufficient and sustainable funding for bus and bus facilities. Under MAP-21, bus funding was reduced by 57 percent. Overall, bus and bus facilities moved from 21 percent to just 9 percent of the federal transit program, even though buses carry more than 50 percent of all transit riders in America. The FAST Act included some increased bus and bus facilities funding; however, by 2020 authorized funding for bus transit programs will still be 15 percent lower than it was in 2011 and will represent only 14 percent of total federal funding for transit.

Cuts to this program between 2009 and 2015 have resulted in an almost 40 percent increase in the number of transit buses nationwide operating past their useful life. This is a significant issue in Hampton Roads, where approximately 35 percent of the bus fleet is 12 years of age or older, and the average fleet age of 10.5 years far exceeds the

industry standard 7 years average age. Many of these buses have more than 500,000 to 900,000 miles, which makes them prone to breakdowns and costly maintenance.

The \$2.85 billion will fill the gap in funds diverted from the Bus and Bus Facilities program between 2013 and 2020. This funding will help transit agencies across the nation reach a state of good repair and operate safe, efficient and reliable systems. It will also quickly boost economic activity. Bus purchase orders are sitting on the shelf and can be generated in a matter of days, not months. Modernizing the nation's transit fleet will create thousands of good paying U.S. manufacturing jobs, increase access to work and commercial centers, and help address the backlog of aging bus fleets and facilities like the ones we have in Hampton Roads.



Doug Tisdale

DOUG TISDALE is the Chair of APTA’s Transit Board Members Committee. Doug was elected to the Regional Transportation District–Denver Board of Directors in 2016 and re-elected in 2020, serving two terms as Chair of the RTD-Denver Board. He serves on APTA’s Executive Committee; the APTA Board; the APTA Finance Committee; among other APTA leadership positions.

Doug was elected twice as a City Council Member and then elected as Mayor of Cherry Hills Village, Colorado, “The #1 Best Suburb of America to Live In” (Wall Street Journal) and was Chairman of the State Board of Psychotherapists at the Colorado Department of Regulatory Agencies. He has chaired numerous healthcare industry and other nonprofit boards. A University of Michigan LS&A and Law School graduate, Doug is President of Tisdale & Associates LLC and was formerly a partner in several global law firms. He has practiced law and consulted in Africa, Asia, Australia, China, Europe, New Zealand and throughout North America.

AAATA Board Retreat

Bus Propulsion and Legislative Agenda

Introductions

- Two discussion items today from Board's Work Plan:
 - zero-emissions bus propulsion
 - TheRide's advocacy agenda
- Beginning discussions. No decisions today.
- Both have shared roles for Board and Staff
- Outside speakers, one time-sensitive

Agenda

PROPULSION: MOVING US FORWARD

- Intro and Process Overview
- Summary of Background Report (Stantec)
- Observations from CEO
- Q/A for Board Members & Discussion
- Wrap Up & Next Steps

LEGISLATIVE AGENDA: FOCUSED ON OUTCOMES

- Advocacy: Why, What, and How
- Advocating at the Local Level & Q/A (Doug Tisdale @ 2:45)
- Exercise: Board Member Suggestions (Goals & Tactics)
- Wrap Up and Next Steps

