Spokane Transit Authority
1230 West Boone Avenue
Spokane, Washington 99201-2686
(509) 325-6000

Approved at
Board Meeting
10/15/2020

BOARD OF DIRECTORS

Minutes of the September 2, 2020, Special STA Board Workshop Via WebEx Video Conference

MEMBERS PRESENT

Pamela Haley, City of Spokane Valley, *Chair Pro Tempore*
Candace Mumm, City of Spokane
Chris Grover, Small Cities Representative (Cheney)
Josh Kerns, Spokane County
Lori Kinnear, City of Spokane
Tim Hattenburg, City of Spokane Valley
Rhonda Bowers, Labor Representative *Ex Officio*
Veronica Messing, Small Cities Representative (Airway Heights) *Ex Officio*

MEMBERS ABSENT

Al French, Spokane County *(Chair)*
Karen Stratton, City of Spokane
Kate Burke, City of Spokane
Kevin Freeman, Small Cities Representative (Millwood) *Ex Officio*
Mike Kennedy, Small Cities Representative (Liberty Lake) *Ex Officio*

STAFF PRESENT

E. Susan Meyer, Chief Executive Officer
Steve Blaska, Chief Operations Officer
Monique Liard, Chief Financial Officer
Karl Otterstrom, Director of Planning & Development
Brandon Rapez-Betty, Director of Communications & Customer Service
Nancy Williams, Director of Human Resources & Labor Relations
Dana Infalt, Clerk of the Board

PRESENTERS

Kylie McCord, CTE
Steve Claremont, CTE
Cliff Henke, WSP

LEGAL COUNSEL

Laura McAloon, McAloon Law PLLC

---

1. CALL TO ORDER AND ROLL CALL

Chair French called the meeting to order at 1:45 p.m. and Dana Infalt conducted Roll Call.

Ms. Meyer thanked everyone for attending and provided brief introductions.

2. STA Staff Study-Zero-Emission Bus Study and Fleet Replacement Strategy

Mr. Blaska reviewed the fleet conversion alternative analysis of zero emission technology over time. He reported that the objective today is to continue the Board education.

Mr. Blaska noted that Battery Electric Bus (BEB) technology is still immature, but STA should continue to lean forward as far as possible with BEB implementation in the near term and stay postured for opportunities as they arrive. Another conclusion was that there are barriers; BEB is bound by technology limitations, infrastructure requirements and ultimately cost. Also, the conclusion validates the Transit Development Plan (TDP) which includes fully a funded mix of BEB and investment in diesel). Bottom line is any more aggressive options included in the TDP costs more money. Finally, Fuel Cell Technology is way behind due to cost. As those cost implications are addressed, it is an emerging as a strategic alternative that STA had not previously seriously considered in staff planning.

Mr. Blaska specified the Board policy basis which is grounded in *Connect Spokane*. He reviewed the Sustainability Policy and noted that from 2009 to 2011, the Citizen Advisory Committee (CAC) wrestled with what STA's sustainability policy should be and came to the conclusion to adopt the triple bottom line framework for sustainability which talked about sustainability as not only being good for the environment but also as a balance between organization centric environmental measures as well as cost. The Board adopted the CAC's recommendation (Sustainability Policy) in 2012.

He noted other relevant policies in the Comprehensive Plan include Fiscal Responsibility and the Alignment with Agency Priorities (long-term view of investments over time so STA doesn't become over-extended). From a system infrastructure standpoint, staff needs to look at investments over the long term. How STA manages the organization is also set in policy in principles. The Transit Asset Management Plan is essentially how STA maintains assets in a state of good repair. Finally, the Capital Improvement Program (CIP), which is the mid-term plan for investments in capital. He reiterated that all is very well grounded in Board policy.

A subset of the CIP is the Fleet Replacement Strategy. He reviewed the lifecycle of the fleet and noted that it is fully funded through the Transit Development Plan (TDP).

