CHARGING FORWARD

EVALUATING PUBLIC-PRIVATE PARTNERSHIPS FOR ELECTRIC BUS BASE CONVERSION TO SUPPORT A ZERO-EMISSION FLEET

MOBILITY INNOVATION CENTER
at the UNIVERSITY of WASHINGTON

King County METRO
Moving forward together

DEPARTMENT OF CONSTRUCTION MANAGEMENT
UNIVERSITY of WASHINGTON
College of Built Environments

COMOTION
Your Innovation Partner

Acknowledgements

This research was made possible by funding provided by King County Metro. The authors would like to thank Jeff Arbuckle, and Huoi Trieu for their guidance and support throughout the development of this report. We would like to thank all of our experts who provided their time and expertise on the project. Their insights are immensely valued and very much appreciated.

Authors

Hyun Woo "Chris" Lee, PhD, LEED AP BD+C
Associate Professor, Department of Construction Management, University of Washington

Laura Osburn, PhD
Senior Research Scientist, Center for Education and Research in Construction, University of Washington

Barton G. Treece, III, PTP
Director, Mobility Innovation Center at the University of Washington

Citation

Lee, H. W., Osburn, L., Treece, B, (2023). *Charging Forward: Evaluating Public-Private Partnerships for Electric Bus Base Conversion to Support a Zero-Emission Fleet.* Seattle, WA.: Mobility Innovation Center, University of Washington

Photography

All photos courtesy of King County Metro

Copyright Information

TABLE OF CONTENTS

EXECUTIVE SUMMARY

As transit agencies shift to a zero-emissions fleet, bus bases that function as the heart of operations will also need to convert to support a growing demand for battery-electric buses (BEB). Although there are traditional procurement methods available for transformative redevelopment of these facilities, there is opportunity to leverage a public-private partnership (P3) that can be an innovative and cost-effective project delivery method when applied appropriately and potentially result in several positive outcomes. These may include shifting finance, design, construction, operation, and maintenance risk to a private entity; augmenting and training the workforce needed for electric vehicle operations and maintenance; offering effective ownership and efficient servicing of charging equipment; spreading costs over a longer time period; and locking in energy costs.

The use of P3 for infrastructure is more commonly associated with toll facilities and is somewhat novel in transit. This research report, sponsored by King County Metro (KCM), sought to evaluate if there are policy barriers that prohibit agencies from entering into a P3 agreement, and also identify industry best practices for project and contract development. Through interviews with industry experts and review of contracting documents and existing laws, the research team found a handful of agencies that have used P3 or elements of P3 in transit procurement that may be helpful to KCM and other public agencies that have similar needs and electrification goals.

Key findings

- Public-private partnerships can be used to redevelop a publicly owned facility, such as a bus base, for electrification in Washington and other states such as California, Maryland, and Rhode Island. Although some laws do not explicitly prohibit the use, legislation may be needed to support the practice.
- In addition to financing needs, technology ownership for energy storage, charging and management, and workforce are also considerations for using P3, or elements of P3 like Energy/Electrification/Charging/ Infrastructure-as-a-Service.
- With increased demands for utility providers to upgrade transmission line capacity and operational resiliency, bus base conversions may require the development and management of an on-site microgrid to deliver the electricity needed in the timeline required.
- Engagement with internal stakeholders, coordination with represented labor, and external partners will help define needs, desired outcomes, and support ahead of advertising and executing a P3 agreement.

Providing value to partners

There is growing industry interest in entering into a P3 for transportation electrification. To be successful, a private partner will need to assume long-term agreements and provide expertise that will support a mission-driven transit agency that provides a public service. This type of partnership, at its best, can be a mutually beneficial arrangement that aids in project delivery, but may not be suitable for every bus base redevelopment due to a variety of factors such as acceptable risk and, of course, profitability for a private entity in order to ensure solvency and perform throughout the lifespan of the contract.

GLOSSARY

ATN	Anaheim Transportation Network
BEB	Battery-Electric Bus
CaaS	Charging-as-a-Service
CMS	Charge Management Systems
DB	Design-Build
DBB	Design-Bid-Build
DBFOM	Design-Build-Finance-Operate-Maintain
DBOM	Design-Build-Operate-Maintain
EaaS	Energy-as-a-Service
ESCO	Energy Service Company
IaaS	Infrastructure-as-a-Service
KCM	King County Metro
P3	Public-Private Partnership
P3-ish	Public-Private Partnership that also includes public funding
PDB	Progressive Design Build
PPA	Power Purchase Agreement
RIPTA	Rhode Island Public Transit Authority
SFMTA	San Francisco Municipal Transportation Agency
WSDOT	Washington State Department of Transportation

I. INTRODUCTION

Increasing state, county, and city regulations and standards to achieve zero emissions goals are a driving factor for many agencies transitioning to an electric fleet, often within the next 10-20 years. Despite the accelerated timeline, many local utilities do not have the required infrastructure in place to produce the energy needed to operate an entire fleet of battery-electric busses (BEBs) and support facilities, nor are they able to provide transmission electricity upgrades within the transit agencies' desired schedule. In addition, many transit agencies do not have internal staff who have the expertise required for managing and operating BEB infrastructure, or the required capital to support infrastructure deployment. To meet these challenges, some transit agencies have explored the potential for using a P3 delivery method.

King County Metro (KCM) has long been at the forefront of moving to a zero-emissions fleet as efficiently as possible. Initially committed to achieving a zero-emissions fleet in 2040, the King County Council's "Jump Start" legislation in 2019 accelerated KCM's goal to 2035.[1] Accomplishing this goal requires not only acquiring BEBs and preparing the workforce for BEB facility O&M, but also building the required infrastructure. Currently, KCM has completed the South Base Test Facility and is in design for the Interim Base using Energy Service Company (ESCO) procured under RCW 39.35A (Performance-based Contracts for Water Conservation Services, Solid Waste Reduction Services, and Energy Equipment and Services).[2] A second new, 250-electric bus depot (South Annex Base) is also in design following traditional Design-Bid-Build. To complete their electricity infrastructure work, KCM has to convert seven existing bus facilities to accommodate BEBs, with each BEB facility conversion anticipated to take 18-24 months.[3] With the large number of BEB facility projects requiring conversion within an accelerated timeline, KCM is exploring the use of P3 to reduce up-front costs while providing opportunities to overcome potential challenges to achieving their zero-emissions goal on time, such as acquiring the energy needed to charge the fleet and ensure fleet resiliency during power outages.

This research aimed to evaluate P3 for BEB facility projects, focusing on policy, P3 decision-making, and procurement processes and best practices. This research has the following objectives:

- Determine whether KCM could pursue P3 based on current state and local procurement laws
- Develop decision-making criteria that could be used to evaluate whether P3 would be suitable for new and renovated BEB facility projects for KCM and beyond
- Develop a standardized P3 RFP process for BEB facility projects that could be adapted by other agencies
- Provide a list of common RFP terms and best practices currently used for procuring P3 private partners on BEB facility projects

Methodology

The University of Washington (UW) research team conducted a literature review and interviews and compiled documents to complete this research project. For the literature review, the research team collected 86 documents focused primarily on state, county, and city-level P3 and alternative procurement regulations where BEB facility projects and other zero-emissions transit facility projects had been completed or were being planned. The research team reviewed regulations from eight states, including California, Florida, Maryland, Massachusetts, New York, Pennsylvania, Rhode Island, and Washington. The research team also reviewed reports on BEB facility projects and federal-level P3 policy, as well as news articles and industry public relations materials about specific BEB facility projects. The research team analyzed the literature, through developing memos regarding specific state policies and state BEB facility projects cases and developed a policy table of different P3 regulations and the enablers and barriers to each P3 policy.

For the research project's interview data, the research team interviewed 16 industry experts between June 7 and August 9, 2023, using snowball sampling to identify potential interviewees and concluding data collection after achieving saturation (e.g., repetition of the same themes and best practices). The aim was to collect multiple perspectives on the use of P3 for BEB facility projects (and other transit facility projects) for electrification. The research team interviewed capital projects and operations and maintenance (O&M) staff who have worked on—or are currently working on—BEB facility projects; industry representatives who have worked on BEB facility projects; and policy makers. From the interviews, the research team developed case studies of three transit facility electrification projects using P3 and those that are using elements of P3, (Table 1). To analyze the interview data, the research team developed decision-making matrices for why a certain contracting method was chosen for specific P3 cases and cross-case comparisons of these matrices to determine common decision-making criteria used for P3 in BEB facility projects. The team also conducted a thematic analysis to identify common RFP processes and best practices for BEB facility projects. The research team conducted a cross-comparison of five P3 RFP processes to develop the standardized RFP process in this report.

The research team collected eight RFPs used for BEB facility projects using P3 or DB project delivery, as well as contracts, scope documents, and other project documentation. To develop important RFP terms, the research team conducted a cross-comparison to identify common terms across all RFPs.

Transit case	Number of interviewees	Type of contracting	Partner contribution
ATN Claudina and Manchester Sites	1	Charging-as-a-Service (CaaS) with Power-Purchase Agreement (PPA)	Purchase, installation, integration of microgrid and charging infrastructure.
Brookville Smart Energy Bus Depot	2	Energy-as-a-Service (EaaS) including CaaS	Design-Build-Finance-Operate-Maintain (DBFOM) of canopy and electric charging equipment.
LA Metro East San Fernando Valley Light Rail Transit Line (only solar component)	1	P3	Design-Build (DB) with Phase III quasi-maintenance and operation.