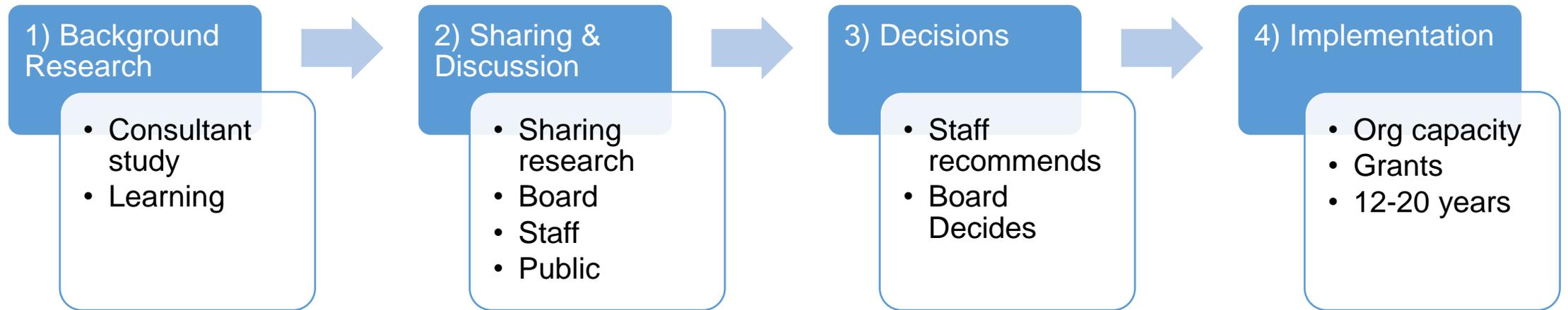
Zero-Emission Bus Propulsion

Strategic Direction

- Board policy goal (Ends):
 - 2.2.2 *“Public transportation option minimize energy use and pollution, and conserve natural resources.”*
 - First step: Elimination of all emissions from bus fleet
- Other policy goals (LRP)
- Policy restrictions: manage risks, fiscal jeopardy, safety,...