Strategic Analysis**.** As early at 2006, STA studied potential alternatives to diesel-fueled buses. The early analysis led to the introduction of 24 hybrid diesel-electric coaches beginning in 2007. There are 24 Hybrid diesel electric buses in the fleet today based on those decisions. After the oil crisis in 2008, staff revisited the analysis. The new study accommodated the falling prices of diesel, improved clean-diesel technology, growing interest in Compressed Natural Gas (CNG), and the evolving potential of electric drive buses. Staff updated the study on several occasions, the most recent edition published in 2015. At that time, Board members used the study to avoid the politically popular temptation to migrate our fleet to CNG. The Board's education led to wise decision making.

Findings of the 2015 study said: *"The study's conclusion supports a fleet replacement strategy that procures diesel engine buses initially but prepares to shift to battery electric buses at some point during the replacement cycle."* Mr. Blaska noted that at that point, it looked to be the most promising fuel source and was one of the reasons STA did not adopt or further pursue CNG, but started to look into BEB as the future as a result of this study.

The study showed the most promising fuel source for the future was battery electric vehicles. However, one current, critical shortcoming of the battery electric option is none of the battery electric vehicles on the market can operate for an entire service day without recharging. The infrastructure required system-wide for in-route charging stations makes it cost prohibitive to commit to a 100% battery electric fleet at this time. Until the time that advancements in battery technology provide more range on a single charge, there may be opportunities on individual corridors/routes to introduce battery electric buses, but the analysis of these specific opportunities is beyond the scope of this study. He advised that in-route charging needed to be considered on a selective basis because of the additional capital costs. It was concluded that Battery Electric technology was not the fleetwide solution yet but to look at specific corridors where STA may be able to introduce the technology on a selective basis, with in-route charging. In the interim, the purchase of diesel coaches was justified. Recent improvements in emissions and fuel efficiency have minimized the environmental impact. In addition, the total cost of ownership of diesel coaches competed favorably with Compressed Natural Gas (CNG) and hybrid diesel-electric fleets. Also, a diesel vehicle has the capability to use biodiesel. The investment in diesel coaches was warranted because it penciled out better and, from an environmental perspective, it was better than CNG, especially with the opportunity to go to biodiesel as it becomes more available and affordable.

He advised that was the direction the Board set for staff five years ago. Staff are on track and the next phase is implementing, as stated in the 2015 study, on selective corridors. What STA has done is good for the environment, economically feasible when it comes to total cost of ownership, and a benefit to taxpayers because staff have leveraged state and federal funding. STA is poised for the future, not only to take advantage of new technology but also for any emerging mandates and/or initiatives. Appendix B of the plan highlights a few Washington State Initiatives that STA is well prepared to address with a study like this and how STA is currently postured as an organization.

Mr. Blaska noted that CTE has been invaluable and advised there were two detailed studies they completed for STA for the Monroe-Regal and the City Line corridors. They evaluated items such as elevation changes, passenger loads, weather extremes, and cycle times for the vehicles. These studies are what informed all staff decisions about the infrastructure requirements, the buses purchased, and the batteries on those buses. Mr. Blaska thanked CTE staff for making sure STA went into this project with a comprehensive plan.

He updated on the status of selective corridors:

- City Line – 10- 60' battery electric buses – the corridor is fully BEB
- Monroe-Regal (Route 4) – 4 - 40' battery electric buses – purchasing 2 Proterra and 2 New Flyer to determine which manufacturer best meets STA requirements. After an evaluation period, STA will decide whether the remaining four will be Proterra or New Flyer.
- SCC Transit Center and Moran Station – 2 Fast Chargers at each of those locations.
- Boone Northwest Garage - A fast charger and depot chargers

Mr. Blaska said the CEO recently approved Proterra as the vendor to build the infrastructure for the chargers. To the question of are Proterra chargers fully functional with other BEB buses and the answer is, Yes. There is a standard in the industry now that allows STA to serve any BEB put in service in the future. Staff expects the first City Line bus to be delivered in December.

Finally, staff have identified six additional battery electric buses in the TDP that STA may add to the fleet that would not require the in-route charging. That is conditional upon obtaining additional grant support to cover the differential cost of those buses. Staff are fully implementing the guidance from five years ago.

The bottom line is BEB technology costs more to have the infrastructure and operate a battery electric bus fleet. So far, along the lines of being fiscally responsible, all the additional differential costs between a diesel investment for us and investing in electric buses on this corridor have been more than covered in state and federal grants.