Table 1: Electrification transit cases

II. WHAT IS A PUBLIC-PRIVATE PARTNERSHIP (P3)?

In transportation, P3s are long-term (35-45 years) contractual relationships between a private and public entity that allow for multiple forms of project delivery that include private financing.[4] In this contractual arrangement, the private entity "bears significant risk, management responsibility and remuneration is linked to performance."[5] There are many types of P3s, including Design-Build (DB), Design-Build-Finance (DBF), Design-Build-Operate-Maintain (DBOM), Design-Build-Finance-Operate-Maintain (DBFOM), and long-term lease agreements.[6] Both DBFOM and long-term lease agreements, known as concession agreements, are agreements where the private partner manages the facility.[7]

For BEB transit facility projects, early P3 arrangements tend to be shorter contractual periods, approximately 10-25 years. For these types of projects, P3s can provide added long-term O&M benefits because the private partner can offer a variety of performance guarantees, which contribute to mitigating performance risks and improving reliability and resiliency. Performance guarantees include but are not limited to:

- Long-term guaranteed energy/charging prices with higher predictability and stability on operating expenses (OpEx) and that are unaffected by volatile market energy prices and geopolitics
- Continuous availability of electricity—even during power outages caused by increased severe weather due to global climate change—through full lifecycle maintenance of the electricity infrastructure and decentralized energy solutions such as microgrids, on-site renewables, and battery energy storage
- Performance guarantee for charging infrastructure with 24/7 monitoring of charge management systems (CMS), guaranteed charging on buses for daily services based on agreed operational availability, and responsibility for any damage or repairs needed for the operation of the system with efficient responses to service calls and service dispatch[8]

There are a wide variety of contracting types that could fall within the research team's definition of P3 for BEB facility projects. While some enter into a P3 to develop multi-use facilities (e.g., apartment housing on top of a transit center), most P3s for BEB facility projects fell within the "as-a-service" model. Many of these models fall under the term, Energy-as-a-Service (EaaS). The most common model is Charging-as-a-Service (CaaS), which covers one or both of the following:

- Installation and management of charging infrastructure and billing
- Development and management of both charging infrastructure and energy storage systems[9]

Just as with definitions of conventional P3s, the research team found that in practice, different types of "as-a-Service" terms were often used interchangeably, and in the case of EaaS, the acronym had multiple meanings beyond Energy-as-a-Service, including Electrification-as-a-Service (where bus procurement and vehicle maintenance and leasing are bundled with either CaaS or IaaS), and the Department of Energy's Efficiency-as-a-Service, where a building owner directly purchases energy savings from a service provider, who funds 100% of upfront costs.[10] This research report will use the acronym EaaS for Energy-as-a-service, which includes CaaS. In addition, the report will use the term Power Purchase Agreements (PPA) for long-term contracts between an electricity provider and a customer. This report will note when CaaS does or does not include PPA.

P3 laws in US transit

While most state P3 laws were designed to regulate P3 project development and procurement for toll roads, few were designed with bus infrastructure projects in mind. This has resulted in specific policy enablers and barriers that transit agencies may encounter when trying to apply existing P3 laws to BEB facility projects. These regulatory enablers and barriers center on (1) whether the laws are flexible regarding project type, solicitation method, and P3 process efficiency, and (2) how well the laws protect public interests while providing private entities with enough confidence that they can make a return on their investment.

Key P3 policy enablers for bus infrastructure projects are laws that are written broadly enough to include multiple forms of fee-producing transit infrastructure projects.[11] To that end, laws should provide local government agencies with the flexibility and authority to study, plan, and use P3 when feasible, and allow transit agencies to accept solicited *and* unsolicited proposals.[12] The ability to accept both encourages private entities to offer public agencies project concepts

for future infrastructure investment opportunities.[13] Ideal P3 laws should also require a Value for Money (VfM) approach—a public sector economic assessment to compare bidder proposals against the public sector—to ensure that public agencies select a final proposal that provides the best financial benefit.[14] In addition, laws should designate a centralized state agency dedicated to P3 that can provide local transit agencies with expertise and guidance.[15] Examples of states with P3 legislation that has enabled successful P3 programs are Colorado, Florida, and Virginia.[16]

Key policy barriers to using P3 for bus infrastructure projects are those that limit the ability to use P3 and raise costs for the public sector and create too much risk for private sector entities to potentially gain a return on their investment.[17] P3 laws that only allow for toll roads (and occasionally railroad transit projects) can limit procurement options for local public bus transit agencies. In addition, some P3 laws require inefficient and expensive project development and review processes, which can limit private sector interest while also raising public sector costs during procurement.[18]

Washington P3 law, alternative procurement laws for projects with P3 components

The Transportation Innovative Partnership Program (TIPP), encompassed in RCW 47.29 and WAC Chapter 468-600 WAC,[19] can apply to transit projects; it designates the Washington State Department of Transportation's (WSDOT) Innovative Partnership Office as the central authority and, as of 2018, allows for unsolicited proposals.

Despite these policy enablers, there have been many critiques of TIPP. The Washington State Transportation Commission's review of Washington state's P3 program found that TIPP—a law specifically designed for using P3 to develop toll-related transportation projects—had been ill-suited for use on non-toll projects and led to WSDOT pursuing other regulatory options for procuring P3 partnerships.[20] Of note, WSDOT believed the TIPP process to be burdensome and inefficient for smaller transit projects. The review suggested amending RCW 47.29 so that non-toll projects have different selection criteria, project development tools, review processes, and final approvals, as well as making the Transportation Commission the primary oversight body of these projects.[21]

A 2012 AECOM study benchmarking the TIPP against similar state P3 laws identified similar challenges for implementing TIPP. These challenges had negative impacts for both private and public sector entities engaging in P3s under TIPP. First, current legislation has a lack of protections for ensuring a public agency can share in profits if private sector profits exceed a specific threshold.[22] The law also has a complex system of reviews, procedures, and authorizations that drives political risk, scares private sector bidders away, and harms bidding competition.[23] Furthermore, current TIPP legislation on the P3 procurement process creates delays, which drives up costs for the public sector and can waste more resources if private investors remove themselves from the process.[24] In addition, legislation limits the use of privately arranged or issued debt financing, which would allow private partners to realize a return on equity.[25]

Despite the intention to produce toll-road infrastructure, no toll projects have been developed under TIPP and many P3 projects that could have been developed under TIPP have instead been solicited using alternative procurement regulations. For example, the Edmonds Ferry Terminal used RCW 47.20.785, the Miscellaneous Projects chapter of legislation on Design-Build projects, to do a P3.[26] This statute allows for experimental small-scale DB projects. In addition, RCW 47.12 (Acquisition and Disposition of State Highway Property) was used to allow WSDOT to exchange property for transportation improvements as long as improvements equal the value of state property.[27]

Washington state now has a new avenue for pursuing P3s centered on energy conservation. House Bill 1777, enacted July 23, 2023, authorizes EaaS as a performance-based contracting mechanism and promotes P3s for public owners.[28] House Bill 1777 builds upon current performance-based contracting legislation found in RCW 39.35A (Performance-Based Contracts for Water Conservation, Solid Waste Reduction, and Energy Equipment) and RCW 39.35C (Energy Conservation Projects) and requires coordinating with the Washington State Department of Enterprise Services to determine whether a P3 would be the most cost-effective as compared to other financing mechanisms.[29] Performance-based contracts are still subject to the requirements of chapter 39.94 RCW (Financing Contracts) and, by December 31, 2023, the department will have completed the development of approved model contracts.[30]

III. P3 POLICY FOR BEB FACILITY PROJECTS

The policy review for this report found that BEB facility projects have used multiple legal pathways for soliciting P3 partners. The pathway a transit agency uses is dependent upon the needs of a specific project and the legislative options available at the local and state level policy.

For example, the San Francisco Municipal Transportation Agency's (SFMTA) Potrero Yard Modernization Project is developing a multi-use facility that includes both housing and a modernized depot that will support its ongoing electrification efforts. SFMTA looked specifically for a private developer for their multi-use housing component. While California has been at the forefront of using P3, the city of San Francisco's administrative code limited its ability to enter into a long-term agreement with a developer that could design, build, finance, operate, and maintain a new bus yard. Therefore, the project requested an ordinance to be exempt from the city code, while ensuring project developers complied with laws surrounding prevailing wages, Local Business Enterprise Program (LBE), and the city's local hiring and first source hiring policies.[31]

Alternatively, the Brookville Smart Energy Bus Depot project in Montgomery County, Maryland, partnered with EaaS provider AlphaStruxure, a joint venture between Schneider Electric and the private equity firm Carlyle Group Inc., for a DBFOM P3. The project consisted of the design, installation, and O&M of a 1.6 MW solar array, a 6.5 MW microgrid, 3 MW battery energy storage system, and electric charging equipment.[32] The project solicited an RFQ under Code of Montgomery County Regulations (COMCOR) 11B.04.01 Electricity Procurement Regulations, rather than under the Maryland Department of Transportation's Public-Private Partnership Program (COMAR MDOT 11.01.17).[33]

In comparison, the Anaheim Transportation Network (ATN) partnered with AMPLY Power (now bp pulse) to develop a new construction BEB facility at its Claudina site. This included a solar turnkey solution with the PPA and a separate CaaS contract for the installation, operation, monitoring, and maintenance of BEB charging stations and CMS. The CaaS was procured in compliance with the California Infrastructure Financing Act, which allows local government agencies to enter into P3 contracts.[34] The PPA was procured in compliance with California Code Chapter 3.2 (Energy Conservation Contracts), which allows for and regulates PPAs.[35]

In addition, the Rhode Island Public Transit Authority (RIPTA)'s Dorrance Street Transit Center Project is pursuing a P3 using DBFOM procurement to support key initiatives to transition to fleet electrification.[36] However, Rhode Island, at the time of this report's publication, does not currently have P3 legislation in place. Procurement bill H6001 has been introduced to the Rhode Island senate specifically for using P3 on the RIPTA project but is on hold for further study and has stalled progress.[37]

As summarized in Table 2, this research review found multiple pathways for pursuing P3 procurement beyond using P3 procurement laws. These include using electricity procurement laws, creating new ordinances for specific P3 projects, and using other alternative procurement laws, such as laws pertaining to DB. The likelihood of having to procure under P3-specific laws for BEB facility projects appears to occur more often when the private partner will supply something beyond infrastructure, such as services related to electric battery storage, energy generation, and energy transmission. In the cases of the Potrero Yard Project and Dorrance Street Transit Center, the need for a P3 partner to design, build, operate, and maintain housing requires the need for legislation and codes that specifically allow for P3 and long-term contracting arrangements.