Process Recap



Stantec

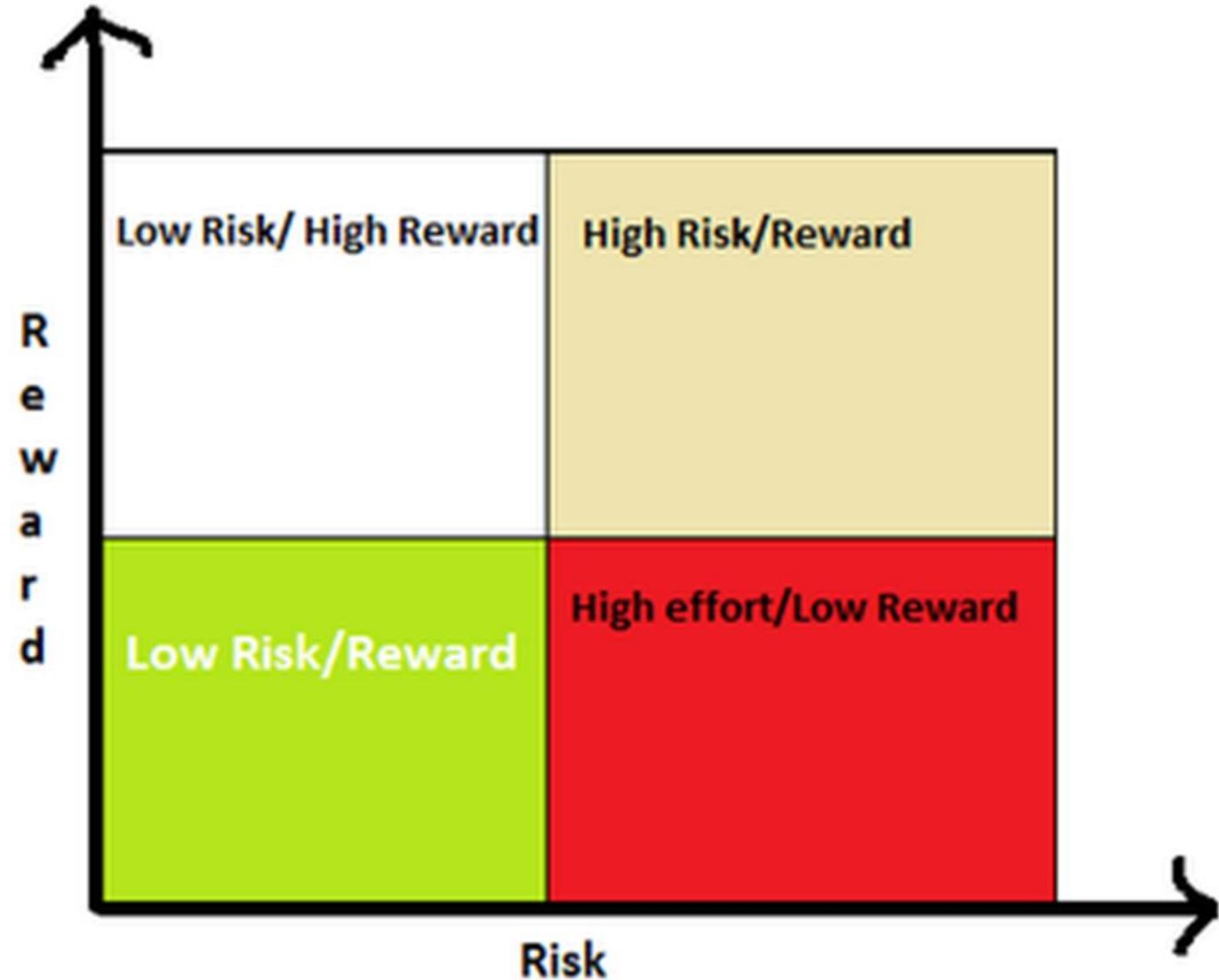
- David Verbich, Project Manager



Stantec

Risks

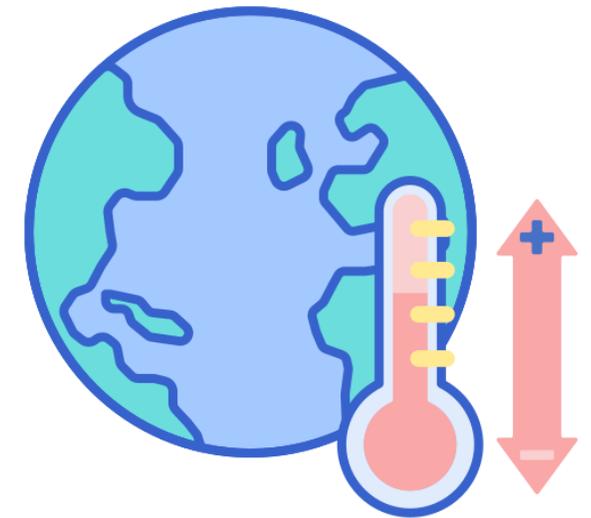
- Higher risk no matter which technology
 - Tech is not mature
 - High costs
 - Many unknowns
 - VCR/Betamax?
- Trade offs (limited funds)
- Risks of waiting too long



Cost/Benefit

- Elimination of 11,000 tons of carbon/year (0.5% of total)
- High costs to de-carbonize transport sector
- Not a financial business case.

- Why we should *begin* in spite of challenges
 - Moral imperative. Have to start sometime
 - Outside funding can help
 - Future mandates, phase out of diesel
 - Community expectations (Owner values)
 - Board's Goals (Ends)



Decision Process

- Staff will recommend (Feb?):
 - Technology (battery or hydrogen)
 - Timeframe (in years)
 - Constraints: funding, staff readiness, trade offs
 - Trade-offs with LRP projects and capital priorities (Use of local capital match funds)
- Board will decide via:
 - Budget approval/amendment
 - Transition Plan (required-approval)
 - Grant application authorization
 - Board can: accept, reject, modify, table, request more info...

Timeline and Input

- Federal grant applications every May (Lo-No grant)
- For 2023:
 - Recommendation February.
 - Board decision April.
 - Will have to start preparing before Board decision
- Can also wait until May 2024
- Some urgency
- Transition will take 12-20 years



Zero-Emissions Propulsion

- Q/A with Stantec and Staff



Wrap Up and Next Steps

- Key Messages

Next Steps

- Public Feedback
- Ongoing Board Discussions (Monthly)
- CEO develops recommendation (Feb?)
- Decision re: 2023/2024



Advocacy/Legislative Agenda

Advocacy & Lobbying

- Emerging Strategy: TheRide has committed to rebuilding more assertive advocacy mechanisms.
- Influencing others to make decisions that support TheRide's goals (ends, LRP, etc)



What and Why?