He displayed a slide that represented the differential costs from our investment in BEB at this point ($18.3M) . To date, if you look at the projects that are BEB projects and the portion of that which would be specifically applied to infrastructure or the buses, STA received about $24M in state and federal funding. STA's investment in BEB technology is not costing the local taxpayer any additional money.

Mr. Blaska advised there are at least two ways to look to the future. He said he likes to call it the *Universe of the Possible* and said that Napoleon had a saying, "*the logistician draws the line the tactician dares not cross.*" Technology, infrastructure, and costs draw the line STA dare not cross when it comes to how far forward an organization or community should lean in the policies, goals, and objectives they set going forward for this technology.

Now is the time to review and take STA's vision farther and the CTE Study enables STA to do that and then to assess the potential impact on fleet replacement and STA's facility master plan, armed with the facts to look at the alternatives and the costs and benefits of those alternatives.

He reviewed technology and noted it is simply the battery's ability to meet day long service demands without in-route charging. That is still a condition to be applied before STA fully integrate BEB technology fleetwide. He discussed the economic and operational impacts of current and future technology on different routes. He noted the important take away is that even with that assumed increase in technology, 19% of STA service could not be served by battery electric buses. Almost 20% of STA's fleet in 2040, given this projection in technology, is going to be diesels or some other type of bus, regardless of the amount spent.

He asked if there were any questions up to this point. None were forthcoming. Mr. Blaska continued with his report. He noted the other thing that poses limits is the Infrastructure.

Ms. Mumm asked if we accounted for the residual life of the battery in the battery electric bus? She believed that when we initially met with some of the manufacturers, they thought there would be a recapture off the battery that could be sold at a higher value than a regular bus. She asked if we included that in the financial analysis. Mr. Blaska replied that STA did not as we don't know what that is going to be in the future. He advised we aren't in the energy business. The bottom line is, no matter what is done (lease or extended warranty), the additional cost of the batteries is essentially the same. There would be a residual payback for those batteries, we just don't know what the market is in order to evaluate that at this time. He asked Kylie or Steve to weigh in on that topic.

Mr. Claremont noted that they hear that a lot and he thinks it is the hope that the market will develop that way. He noted they have been hearing for the last five years that there is going to be a market for second life batteries to go into battery energy storage. So far, they have not seen where it has actually been priced out. There is a developing market for battery energy storage, especially associated with solar, so they expect that market will develop but so far no one has put a residual value price on it. Also, he noted, something to consider is that some of the batteries or buses are being sold now with an extended 12-year warranty. A lot of those warranties that the bus manufacturer takes the battery back during the life of the bus and at the end of 12 years, you would end up with a shell of a bus without any batteries, thus no residual value. They are basically placing bets on that residual value.

Discussion ensued.

Mr. Blaska continued, stating the Boone Northwest Garage was built to house the battery electric charging technology. He reviewed the capacity of the garage and said beyond that, the study looked at what it would take to retrofit the current Boone garage but, even with an approximate $13M investment, STA could only accommodate potentially 84 additional buses and a new facility would be needed**.**

He noted a decision point. The type of commitment to more than 40 or 50 battery electric buses would need a new, currently unfunded, facility. On a bus per bus comparative basis, he noted they are more expensive from a capital cost (all to do with the battery). Maintenance costs of battery electric drives could be as much as 30% less but when the cost of the requirement to replace that battery pack at mid life (or about 7 years) is added in, then that cost differential goes in favor of current technology (diesel).

CTE took a fleetwide view of the scenario if STA were as aggressive as technologically possible, what would a comparison be between diesel to battery electric to fuel cell. The base option is actually diesel plus our current investment in battery electric buses – so it includes City Line and Monroe Regal.

To foreshadow the potential of fuel cell electric buses (FCEB), you could replace the entire fleet with a fuel cell electric bus. There is not a constraint to the amount of service it could provide.