Transit case	Procurement Regulations	Type of P3	Partner contribution
ATN Bus Charging and Solar NRV Charging (Claudina and Manchester sites)	California Infrastructure Financing Act and California Code Chapter 3.2, Energy Conservation Contracts	CaaS with PPA	Purchase, installation, integration of microgrid and charging infrastructure
Brookville Smart Energy Bus Depot	COMCOR 11B.04.01 Electricity Procurement Regulations	EaaS including CaaS	DBOM of canopy and electric charging equipment
SFMTA Potrero Yard Modernization Project	Created own ordinance for city code exemption	Developer for housing	Develop multi-use facility that includes modernized depot for ongoing electrification
RIPTA Dorrance Street Transit Center Project	Previous P3s used procurement code: 37-2-39; RIPTA P3 bill proposed in state legislature	Developer for DBFOM	Transfer hub to support RIPTA key initiatives including the potential transition to fleet electrification

Table 2: BEB facility projects and associated procurement regulations

IV. DECISION-MAKING FRAMEWORK AND SCREENING TOOL

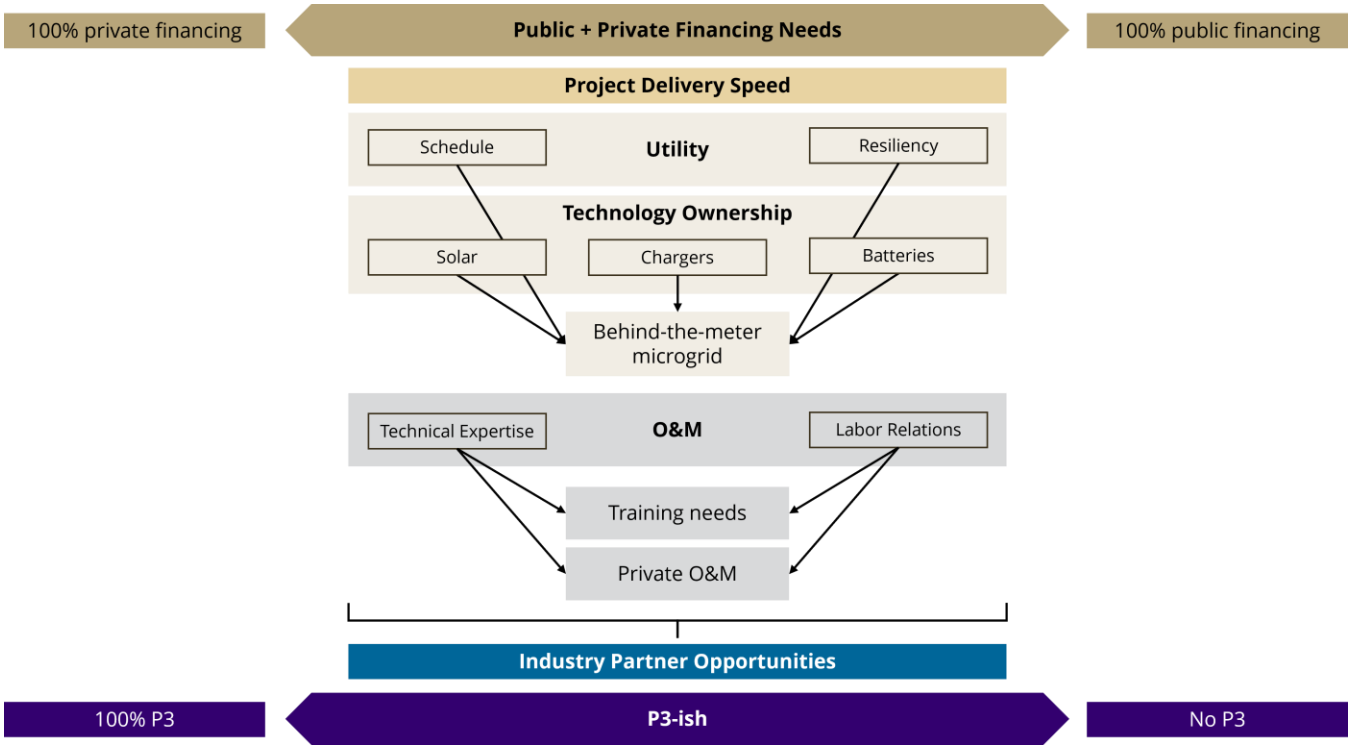

Figure 1: The P3 Decision-making Framework method

The P3 Spectrum

To use the P3 decision-making framework (Figure 1) to screen potential P3 BEB facility projects, the research team developed a P3 spectrum to assist public agencies with their P3 decision-making and understand multiple options available for private financing. This P3 spectrum covers a broad range of long-term private service contracting partnerships to support the development of bus infrastructure electrification. This spectrum moves from what we do not consider a P3, or "No P3," to "100% P3." The spectrum itself is based on the financial risk that the private entity takes on for the project. At 100% P3 (the far left of the spectrum), the private entity accepts 100% of project capital costs. Often these private partners provide multiple services, including charging and energy storage infrastructure design operations and management and vehicle maintenance.

On the far right of the spectrum are services that the team does not consider a P3. In this report, these can be DB, DBB projects, or energy service contracts where public entities accept 100% of the risk for upfront installation costs and own their assets throughout the contract. An example of this is KCM's current use of an ESCO contract on the Burien Transit Center, which does not require a performance guarantee or private financing of the project.

In between are contracting types that this research report calls P3-ish, with variations of public and private funding on a single project. Where on the P3-ish spectrum a transit agency fits is dependent upon the varying degrees of financial risk that each of the private and public entities is willing to assume. The more risk taken by the private partner, the closer the public entity is to having a 100% P3. The more risk the public partner takes on, the closer the public entity is to engaging in a project that is not a P3.

Whether to use a P3 and what type of service contract you need depend greatly on six decision-making factors.

Each of these decision-making factors has its own array of questions that an agency should answer when determining whether a P3 is viable and what type of P3 could be used. In addition, a transit agency will need to make some core decisions around whether to develop its own form of energy generation (e.g., a microgrid) in addition to the utility's grid, and what O&M needs or requirements may affect the type of P3 that they can enter. Subfactors that determine these decisions are highlighted in bold below.

How to Use the Framework, Decision-Making Factors

The transit agency should answer the relevant questions listed for each factor and subfactors in the P3 decision-making screening tool (Table 3), using the decision-making framework (Figure 1) as their guide to move through each factor and determine positioning in terms of the P3 spectrum. These answers will require engagement with internal and external stakeholders. Transit capital projects staff should meet with their utility, fleet, O&M personnel, and other stakeholders (e.g., consultants and other transit agencies) with the expertise needed to help answer the screening questions.

1. Public and Private Financing Needs

This factor asks how much a transit agency requires in terms of private versus public funding. Determining financing needs depends upon Factors 2-5, which will help estimate the total **Project Capital and Operating Costs** and potential long-term **Project Operating Savings** according to baseline fuel spendings. Transit agencies will need to know their service profile assumptions, equipment costs, long-term utility costs, and O&M costs. Once costs and savings are determined, the transit agency needs to decide on **Financial Risk Tolerance**, which depends upon current budgets, capital planning, and accessibility to public funding.

2. Project Delivery Speed

This factor concerns the design and construction schedule requirements for the transit agency. Many transit agencies with mandates to convert to a zero-emissions fleet need to achieve this goal between 2035 and 2040 and require faster project delivery times than usually seen on DBB and DB projects. P3 has the potential to expedite project delivery, such as in the case of the Brookville Depot, which broke ground in 2021 and was completed by 2022.[38] A transit agency's project delivery schedule requirements will determine whether there could be conflicts with a utility's schedule.

3. Utility

One of the key decision-making factors for using P3 is the capability for the utility to meet the transit agency's increased electricity demand and required **Resiliency** for BEB facility projects. First, many utilities are not able to supply the power required for transit's growing electricity needs due to rapid electrification. Utilities that deliver a transit agency's increased electricity demand may need to upgrade their transmission capabilities. However, a utility's upgrade **Schedule** often conflicts with many transit agency's electrification timelines set by state or local zero-emissions laws or self-imposed by the transit agency. These **Schedule** conflicts between the utility and transit agency can lead to a need for a P3, as well as lead to the need for an on-site microgrid as a solution. Second, even if a utility can perform the upgrades on **Schedule**, they may not be able to provide the type of **Resiliency** a transit agency needs. For example, a utility could build out their infrastructure to meet a BEB facility project's needs, but if another public entity indicates that they will require more power, there may not be sufficient energy for the new BEB facility project once construction is complete.

Concerns about resiliency also may lead to a transit agency viewing a microgrid as a potentially appealing option. Microgrids have been used in BEB facility projects to improve fleet resiliency during power outages, and to better manage peak electric demand times to reduce costs. Decision-making related to utility **Schedule** and required **Resiliency**, in combination with decisions about Technology Ownership related to **Batteries** and **Solar** energy storage, will help the transit agency determine whether they need to build, operate, and maintain an on-site microgrid.

> **It Isn't just electrifying a depot; it's also making the depot resilient to provide continuous service during an emergency.**
>
> *—Transit owner representative*

4. Technology Ownership

This factor refers to what technology is needed and who would own the technology for BEB facility projects. Electricity infrastructure for BEB requires utility grid improvement, energy generation (whether on-site energy production, which is often **Solar**, or a mix of on-site production and drawing from the utility's electrical grid), transmission (e.g., **Chargers** and charge management systems), and energy storage (e.g. electric **Batteries**). Transit agencies should identify the technology required, whether they will retain ownership of any electric technology or systems, or whether it is preferable for a private vendor to take on ownership of any—or all—of the electricity infrastructure, and finally whether the utility company can meet the increased demand. Decisions made related to energy generation and storage—in addition to utility decisions regarding **Schedule** and **Resiliency**—will influence a decision on whether the transit agency needs to build, operate, and maintain a microgrid.

5. O&M

Decision-making factors related to O&M center on current and needed **Technical Expertise** to operate and maintain high-voltage electricity infrastructures, as well as workforce **Labor Relations**. Both **Technical Expertise** and **Labor Relations** affect whether a private partner can hire its own O&M professionals, contract out current transit agency staff, or train the transit agency's employees to operate and maintain the newly installed electricity infrastructure. In terms of **Technical Expertise**, a transit agency should ask whether it currently has existing staff with the expertise needed to manage and operate high-voltage electrical equipment and systems, including those who can navigate tariffs and permits, as well as operate and maintain cybersecurity and CMS. If this expertise is not already within the agency, the next question an agency should ask is whether it has the resources to train staff to take on all new high-voltage electricity infrastructure and assets. If not, then they will need a partner who can either bring in its own O&M staff or train public agency staff. In terms of **Labor Relations**, transit agencies should identify the boundaries of existing labor agreements regarding O&M staffing and determine where negotiation may be required. Answers to these questions can help determine whether a P3 is possible and, if so, to what extent it includes O&M.

6. Industry Partner Opportunities

This decision-making factor asks two things:

- Is the agency financially stable enough to attract a private partner?
- Would the agency's final decisions for Factors 2-5 provide a private partner with enough financial benefits to outweigh project risks?

The Decision-Making Framework Screening Tool

Transit agencies should use his tool to engage with both internal and external stakeholders to explore what type of P3 opportunities may be available for a BEB facility project and where a BEB facility project may fall on the P3 spectrum.

Considerations prior to pursuing P3 for bus facility electrification

Are there laws in place that allow P3 procurement for BEB facility projects?