- To advance Board's *outcome* goals (Ends Policies)
 - Increase ridership, Social equity, Enviro benefits, Labor mobility
 - Often manifests in specific projects, initiatives, decisions...Long-Range Plan
- Reduce Risk (Exec Limitations)
- One set of goals



Observations

- Closer Board/staff activities:
 - Ownership Linkage (Board)
 - Advocacy (Means)
 - Adjacent Objectives: Building relationships (Both)
- Clear on goals/roles (before and after meetings)
- Coordination & communication



What and Who? (DRAFT)

	<u>Feds</u>	State	<u>Muni Govs</u>	RTA	UM/ biz	DDA, etc	Public
Funding	✓	✓					✓
Regulation/Authorizations	✓		✓	✓			✓
Partnerships			✓	✓	✓	✓	✓
Influence Their Policies	✓	✓	✓				✓
Influence their Infrastructure		✓	✓			✓	✓

Priority Audiences & Outcomes

Federal/State

- Maintain & expand funding
- Favorable regulation
- Taxation (roads)

Municipal

- Land development regs
- Parking regs
- Pedestrian infra
- Bus lanes
- Signal priority,
- Climate action

Public

- See value from transit

Strategy & Tactics

Get Organized Internally

- Set Single Agenda
- Clear roles (many faces, single voice)
 - New Manager of Public Affairs and staff
 - Ownership Linkage Task Force (Rich)

Set Strategy and Tactics (TBD)

- Audience calendars (Fed, state, local, etc)
- Lots of meetings! 1-on-1 and groups
- Maybe just get started...



Special Guest: Doug Tisdale



Exercise

Individually then share:

- Write 3 policies/issues/projects do you want to make sure TheRide advocates for?
- Which existing policy goals (Ends) do they advance?
- Which audience is a priority?
- Why?

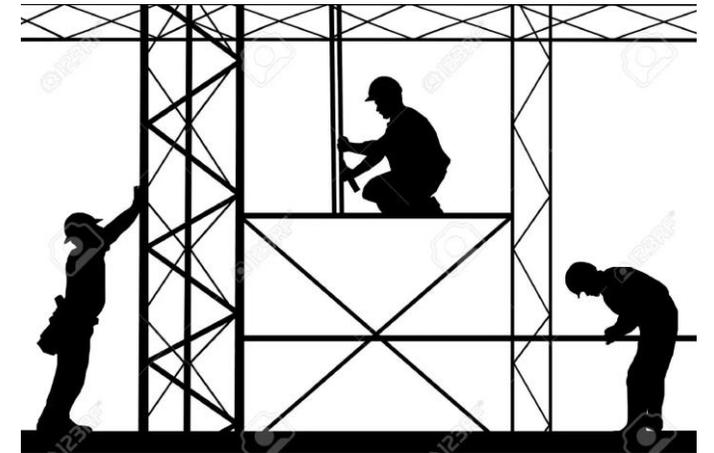


Wrap Up & Next Steps...

- Key Take Aways...

Steps

- Ownership Linkage Task Force
- Recruit of Manager of Public Affairs
- Organization of staff and resources
- Establish clear advocacy goals
- Develop strategy and tactics
- 12 months



AAATA Board Retreat

Bus Propulsion and Legislative Agenda

TheRide 3



AAATA/TheRide Alternative Bus Propulsion Study

October 2022



The analyses and conclusions contained in this document are based on various assumptions that were developed by Stantec and AAATA, which partly may or may not be correct, being based upon factors and events subject to uncertainty. Such assumptions were developed solely as a means of illustrating the principal considerations that may be taken into account and independently evaluated. Such information has not been independently verified and is inherently uncertain and subject to change. Future results may differ materially from any statements of expectation, forecasts or projections. These materials do not constitute legal, accounting, policy, or similar professional or regulatory advice normally provided by licensed or certified practitioners. Stantec Consulting Services Inc. makes no representation or warranty, express or implied, as to the accuracy or completeness of the underlying assumptions, estimates, analyses, or other information contained in this document, and nothing herein is or shall be relied upon as a promise, warranty or a representation, whether as to the past, the present, or the future. AAATA remains solely responsible for all decisions, use of these materials, and compliance with applicable laws, rules, regulations and standards.