He reviewed some of the high-end cost comparisons from the CTE study (included in the packet) and reminded that the infrastructure costs for either of the new technologies are additive to our current facility costs and noted the cost and requirements for hosting diesel vehicles continue until all those vehicles are retired from the fleet. He said that it is important to remember that due to space requirements of BEB charging equipment, a new facility is required to house STA's fleet. Similarly, due to fuel handling requirements, a new facility is likely to be required for an FCEB fleet. The cost of a new facility is additive to the cost identified in this analysis. The comparison was done based on a CNG fleet and there are significant differences between a CNG and a Fuel Cell Fleet with electric drive. The fuel cell electric bus is $285M over the baseline and is not at all cost competitive at this point. One of the encouraging things is this relationship between a fuel cell infrastructure and a battery electric infrastructure. Fuel cell, once you build that hydrogen fuel capability, then your cost per bus goes down because you are not making incremental investments as you add buses to the fleet. With the BEB technology, we are putting in enough battery electric chargers for City Line and Monroe Regal. As we add to that fleet, we are going to have to add charging capability. There is an inverse relationship in that your infrastructure costs tend to go up with BEB and down with FCEB fleet.

Bottom line, our conclusion is we've been pretty aggressive. We are as about as forward looking and forward leaning as any transit in the country when it comes to adopting this technology. We want to continue to lean forward with selective BEB implementation; use state and federal resources to offset the increased costs; and then put in key decision points along the way so we can reassess the state of technology and the direction we want to go as battery costs and technology advances.

As presented in the TDP, it is valid to have a significant investment in BEB technology that is fully funded and, to plant a seed, fuel cell buses are emerging as a strategic alternative. One of the things we don't want to miss is we wouldn't want to be in a position where we built a battery electric bus garage with a battery electric charging infrastructure and then all of a sudden, fuel cell is the thing to have. Before STA gets to that fork in the road, there is a need to understand the decision being made at that point.

He reviewed the strategic timeline going forward which completed his coverage of the staff study. Mr. Blaska asked for questions before he turned it over to CTE for their introductions. None were forthcoming.

Mr. Kylie McCord provided a brief overview of CTE and advised they have teamed with WSP, a full-service engineering and design firm to deliver projects. CTE took data from 16 existing STA routes to model the entire service to determine where the ZEB vehicles could be successful and operate. He showed the CTE Zero Emissions Transition Methodology which included Planning & Initiation, Requirements & Data Collection which feed into Service Assessment, Fleet Assessment, Fuel Assessment, Maintenance Assessment and Facilities Assessment which led to the TCO Assessment and ultimately the ZEB Transition Plan. The Transition Scenarios included the baseline, BEB Depot Only Charging, BEB On-Route and Depot Charging, Mixed BEB and FCEB, and FCEB only.

Mr. Steve Claremont discussed the timing of entering the marketplace for any new technology and compared the number of buses on the road today versus ten years ago. Two-hundred transit agencies have deployed or are deploying ZEB. Some agencies are making significant investments in the technology. Mr. Henke confirmed that other agencies are implementing the technology more quickly than the California 2040 mandate and are encountering various budgetary, construction phasing, programmatic issues, and challenges due to the aggressive strategy.

Mr. Claremont explained the ZEB Technology Maturity Model includes: Electric Drive Components (solid technology and integrated), BEB, Charging Equipment - less mature than the stage of BEB, and Standards and Interoperability. There are some still in development that need to be approved by the industry, but the key is leading to a wider level of interoperability which will give STA a choice of vendors in the future.

When considering what is it going to take to scale up, we look at Integrated Control and Dispatch and Monitoring Systems. He reported that technology is viable on the scale STA is planning to deploy in the near term and asked if anyone had questions.

Mr. Blaska thanked everyone for their input. He asked if the CEO or Board members had comments or questions. Ms. Meyer expressed her gratitude to all and noted what great professionals STA has been able to work with on this project.

Pam Haley thanked everyone and said it was a great presentation and she is thrilled to work with people who know so much about all this technology. She noted they made it very understandable and made her feel we really are doing the right thing the right way.

3. ADJOURN

With no further business to come before the Board at this workshop, Acting Chair Haley adjourned the meeting at 1:14 p.m.

Respectfully submitted,

Dana Infalt
Executive Assistant to the CEO
& Clerk of the Authority