- Does your state, county, or local government have P3-enabling laws?
- Are there other alternative procurement laws that would allow a P3 (e.g., electricity procurement codes that would enable EaaS or CaaS, or alternative procurement codes)?

Are there laws in place that allow for contracting with energy service companies?

Public Vs. Private Financing Needs

Project Capital and Operating Costs

Are the total project capital and operational costs more than you can fund?

- What is your service plan?
  - What are your anticipated route schedules/headways?
  - What are your route or block distances?
- What are the equipment and software costs?
  - How many more BEBs will you buy that need to use the facility?
  - What charging technology are you using, or plan to use?
  - What CMS will you use?
  - What new equipment will you need? (e.g., chargers)
- What are the O&M costs?
  - Are your O&M staff trained for operating and maintaining electrical equipment?
  - If not, what is the cost of training?
  - Do you have sufficient staff? What are the costs and timeline for hiring additional staff or support?
- What will the long-term utility costs be?
  - How will utility costs over time compare to the price of a EaaS or CaaS service?
- What is the total cost of the project?
  - How much CapEx do you need?
  - How much OpEx funding do you need?

Project Operating Savings

What is your potential cost differential for electrification?

- What are the current fuel & maintenance costs?
- What are the long-term fuel & maintenance savings with electric?
- Are there any federal and/or state carbon credits available?

Financial Risk Tolerance

How much financial risk do you want to take on?

- What risks can you currently cover in your capital and operating budget?
- What are the risks of cost overruns?
- Will you require a performance guarantee on any of the technology?
    - How to guarantee long-term fixed energy/charging prices?
    - How to guarantee continuity of electricity?
    - How to guarantee availability of charging infrastructure?

Which portions can or should be publicly funded and what can be funded privately?

- How much private financing will you need?

Project Delivery Speed

What is your schedule for completing a BEB facility project?

- Does your agency have a fixed timeline to make a facility operational?
    - Is there a public policy requiring fast speed to completion?
    - Is there a mandated due date to convert to all electric? If so, how soon is that due date?
- Do you need to expedite design and construction?

Utility

Schedule

Can the utility meet the increased electrical demand needed?

- How much charging is needed on site?
- Is the current grid's capacity sufficient for forecasted operational requirements?
- If the capacity is not sufficient, will the utility be able to perform upgrades to achieve the needed demand?
- How long would the upgrades take?

Can the utility deliver a solution within your scheduled timeframe?

- Does your agency have a fixed timeline to make a facility operational?
- Will you need a microgrid to meet your agency's goals?

Resiliency

Does your facility need to be operational even when the utility power is disrupted?

- How does your facility need to function during an emergency?
- Can this need be met by the utility or must you resolve behind the meter?

Will you need a microgrid to operate during an emergency?

- Does the utility support behind-the-meter microgrid?

Technology Ownership

Who will own the technology for energy generation/solar, transmission/chargers, and storage/batteries?

- Will the utility retain ownership of any electric technology or systems?
- Do you want a private vendor to take on ownership of any of the electric technology or systems?

O&M
Technical Expertise
Do you have O&M staff with the expertise needed to operate and manage your high-voltage electrical equipment and systems? • Does your O&M staff have expertise in operating and maintaining high-voltage electrical equipment? • Can staff navigate electricity operations and maintenance? • Can staff operate and manage a microgrid? • Do you have Charge Management Software (CMS), or will you need CMS? • Are there staff with expertise in CMS? • Do you have staff that can monitor and manage the CMS 24/7? • Are cybersecurity systems in place or will you need them in place? • Are there staff with cybersecurity expertise? • Will your staff need training to manage all these systems?
Workforce labor relations
Are your O&M workers represented by a union? • Do existing labor agreements prohibit the use of private O&M contractors? • Do existing labor agreements prohibit a private company from hiring your workers as employees? Do you need to train your staff to perform O&M of high-voltage electricity infrastructure and assets? • If so, will your private partner provide the training? Will labor unions provide training? Will the transit agency provide training?
Industry partner opportunities
Are you in a financially stable position for a private partner to be willing to enter into a long-term contract with you? • Can your transit agency guarantee scheduled payments? • Does your agency have a good credit rating (e.g., AAA, AA+)? Does the project provide a private partner with enough financial benefits to outweigh project risks? • Would labor agreements preclude P3 as a suitable long-term cost model for owner and developer? • Are there design criteria that could prevent a developer from building the best possible option?   ○ Could these design criteria be changed or amended? • Are there any policy restrictions that would prevent your agency from sharing profits with a private partner?

Table 3: Decision-making Framework Screening Tool

V. THE P3 RFP PROCESS FOR BEB FACILITY PROJECTS

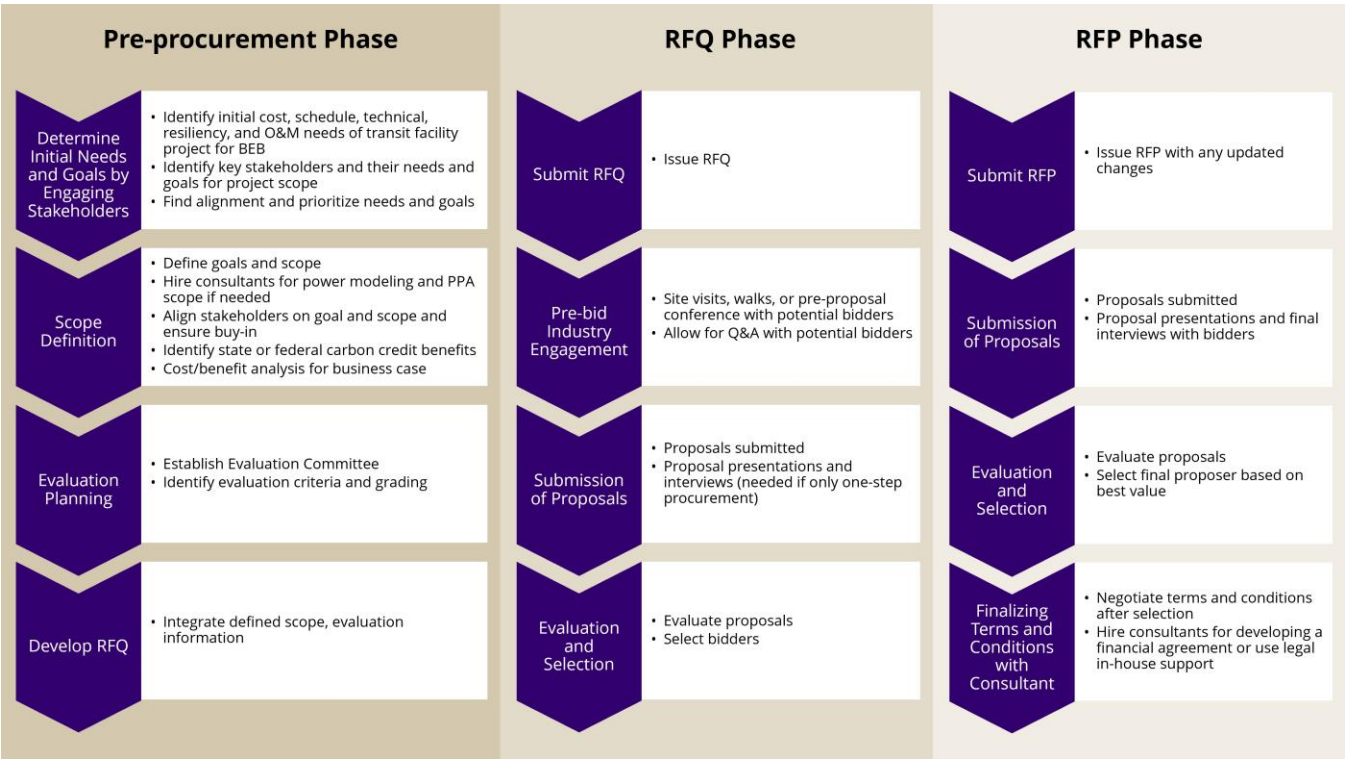

Figure 2: The RFP Process Map for BEB facility projects

The RFP Process Map

The RFP process for BEB facility projects can be adapted by transit agencies as a one or two-step procurement process (Figure 2). The RFP process is intended for a solicited RFP process. Any private sector entity interested in sending an unsolicited proposal to a transit agency should first discuss with the agency if an unsolicited proposal would be of interest or is compliant with transit agency procurement rules and regulations.

For this report, the research team found that the majority of transit facility electrification projects were conducted with a one-step procurement process. The bulk of activity occurs in the pre-procurement phase where in significant planning, stakeholder engagement, and information-gathering occurs. If the pre-procurement phase is well developed with clear project goals, outcomes, technical requirements, and evaluation criteria, this will provide a robust foundation that will allow transit agencies to spend the rest of the procurement process focused on engaging with potential industry partners and evaluation and selection.

Pre-procurement phase

1) Determine Initial Needs and Goals by Engaging Stakeholders. To determine the scope of a BEB facility project, the transit agency will need to identify the initial needs and goals of the project. This includes determining desired project outcomes, estimated (and desired) capital and operating costs, schedule needs (such as meeting a specific policy deadline for electrification), technical requirements (e.g., types of chargers, batteries), resiliency needs, and O&M needs for any new electrification infrastructure construction or renovation project. Identifying these project needs and goals will require engaging both internal and external stakeholders.

To engage with stakeholders, identify key personnel within the transit agency who will be affected by the project (e.g., O&M staff, coach operators, compliance staff, finance staff) and meet to discuss what each their needs and goals for the final project outcome to be a success. External stakeholders who will be affected by the project, including the local utility, other transit agencies that may be involved in the project, municipalities that the transit agency may need to coordinate with, and permitting and legal stakeholders to determine procurement requirements and estimated timelines. Identify where different goals and needs align with both internal and external stakeholders. If there is a lack of alignment, and a project is still required to meet agency goals, the transit agency should analyze how support could be generated based on political, cultural, or agency values and mission.

2) Scope Definition. With clarity on the final goals and scope for the project, informed by stakeholder engagement, the next step is to define the scope concerning required essential components, including energy and technical needs and estimated capital and operation costs for the RFQ or RFP. A consulting firm may provide the necessary capacity and expertise to conduct independent energy modeling and estimate operating costs. Experience with PPA and other types of P3, such as CaaS or EaaS, would be valuable to a public agency. Transit agencies will also want to identify any state or federal financial benefits—such as carbon credit, tax credit, and tax incentives—and conduct a cost/benefit analysis to develop a business case and determine whether a private entity would be interested in the proposed work. When the scope is defined, the transit agency should reengage internal and external stakeholders to ensure there is concurrence.