Outline

1. Project overview
2. Context & Background
3. Benefits and Costs
4. Risks and Challenges
5. Technology Overview
6. Financial Evaluation
7. Conclusions
8. Next Steps



Project Overview

- Public transit agencies across the US have begun to adopt and transition to zero-emission buses (ZEBs) to reduce emissions from bus fleets
- TheRide's Board has directed the agency to explore alternative bus propulsion technologies as a way to reduce pollution from transit operations
- Michigan has no state mandate; no federal mandate (although a ZEB transition plan is needed to apply for federal funding)
- The federal government is prioritizing the funding of ZEBs as a way to combat climate change and improve air quality, particularly in historically disadvantaged communities
- We focused on ZEBs, but initially considered low-emission buses too

This is a preliminary exploration and NOT a final engineering or financial study. It is not an endorsement of one technology or another. Further detailed work is needed to move ahead.



Context / Background

- The City of Ann Arbor has established targets to reduce climate change through the (non-binding) A²Zero Climate Action Plan
- The A²Zero Plan estimated that TheRide's fleet emits ~10,700 tons of CO₂e annually—**0.5%** of GHGs throughout the region
- The A²Zero Plan estimated that transitioning to ZEBs and the reduction in GHG would cost about **\$5,800 per ton of GHG**
 - *A community solar program in the A2Zero Plan could eliminate about the same amount of GHG for about \$18 per ton*
- Overall, the GHG emissions from AAATA's fleet is small and the cost to decarbonize is high





Benefits

- The modeling estimated **~7,000 tons of CO₂e** per year from the current fleet
- A ZEB fleet can reduce GHG emissions by **~27-50%** over the next 12 years
 - Not completely zero emissions because of carbon intensity of electrical grid as well as hydrogen supply chain, as well as continued diesel operations
- Once 100% ZEB, reducing 7,000 tons of CO₂e per year can amount to **~\$371k** of social benefit per year
- Potential cost savings around electricity vs. diesel fuel and potential savings around maintenance
- Quieter, smoother ride for customers and operators

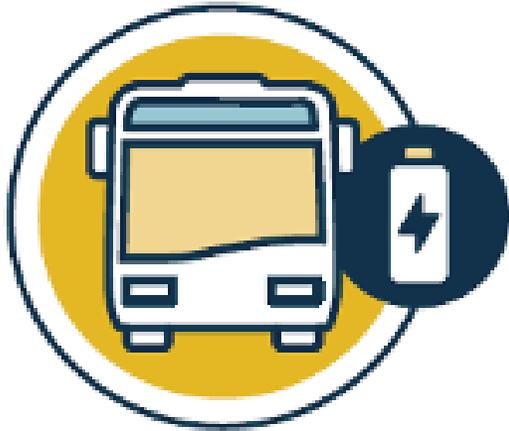


Costs

- The chief cost drivers for the ZEB transition include the **premium on vehicles over diesel equivalents and the related fueling infrastructure**
- Capital cost estimates – up \$75M above current diesel buses over 25 years
- Federal funding through competitive grants are available (up to 80% of capital), but long-term funding may be uncertain
- These transition costs and their funding needs must be balanced with other capital projects stemming from the long-range transit plan



What is a Zero-Emission Bus?



Battery Electric Bus (BEB)

- Propulsion occurs from electricity directly stored in batteries
- Fueling occurs by recharging batteries



Hydrogen Fuel Cell-Electric Bus (FCEB)

- Propulsion occurs from hydrogen converted by fuel cells into electricity for propulsion
- Fueling occurs by refilling on-board hydrogen tank

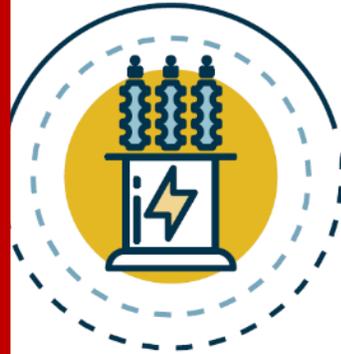


Battery-Electric Buses

Items with 'significant' footprints



Grid



1. Transformer



2. Switchgear



3. Charger



4. Dispenser



Bus





BEBS

Pros

- Lower vehicle costs compared to hydrogen buses
- Lower maintenance costs
- Battery range expected to improve
- Lower fuel costs

Cons

- Range limited. Can deliver 62% of service in cold weather
- Space requirements for chargers and related infrastructure
- Electrical upgrades required
- Electricity rates more complex than diesel contracts
- Less cost effective at scale