4) Evaluation Planning. Plan for the proposal evaluation process prior to issuing the RFQ or RFP. Evaluation planning should consist of establishing a selection committee that is representative of stakeholders who will be most affected by project outcomes and can provide expertise during evaluation, such as capital projects, fleet management, and O&M. The committee could include consultants or internal stakeholders with expertise on energy concepts and electrification-related P3 agreements. The selection committee should also identify and document proposal evaluation criteria as well as how each criterion will be weighted and graded. Final evaluation criteria information should be in the RFQ and RFP.

5) Develop RFQ. The final step in this phase is to develop the RFQ/RFP by integrating the defined scope and evaluation information. Other key information for RFQ and RFP development can be found in the RFP terms section of the report

RFQ phase (or RFP phase if one-step)

1) Submit the RFQ or RFP.

2) Pre-bid Industry Engagement. The quick pace of technological innovation in the BEB field and the emerging interest in using P3 for BEB facility projects means that potential private partners will have several questions regarding technical details and other aspects of the project scope. Transit agencies should ensure there is at least one or more activities scheduled for the industry to engage in Q&A with procurement team members about the project. Site visits or a pre-proposal conference with potential bidders will allow industry firms to ask questions and raise concerns that the agency may not have anticipated. This can also allow the transit agency to make any needed amendments to the solicitation if needed based on questions and feedback.

3) Submission of Proposals. After pre-bid industry engagement, proposals should be submitted by the published due date on the RFQ or RFP. If this is the only procurement step taken, proposal presentations and interviews with potential bidders and their project teams are needed.

4) Evaluation and Selection. The selection committee should evaluate the proposals based on the evaluation criteria developed in the Pre-Procurement phase and written in the RFQ. If this is a two-step procurement, the selection committee should select the bidders they will invite to the RFP Phase. If this is the final step of the procurement process for the project, the selection committee will need to select the final bid based on best value and then finalize terms and conditions, working with a consultant if needed (see RFP Phase).

RFP phase (two-step procurement)

1) Submit RFP. For a two-step procurement, a transit agency should issue an updated RFP with any changes to the project scope that were identified during the RFQ phase.

2) Submission of Proposals. Proposals should be submitted on the published due date. The selection committee should arrange for proposal presentations and interviews with potential bidders and their project teams.

3) Evaluation and Selection. The selection committee should evaluate the proposals based on the criteria developed in the pre-procurement phase and written in the RFP and select the final bidder based on best value.

4) Finalizing Terms and Conditions with Consultant. After selection, the transit agency should negotiate contract terms and conditions. Transit agencies should consider hiring consultants to develop the financial agreement or use in-house legal support.

VI. RFP TERMS

The research team identified common RFP terms using a comparison analysis of terms found in eight RFPs used for transit facility electrification projects using P3 or performance-based contracting. Key terms and information are listed in Table 4. Transit agencies may want to include more information in their RFPs depending on their project and procurement compliance needs.

Project description or summary	A short summary of the project including the type of services or activities solicited
RFP timeline	A list of any important dates and times during RFP process (e.g., pre-bid industry engagement activities, submission due dates)
Instructions to submitters	Information to submitters on where and how to submit questions about: • RFP • Proposal formatting and other submission requirements Materials to submit may include: • Financial forecasting of partner • Design and construction documents • Any other forms required by the transit agency
Scope	Scope information about the project. Scope information should include: • Project goals and objectives • Schedule • Project delivery services being requested (e.g., DBFOM), • Project requirements (e.g., design, construction, financial) • Risks that the private partner and the agency will be responsible for and the desired compensation structure • Information related to O&M (e.g., whether training will be included as service)
Evaluation	Evaluation information detailing: • Who will be evaluating the proposal (e.g., selection committee, transit management) • How the proposal will be evaluated including the criteria and grading system • The proposal evaluation process
Location and site information	Location and site information should include: • Utility information • Physical characteristics and anticipated energy consumption of the project
Other terms and conditions	Any other information or documentation needed to meet federal, state, local, or organization compliance requirements

Table 4: RFP Terms

VII. RFP BEST PRACTICES

The research team identified multiple RFP best practices for BEB facility projects. These best practices emerged from interviews with transit owner representatives, O&M personnel, and industry partners for BEB facility projects.

Stakeholder engagement and communication

BEB facility projects affect a range of stakeholders with different project needs and goals (Figure 3). Sometimes these needs and goals will align, other times they may seem to be at odds and need to be reconciled or—at the very least—acknowledged. To better understand where alignments and tensions may occur requires both internal and external stakeholder identification and engagement. Capital project managers should identify and engage with internal and external stakeholders early in the process to identify different needs and goals and build trusting relationships to help with future stakeholder alignment and project scope consensus and support. In addition, early internal stakeholder engagement will help identify individuals who should be on the selection committee during the RFP process.

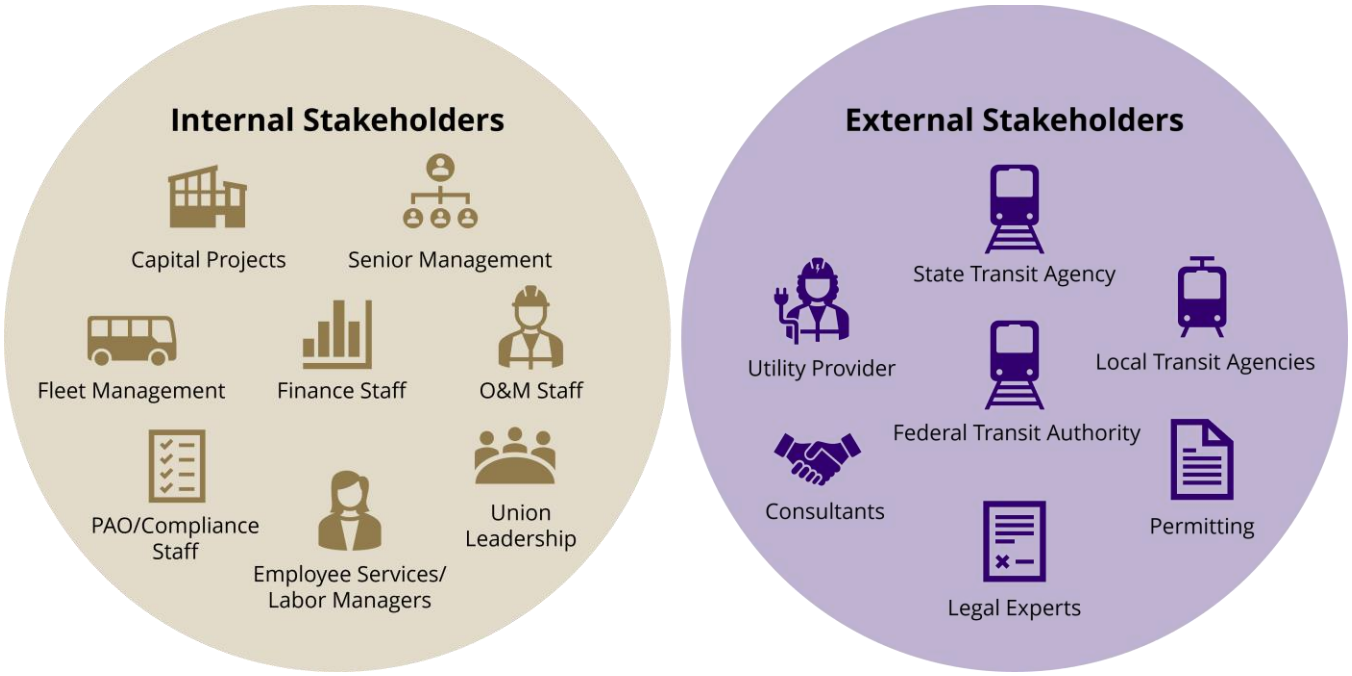

Figure 3: Internal and external organizational stakeholders

> **This is not a normal procurement process... It's getting the right people who are running the buses, operating and maintaining the depots, the people who are involved with the energy concepts, all into that selection process. That's probably the most important thing.**
>
> *—Transit agency owner representative*

Engage internal stakeholders to begin early goal alignment and determine what type of P3 is appropriate. Identify early in the RFP process any stakeholders within your transit agency that will be most affected by the project and who may have the most impact on the type of P3 that your agency may be able to pursue. Key internal stakeholders are capital projects, fleet management, and O&M staff, and any agency's unionized workforce that would be affected by a P3. Once stakeholders are identified, they should be engaged to determine their needs and goals for the project, and if there are any concerns for using P3. O&M staff and unionized workers are particularly key to determining whether you can use a P3 that includes O&M or whether the private partner will need to train your agency's current (and future) staff. You should engage with O&M staff and any unionized workforce at the beginning of the Pre-procurement Phase to begin having discussions on what current O&M staff may need to support or complement their work with operating and maintaining future charging infrastructure, CMS, and other electricity infrastructure needed on the project. Evaluate potential opportunities a P3 could provide to augment existing staff resources and capabilities.

Engage external stakeholders to begin early alignment, identify potential complexities, and plan for multi-agency coordination. There are a broad range of external stakeholders who will be affected by the transit facility project for BEB and the use of P3, or who can provide important expertise on the project or the RFP process. Key external stakeholders include other state or local transit agencies, utilities providers, permitting authorities, legal experts, and consultants who may help augment existing agency staff and have experience in conducting energy power modeling or developing P3 financial agreements in the BEB industry. Other external stakeholders include city, county, or state agencies that will be affected by the project or whose input is required on the project to better understand their needs and concerns and to determine whether any multi-agency coordination is needed. Early engagement includes identifying the best stakeholder contact, discussing with each stakeholder their needs, concerns, and desired goals for the project, and identifying the best methods for multi-agency coordination. This engagement time can be valuable for building trusting relationships through listening to each stakeholder's needs and having honest discussions about what the transit agency can do (and what they may not be able to do) to meet those needs.

RFP Information

A successful RFP will have enough information to allow potential bidders to understand what is most important for the owner, the criteria that a project needs to meet, and general project requirements for the transit facility project for BEB.

Have a well-defined scope. Designing BEB infrastructure requires understanding types of buses that will be purchased and in existing rolling stock, the type of charging infrastructure your transit agency will use (whether the chargers will come with the buses and then be installed or whether they will be first built into the facility), and any energy generation infrastructure required. A well-defined scope also includes knowing facility power demand, fleet schedule, and energy requirements, and whether O&M support or staffing is needed. Gathering all this information will help you evaluate which P3 would be most appropriate for the project. A clear understanding of the technical needs for the site will also be required before the concept and preliminary design move into the next phases of the procurement. For a well-defined scope, an energy services consultant may be valuable to bring new ideas and technical clarity to the project.

> **"One of best practices is to make sure that all your stakeholders have bought off on the scope that you're procuring specifically as it relates to operations and unions and zero emission buses and things of that nature. You want to make sure that you're procuring something that your partners on the other side of the hall are familiar with and agree to, and you're both looking at the exact same thing.**
>
> *—Transit agency owner representative*

Clarify owner criteria and project goals in the RFP. Owner criteria and goals may concern the budget, funding strategy, operational requirements, schedule, and particular agency goals, such as ensuring transit efficiency or sustainable design goals. Clarity regarding owner expectations and criteria for success will help potential bidders be specific and direct about how their proposal will address project criteria and how successful or not successful their project could be.

Include any information on software and data requirements. Software management, data collection, data reporting, and cybersecurity monitoring are all integral to managing a BEB facility. Specify any software and data needs in the RFP to ensure IT systems for electricity infrastructure align with agency needs.

Proposal Evaluation

Successful proposal evaluation requires asking the right questions of bidders and establishing a good working relationship with your potential new partner.

Develop evaluation questions that reflect the different expertise of the selection committee. Each committee member brings their own specific expertise to the table. It is essential that evaluation questions and review capture this to ensure different points of view are reflected in each proposal. Provide adequate time to evaluate if the project will meet the needs and goals of the fleet, O&M staff, or capital project delivery to select a proposal that is best value for your agency.

Focus on the interview process and on the team. Thorough evaluation of proposals means carefully reviewing each proposer's approach to meeting your project criteria. To that end, the interview process can provide a valuable opportunity to see how a proposer would operate as a team and as a partner on the project. Include agency personnel who will ultimately interact with the successful proposer (e.g., contract administration, engineering design, and finance staff) to meet with each bidder to understand how they would potentially work together. Look beyond whether an individual understands their role on the team and instead ask questions the bidder would have to problem-solve together to better understand team dynamics and communication style.

> **"I believe as an industry we place way too much emphasis on the binder that they hand us with their proposal in it and not enough emphasis on how they operate as a team. With a P3, that's incredibly important because you have your finance partner, your builder, your designer, sometimes the developer. Bringing those people in and seeing how they operate as a team is much more important than, "do they understand their role on the team."**
>
> *—Transit agency owner representative*

Managing BEB infrastructure complexities

BEB infrastructure comes with a range of complexities involving specific external stakeholders, such as utilities, permitting agencies, and other transit agency partners. There are also distinct complexities related to risk management and insurance, supply chain challenges, and technical expertise. Transit agencies should identify and plan for these challenges early in the RFP process and throughout the project.

Engage your local utility early in the pre-procurement process to gather information and engage in P3 decision-making. The local utility provider will be an important partner on the project. Early engagement is essential to gather site and energy information for the RFP. These discussions will help determine whether the utility will be able to provide the energy needed, or types of upgrades that may be necessary for the project and the timeline required. There may

also be site complexities that could impact how much energy the utility could provide. The utility's ability to meet your project's energy needs on time will directly impact whether you need a P3 that includes constructing a microgrid for on-site energy generation.

Identify the permitting authority that will have jurisdiction on the project and prepare for their requirements and turnaround times. The permitting process on BEB facility projects can be onerous. If you are working on multiple BEB facility projects that span multiple permitting authorities, know that each permitting authority may have different turnaround times, requirements (e.g., fire code), and critical paths to completion. Identify who the permitting authority will be for each project and identify permitting processes, lead times, and requirements for approval.

Plan for fire risk management. BEBs have unique risk management concerns in relation to batteries and bus fires. Permitting agencies and transit agencies are increasingly concerned with fire risk management and how the agency will maintain, monitor, and contain batteries and BEB fires, as well as any structures that may be affected by a fire. Think through potential fire risks and risk management plans when developing your RFP.

Know what type of electrical equipment you need in the RFP process. There can be long supply-chain lead times for BEB infrastructure equipment that can affect your schedule. If your P3 partner will own the charging and storage equipment, they should begin procurement earlier in the project. If you are working with the local utility to procure equipment, you will want to work closely with your utility to ensure they are willing to work in parallel during design to start procurement as soon as possible. Having a clear understanding of the type of equipment needed, and the technical requirements in the RFP can also help to begin procurement earlier in the project.

Develop partnerships with other agencies, cities, and jurisdictions. BEB facility projects require coordinating with other cities, jurisdictions, and public agencies that have authority on the project. Identify appropriate representatives to work and coordinate with on the project during design and construction. Engage with these individuals as early and often as possible to build trusting relationships through listening to their concerns about the project or their own organization's goals for the project and keeping the lines of communication open throughout the RFP process.

Plan for acquiring or developing the expertise needed to operate and maintain BEB infrastructure. Many transit agencies lack in-house staff with the expertise or do not have sufficient staff capacity needed to operate and maintain BEB infrastructure, particularly if you are developing a microgrid or building out charging infrastructure at multiple locations distributed across the county. Some private partners will bring in or contract their own O&M staff to manage your system. If your private partner is unable to conduct all O&M duties on site, ensure (1) that current and future O&M staff receive training on electrical O&M, and (2) that your P3 includes having your private partner develop and run a comprehensive training program on the management of charging equipment, battery storage, and energy generation.

> **"You're going to have a contract with a company for 25 years. You have to make sure that you can get along and you understand the people that you're dealing with, and that they have the same kind of goals and objectives.**
>
> *—Transit agency owner*

VIII. EVALUATION FOR KING COUNTY METRO (KCM)

First, the research team analyzed procurement laws to determine whether KCM could pursue P3 for its BEB facility projects. Second, the team applied the P3 decision-making framework to develop a case study that aimed to assess whether P3 procurement would be a good fit for KCM's project. The research team used the questions in the P3 decision-making screening tool to identify opportunities that P3 and determine the type of P3 to pursue.

Policy considerations: Can KCM use P3 for BEB facility projects?

KCM should be able to lawfully use P3 for their BEB facility projects, although the type of project delivery and project scope will determine which regulations will apply. First and foremost, it is possible that KCM could enter into an EaaS contract under the recently revised state performance-based-contracting laws (Chapter 39.35A RCW and Chapter 39.35C RCW), which now include EaaS contracting due to the passage of House Bill 1777 in 2023. However, the process and rules surrounding EaaS procurement in Washington have yet to be developed by the Department of Enterprise Services.

Alternatively, if KCM pursues a transit facility project for BEB that includes a multi-use facility or any Design Build Finance Operate Maintain (DBFOM) services in addition to a BEB facility project, then it can seek out alternative procurement options. One option is to do a P3 based on IRS rule 63-20 Alternative Project Delivery, which has been used successfully on prior King County projects.[39] A second possibility is the "Miscellaneous Projects" chapter on Design-Build (RCW 47.20.785) used on the Edmonds Ferry Terminal, although the project did not successfully receive proposals from an initial nine private developers primarily due to financial risk and bond timing.[40] It should be noted that using TIPP as an avenue for conducting a P3 is also a possibility but does come with its own challenges in terms of inefficient processes leading to the possibility of not attracting enough private investor interest.

Case study: East Base

East Base is a 16.5-acre campus located in Bellevue, Washington. East Base is adjacent to Bellevue Base (Figure 4), both of which are a part of KCM's East Campus and serviced by Puget Sound Energy (PSE). East Base is also adjacent to Sound Transit's Light Rail Operations and Maintenance Facility and the base holds both KCM and Sound Transit buses. East Base currently holds 235 buses, with 192 BEBs anticipated in the future. KCM's current timeline for East Base's conversion is to have the base offline between 2028 and2029 and operational by 2030.[41]

Figure 4: Site photo of East Base and Bellevue Base

Applying the P3 decision-making framework to KCM East Base

Public and Private Financing Needs. Converting to a BEB transit facility involves a great deal of risk: BEB technology is rapidly changing, energy prices can be volatile, and most importantly, KCM currently lacks substantive in-house expertise and experience with BEB charging technology. At this point, KCM intends to fund BEB facility projects through a combination of local, state, and federal funds. However, conversion to BEB facilities will exceed $1 billion and may divert internal resources from other KCM core programs. To that end KCM can significantly benefit from the use of a P3 by lowering the risk of Cap Ex and Op Ex overruns and spreading Cap Ex across multiple years rather than in a lump sum. More specifically, a P3 can help transfer Cap Ex risk to a private partner through using Design Build (DB) or a turnkey solution that provides guaranteed maximum price (GMP). With P3, KCM could also lower the risk for Op Ex overruns, by better managing (1) market price volatility for electricity through long-term contracts that guarantee specified energy prices, and (2) insufficient O&M staff with capacity and expertise in BEB and charging. Investing in a P3 to support O&M workforce capacity and expertise will help ensure that KCM efficiently delivers reliable service with fewer technical challenges that can often cause frustration and resistance when implementing new technologies. Therefore, while KCM may have sufficient funds for Cap Ex and Op Ex up front, there is still a great deal of financial risk in the scope and scale of KCM's BEB facility projects that can be better managed and mitigated by entering into P3.

Schedule. KCM is currently under an accelerated schedule to meet a zero-emissions fleet by 2035.[42] East Base's planned timeline for construction is 2028-2029 with the base operational by 2030. A P3 could meet KCM's accelerated delivery schedule, particularly if deploying a model that can be procured under the revised Chapter 39.35A RCW and Chapter 39.35C RCW.[43] Alternatively, IRS rule 63-20 can be considered for a P3 by structuring it for long-term lease and O&M agreements with a nonprofit entity led by the private partner.[44] This procurement pathway could help meet an accelerated schedule, especially when affordable housing is planned as a part of KCM's BEB facility development.

Utility. East Base's anticipated BEB power demand after conversion is estimated to range from 4.6 MW (with managed charging) to 6.5 MW (with unmanaged charging). Model assumptions include 43 40-foot BEBs and 149 60-foot BEBs requiring 192 chargers.[45] To provide the power needed for East Base, PSE has confirmed that it will take 6-8 years to make the necessary grid improvements to power the charging infrastructure. As East Base is planned to be closed for conversion between 2028-2029, it is highly unlikely that PSE will have the necessary grid improvements completed to meet KCM's planned timeline.