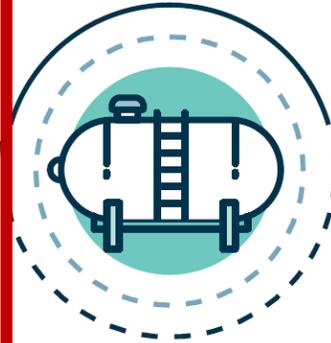


Fuel Cell-Electric Buses

Items with 'significant' footprints



1. Hydrogen Delivery



2. Storage Tank



3. Vaporizer
(for liquid storage)



4. Compressor



5. Chiller



6. Dispenser



Bus





FCEBs

Pros

- Long operating range – can deliver over 90% of service in cold weather
- Minimal changes to servicing cycle (fueling, etc.)
- Lower maintenance costs
- More cost effective at scale

Cons

- Space requirements for on-site fueling infrastructure
- More expensive vehicles
- Significant building upgrades
- More expensive fuel compared to electricity – costs coming down



Financial Evaluation

Primary Inputs:

- Predictive modeling outcomes for BEBs and FCEBs
- Bus energy/fuel consumption
- Unit cost assumptions

Primary Outputs:

- Operating and capital cost comparisons to business-as-usual
 - Total cost of ownership across the 25-year horizon
 - Year-over-year cash flow implications