In the Parametrix/HDR's solar report, the report proposed two large solar canopies over the East Base bus parking area that could produce 10.7% of the annual bus charging load. However, the report discouraged use of solar as annual savings would not cover the large Cap EX of designing and building the system.[46] Despite this recommendation, use of solar should still be considered to provide the base with additional resiliency. The HDR report on resiliency stated that East Base's resiliency needs could be met by tying into two separate utility substations: the first connection would be a future distribution feed between East Base and the Vernell substation and a second feed to Northrup.[47] While two substations will provide some resiliency, it would not provide 100% resiliency should one substation go down during a power outage. A pathway to achieve 100% resiliency would be through the installation of a microgrid.

Given the schedule for PSE's grid improvements and KCM's resiliency needs, a P3 would be needed to design, build, and install a microgrid with battery storage to meet KCM's energy demand and needs. A microgrid with battery storage may significantly offset the charging demand on its own and with connection to the PSE grid through two planned substations, ensuring resiliency should one substation go down in an emergency. If needed and aligned with the KCM's zero-emission fleet goal, any gap between the power demand and the battery-based microgrid capacity can be met through the addition of a natural gas generator, similar to what is used in the Brookville Smart Energy Depot.

Technology Ownership. As there is a large amount of financial risk associated with the rapid changes in BEB technology concerning chargers and batteries, and a lack of substantive in-house expertise and experience with operating BEB technology, a private partner would be better suited to design, build, operate and maintain chargers and battery systems of the East Base facility. There are three subfactors for technology ownership: solar or microgrid, chargers, and batteries. In terms of solar energy generation, since a microgrid would be required (see Utility), there are no expectations that PSE will own or maintain any part of the microgrid system, and, in addition, there is a lack of

expertise within KCM to manage and maintain the microgrid, it would be preferrable to transfer financial risk for the design, build, and O&M of the microgrid system to a private partner.

O&M. In terms of technical expertise, KCM is currently relying on private vendors for the installation of charging infrastructure at the South Base Test Facility. In KCM's current, relatively small-scale pilot at South Base Test Facility, KCM's workforce provides preventative maintenance and first line assessment and corrective maintenance but relies on service-level agreements with charger manufacturers for substantive repairs. As KCM scales their operations, it is likely that KCM will need more vendors for O&M of BEB technology, including the microgrid. This would indicate that a P3 would be preferable for East Base as many P3s for BEB facility projects can provide guaranteed up time, 24/7 monitoring and operation of charge management systems (CMS), as well as taking responsibility for any repairs needed the O&M of BEB facility electricity systems.

The challenge for using P3 at KCM surrounds workforce/labor relations. A private partner could be welcomed for BEB facility O&M as long as the agency and its labor partners are able to negotiate agreeable conditions. One of these conditions relates to the current KCM union requirements for an electrical O&M workforce. These include that any O&M staff must be union members, including contracted private vendor staff. KCM's emphasis on equity and social justice (ESJ) may also drive requirements within a P3 agreement to ensure both the capital investment and ongoing operational contracts promote equitable hiring and provide opportunities for historically marginalized communities.

Regardless of whether a private vendor brings in its own staff or KCM hires additional staff to manage high-voltage electricity O&M, training will be required as there is currently a shortage of high-voltage electricity O&M staff with BEB expertise in the public and private sector across the United States. A private partner may be able to deliver training materials but KCM would have to provide training for their staff.

Industry Partner Opportunities: A P3 contract could be negotiated, structured, and agreed to in a way that would be profitable for a private partner and would mitigate risks for KCM, particularly a P3 involving EaaS with a Power Purchase Agreement (PPA). An EaaS and PPA would provide the industry partner with high risk but high return. To reach a win-win solution for both a private partner and KCM, the partner would need to be able to understand and work through KCM's specific labor agreements to find a solution that is both profitable and provides the service reliability that KCM needs.

Recommendations for KCM

KCM cultural change and process alignment

Cultural change is difficult for any large organization. KCM has only recently embarked on using Washington State's Energy Savings Performance Contracting (ESPC) program for its recent BEB facility projects. ESPC was selected over alternatives due to ESPC's faster procurement times and KCM's aggressive schedule for deploying charging infrastructure at the Burien Transit Center, Kent-Des Moines Station, and Federal Way Transit Center, as well as conversion of KCM's 120 Bus "Interim Base" Depot. One of the biggest challenges for these projects was the need for cultural change and process alignment between KCM and its private sector partner. Both KCM and its private partner are continuing to learn how to work together in a different way than what they were used to, and ensure alignment among one another's processes to improve coordination on the project. As a P3 would be new for KCM and as P3s require a high level of collaboration between public and private partners, KCM will need to prepare for further cultural change and adopt current best practices for process alignment that have already begun to be put into place for past BEB facility projects. In addition, there is a need for industry to adapt to and align with KCM's culture and processes. The following recommendations highlight current and future pathways to engage in cultural change and process alignment.

Educate your private partner about work process requirements and expectations to improve process alignment. P3 for KCM on BEB facility projects will be new for both KCM and the private partner. The private partner will need to know process expectations for project delivery and understand *why* these processes occur and are important to KCM. One method current KCM staff have used to improve alignment is the creation of a KCM process map that becomes a focal point for dialogue about when and why certain processes will be necessitated. This has helped to not only get everyone on the same page and aligned on process requirements, but helped to identify where new processes are needed that will best fit the project and mutually benefit project stakeholders.

Generate strong KCM management buy-in for P3. Cultural change and personal investment in using P3 requires having the support of KCM upper management and King County overall in visible promotion and support for process development and updates necessary for KCM's using of P3 on BEB facility projects.

Educate workforce about using P3 for BEB facility projects. P3s can sometimes be misunderstood as the privatization of public assets, and it may not be clear why a P3 could benefit a BEB facility project. Upper management should spend time to educate staff about P3 and why it could benefit BEB facility projects, as well as the work of KCM staff. Education should also include when a P3 may not be a good fit for a BEB facility project.

Workforce labor relations

Managing workforce labor relations will be key to successfully using P3 on a BEB facility project. KCM's electrical staff are members of the International Brotherhood of Electrical Workers (IBEW) locals 46 and 77 and any future P3 will need alignment with labor agreements between KCM and IBEW 46 and IBEW 77. There will also be staff concerns about the private partner's O&M workforce having the same O&M expertise and staffing challenges that KCM has experienced internally and with current vendors.

Engage early with local unions to better understand O&M opportunities. Start a dialogue with union leaders about the conditions KCM would need to meet to use P3 for a BEB facility project while still working within current labor agreements. These conversations should begin when screening a BEB facility project for using P3 to determine what would be possible for O&M hiring and training.

Collaborate with KCM O&M unionized workforce. Develop a collaborative approach between KCM management and the labor unions to begin a dialogue regarding the potential use of P3 for BEB facility projects. Use these early conversations to educate staff about the different types of P3s currently in use for BEB facility projects and learn about staff concerns to promote a productive dialogue between the agency and labor unions that aligns with O&M staff goals.

Integrating KCM ESJ goals into the P3 process

KCM's ESJ values and goals are an important part of KCM's culture and are important to KCM staff. KCM has crafted ESJ goals for its BEB fleet and O&M staff, including the expansion of KCM's training and educational program for O&M staff working with BEBs and BEB infrastructure, the recruitment of new staff from local community colleges.[48] King County has an Equity and Social Justice Strategic Plan that KCM has already adopted, including priority hire requirements and King County's criteria for hiring consultants.[49] KCM O&M staff are also investigating multiple pathways for underserved, underutilized, and historically marginalized communities to gain training and education in BEB facility O&M and to take these new skills to KCM and the industry at large. The following recommendations can help KCM find a private partner, consultants, and subcontractors that will be willing to prioritize and align with KCM's ESJ initiatives and activities.[50]

Gather input from O&M staff about how a P3 partner could best align with KCM ESJ goals. O&M staff on current BEB facility projects know what O&M skills KCM staff and vendors need to ensure smooth operations. In addition, O&M staff can provide input on how a P3 partner could carry KCM's ESJ values forward on a BEB facility project, such as engaging in O&M recruitment and training programs in underserved communities. Discuss with O&M staff the potential contributions a private partner could make to support KCM ESJ goals and desired ESJ outcomes on a BEB facility project. Consider integrating these activities and outcomes into the RFP.

Use KCM's ESJ goals as part of the evaluation criteria in the RFP. It is not uncommon to have ESJ goals as a part of RFP evaluation criteria for electricity infrastructure projects (including BEBs), such as prioritizing subcontracting to Minority Business Enterprises (MBE), Women Business Enterprises (WBE), and Disadvantaged Business Enterprises (DBE). For example, Brookville's RFP required proposers to address how proposers would engage in community partnerships that would improve equity, support job creation and workforce development, and include MBEs and WBEs as subcontractors. KCM's RFP would be an opportunity to also include KCM's ESJ goals for workplace training, education, and hiring in the proposal. Ensure that proposers describe an actionable plan for achieving those goals and how they will measure ESJ outcomes.

Have O&M represented in the RFP evaluation committee. Having one or more O&M representatives on the selection committee will ensure that private partner plans for O&M are realistic and practical, and meet any workplace labor concerns and O&M ESJ criteria in the RFP.

IX. APPENDIX AND REFERENCES

Transit Facility Electrification Cases

Through interviews and document collection, the research team developed three case studies of transit facility projects for electrification (two projects for BEB, and one for light rail facility electrification) that used a variety of P3s (Table 5). The research team identified each transit agency's key decision-making factors for selecting P3, how they fell in the P3 Decision-Making Framework, and their RFP process. The research team also identified the challenges each agency faced during the RFP process and suggested best practices. method.

Transit case	Number of interviewees	Type of contracting	Partner contribution
ATN Claudina and Manchester sites	1	CAAS with PPA	Purchase, installation, integration of microgrid and charging infrastructure
Brookville Smart Energy Bus Depot	2	EaaS with CaaS	DBOM of canopy and electric charging equipment
LA Metro East San Fernando Valley Light Rail Transit Line (only solar component)	1	P3	DB with Phase III quasi-maintenance and operation

Table 5: Transit electrification cases

Brookville Smart Energy Bus Depot, Montgomery County, Maryland

This P3 was a partnership between Montgomery County, Maryland, and the EaaS company AlphaStruxure. It involved the design and installation of a 1.6 MW solar array, a 6.5 MW microgrid, a 3 MW battery energy storage system, and electric charging equipment.[51] AlphaStruxure also finances, owns, and operates the microgrid. The project solicited an RFQ using county-level electricity procurement regulations rather than state P3 regulations.