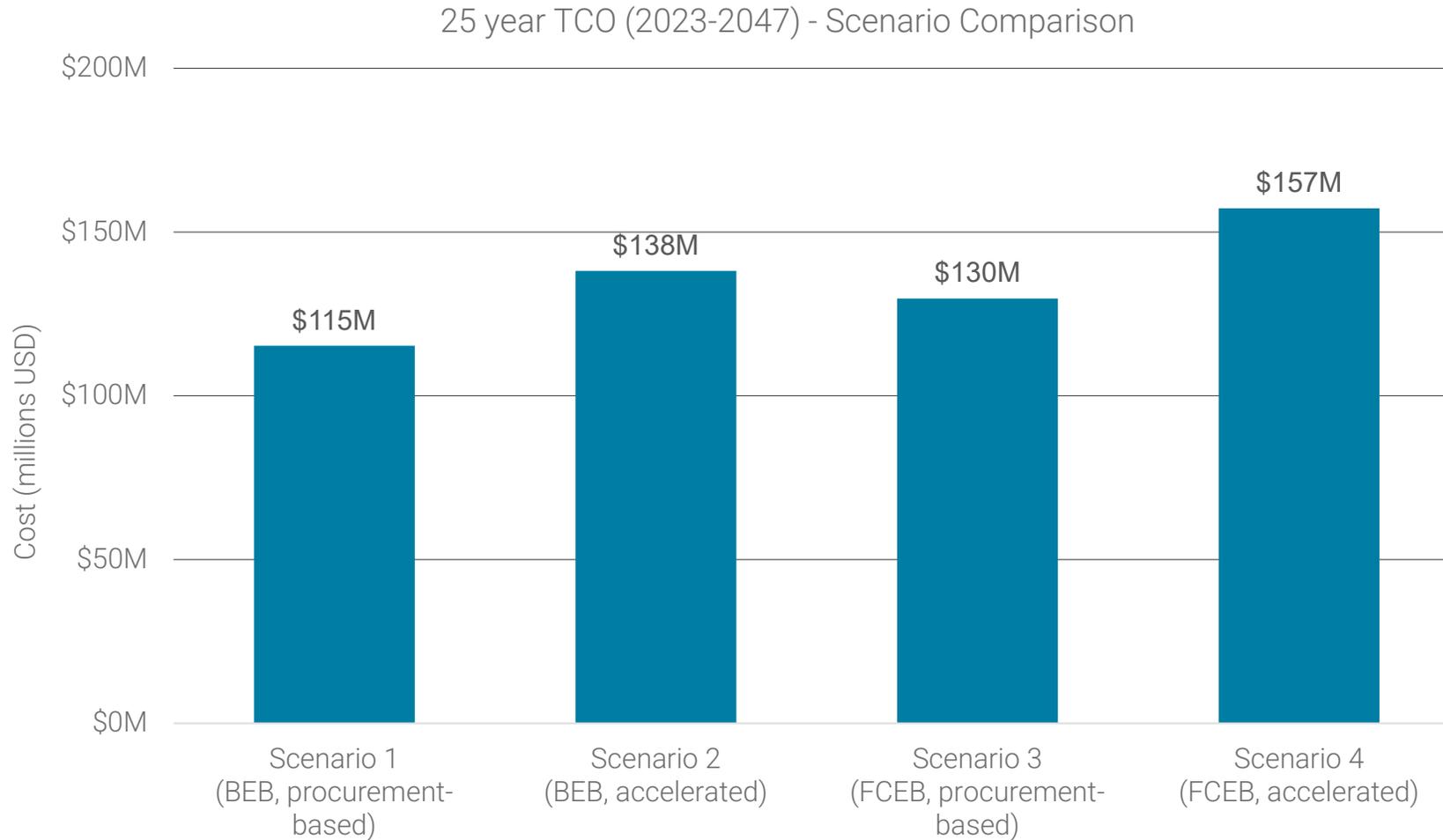
Scenarios Evaluated

<p>Scenario 1: Transition to BEBs, procurement-based approach*</p> <ul style="list-style-type: none">• Annual replacement of 8 buses in line with current procurement practices• Long-range BEBs considered w/ 675 kWh battery• Full fleet transition by 2036	<p>Scenario 2: Transition to BEBs, accelerated approach*</p> <ul style="list-style-type: none">• Long-range BEBs considered w/ 675 kWh battery• Full fleet transition by 2030
<p>Scenario 3: Transition to FCEBs, procurement-based approach</p> <ul style="list-style-type: none">• Annual replacement of 8 buses in line with current procurement practices• 37.5 kg hydrogen tank and 100 kWh battery• Full fleet transition by 2036	<p>Scenario 4: Transition to FCEBs, accelerated approach</p> <ul style="list-style-type: none">• 37.5 kg hydrogen tank and 100 kWh battery• Full fleet transition by 2030

** Assumes 1:1 replacement based on assumed battery improvements. To start transition on easier to electrify blocks, reblocking may be needed.



Scenario Total Cost of Ownership Comparison



After balancing total capital requirements, the timing of investments, and O&M savings potential, and then comparing the *relative* financial impacts of the scenarios, we can make two observations:

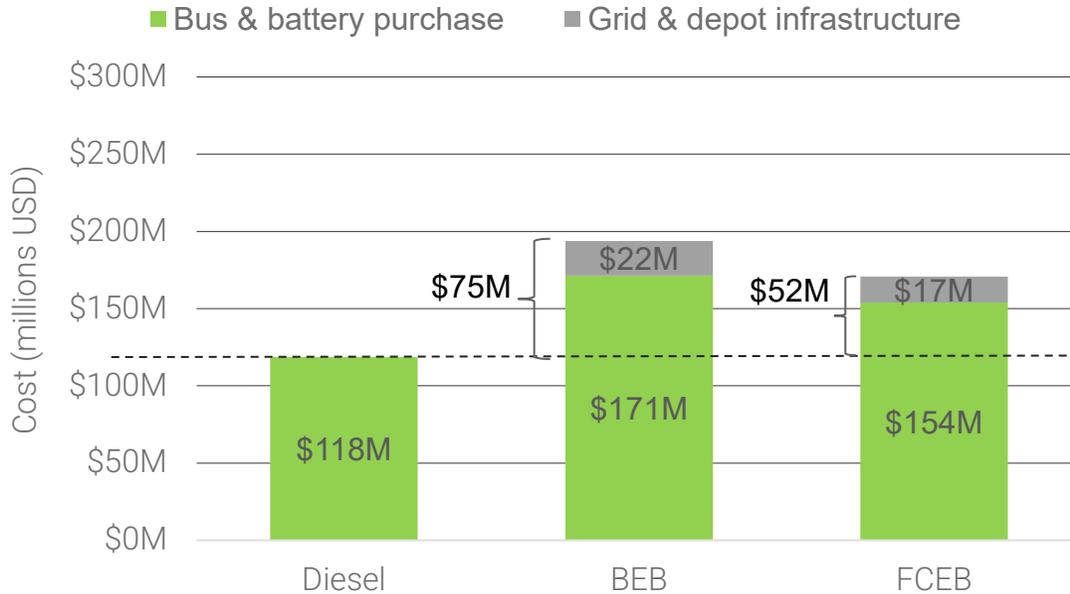
1. The procurement-based approach is more pragmatic than the accelerated approach.

2. Implementing BEBs is expected to have fewer net costs over the 25-year horizon than implementing FCEBs.

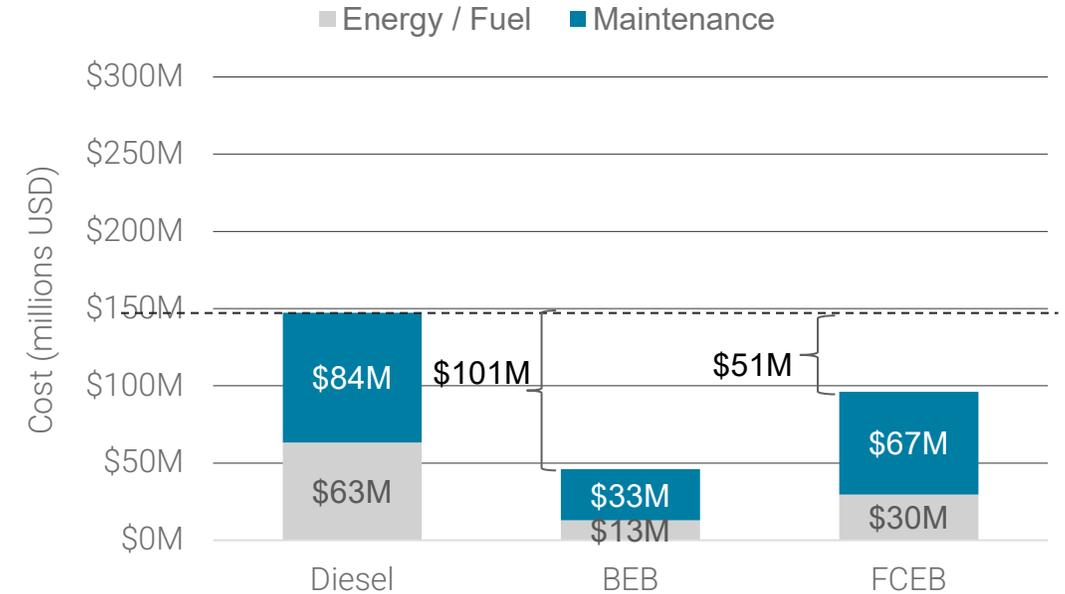


How much will the procurement-based approach cost?

25 year whole of life undiscounted capital costs
Procurement-based approach (scenarios 1 and 3)



25 year whole of life undiscounted O&M costs
Procurement-based approach (scenarios 1 and 3)



Takeaways:

- Scenario 1 requires incremental net capital requirements of \$75M across the 25-year horizon, which includes a \$7.7M investment in year 1 (2023).
- Scenario 1's O&M savings potential across the 25-year horizon is \$101M
- However, future cash flows are sensitive to future vehicle and infrastructure capital costs, which can be difficult to predict. Additionally, the modeling does not account for a possible increase in fleet size which may be required.



Conclusions

- A full transition to ZEBs will impact GHGs in the Ann Arbor area by less than 1%
- ZEBs could potentially result in O&M savings, but an upfront short-term investment up to \$75M over and above business-as-usual will be required

BIGGEST CHALLENGES

Facility constraints

Infrastructure upgrades

Cost uncertainties and technology maturation

Staff and resource capacity

Funding and local matches

BIGGEST OPPORTUNITIES

Pollution reduction and societal benefits

Potential cost savings for fuel and maintenance

Quieter buses



Next Steps

- TheRide will engage with the community and staff regarding the technologies described in this study
- Feedback is being sought. Please visit www.TheRide.org
- TheRide will use the results of discussions to chart a path forward on implementation