The primary decision-making factors for pursuing a P3 concerned utility and cost. Montgomery County has a mandate to reduce carbon by 70% by 2027 and eliminate it entirely by 2030. To achieve this goal, the county bought four BEBs and four chargers through a federal grant. The county plan was to place the chargers and buses in the Brookville depot and have the depot built out to hold 70 BEBs with one charger per bus. The county opted to include an on-site microgrid in the redevelopment plan due to the amount of power required and the two years needed to complete the conversion, and to address resiliency concerns in the event of unplanned electrical service disruption and outages. The county also wanted to avoid paying upfront capital costs and instead moved its budget for the facility from a capital expense to an operating expense. For the county, the final P3 contract would also provide 25 years of electricity price stability.

Brookville's RFP Process. This two-step process used an RFI in the RFQ phase (Figure 5). The RFP was issued under Montgonery County's *Electricity Procurement Regulations*. The RFP process went through all steps for the standardized RFP process for BEB facility projects. Pre-bid industry engagement included a site visit and a pre-bid meeting.

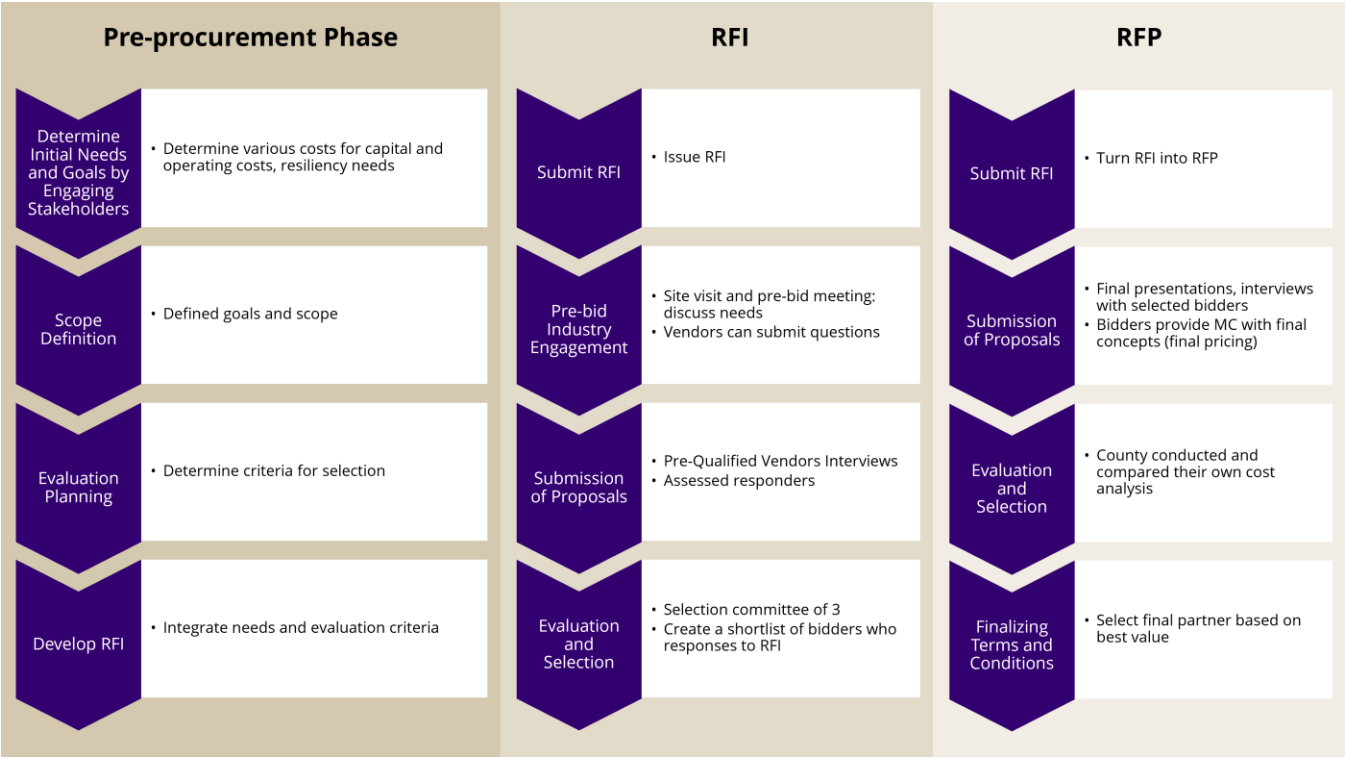

Figure 5: The Brookville RFP process

Brookville RFP Best Practices

- Communicate with external and internal stakeholders throughout the process
- Provide agency staff adequate time in the schedule to review and evaluate proposals
- Invite a broad range of stakeholder representatives in the selection committee, including any other involved transit agencies, fleet operators, and O&M workforce
- Engage your utility and permitting authority early in the RFP process
- Consider how to manage fire risks with BEB facilities

ATN Claudina and Manchester Sites

Anaheim Transportation Network (ATN) partnered with AMPLY Power (now bp pulse) using a P3 consisting of CaaS and PPA for a two-phase BEB facility project at its Claudina site (Phase I) and Manchester site (Phase II). At the Claudina site, bp pulse was responsible for the installation of 46 BEB charging stations, a solar canopy, and charging infrastructure that would allow for 82 BEBs, as well as maintaining and monitoring the CMS. The Manchester site included solar canopies, a CMS expansion, and battery storage. bp pulse owns, operates, warrants, and maintains the charging equipment and the 545kW solar canopies that support a microgrid. bp pulse also provides ATN with shipping containers that have been converted into portable charging units to manage site infrastructure constraints.[52]

The key decision-making factor for ATN choosing P3 was the high CapEx required to install the BEB facility infrastructure. Even though ATN had received funding from multiple sources, including federal funds, it still required more funding to complete projects. ATN viewed CaaS, combined with the PPA, as a funding mechanism for the installation of the chargers and the solar that the transit agency needed.

RFP Process. ATN used a one-step procurement process using Federal Transportation Administration (FTA) guidelines for RFP development[53] (Figure 6). Several consultants were working for the agency during the pre-procurement phase of

the RFP process, bringing expertise in detailed power modeling and PPAs to ATN, all of which became a part of the RFP. ATN also held a pre-proposal conference as a part of their pre-bid industry engagement, during which they received many technical questions on interoperability between current ATN BEBs and chargers.

Originally, ATN had the RFP designed to put both CaaS and the PPA into a single combined contract. However, the market pushed back to revise the RFP to make the solar component with PPA a separate contract from CaaS. The pushback had to do with the differences in warranties between solar assets and charging infrastructure. While solar assets have warranties that last 20 or more years, charging equipment has warranties of only five years. The RFP was reissued with a separate PPA and CaaS policy.

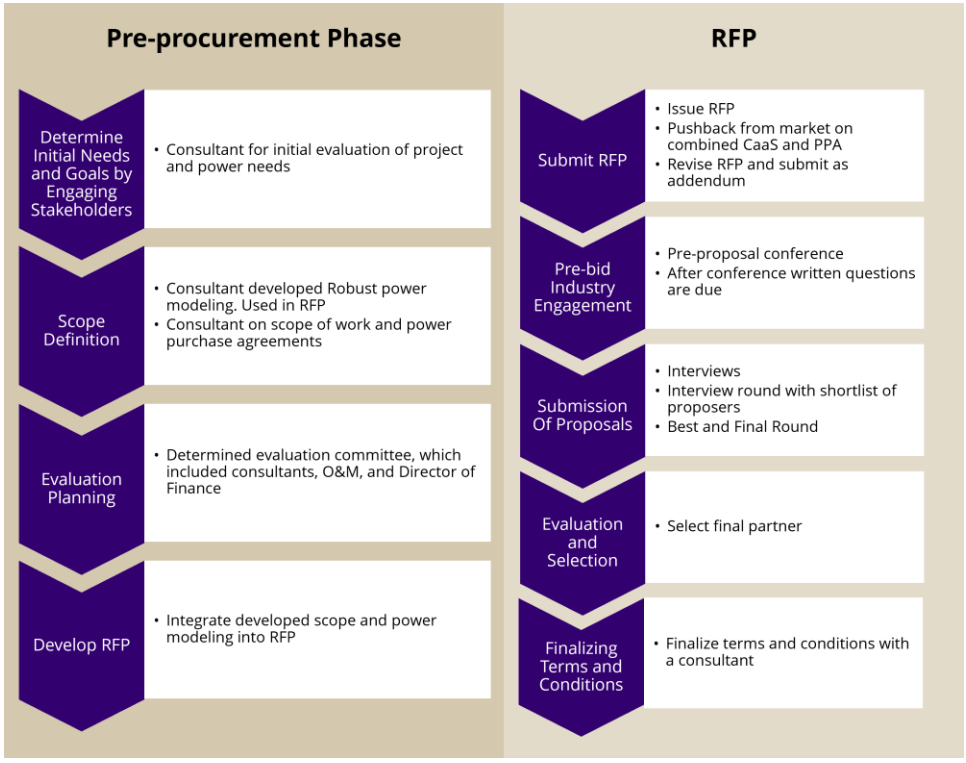

Figure 6: The ATN RFP process

ATN RFP Practices

- Owners should hire consultants for power modeling during pre-procurement to provide baseline data available to you and to the potential bidders
- Engage the utility early in the pre-procurement process
- Allow for flexibility during procurement for any changes in scope that need to occur due to changes or additions to grant funding

LA Metro East San Fernando Valley Light Rail Transit Line (solar component)

This project used a P3 for a solar component (Phase III) on the maintenance facility for light rail. The remainder of the light rail project used Progressive Design Build (PDB) for Phases I and II. The P3 partner designed, installed, and administers O&M on the solar canopy. The contract is for 15 years, after which, the canopy transitions back to LA Metro. The case is unusual in that the transit agency used P3 to access funding from the FTA's Expedited Project Delivery Program, which required that a P3 be a part of the funding application. LA Metro used P3 to install rooftop solar panels.

One of LA Metro's biggest challenges for using P3 was satisfying workforce collective bargaining agreements that required LA Metro's staff to conduct all O&M activities while providing a P3 partner with a business case for taking on risk. The solution was to have O&M conducted by LA Metro but overseen by the developer, who is still responsible for

meeting certain performance requirements and to ensure that Metro staff can monitor and maintain the system. In turn, the developer is not responsible for any risks related to O&M performance guarantees, such as ensuring the systems are being run or maintained properly. In this way, risks concerning OpEx remained with LA Metro.

RFP Process. LA Metro's RFP process was unique in that the P3 was connected to a PDB contract, which was a new form of project delivery for LA Metro (Figure 7). The pre-procurement phase for the P3 was in application, a contract development phase for PDB. The initial PDB contract was published for industry comments and feedback, then integrated into the revised contract and the RFP. The P3 contract was developed and modeled based on the PDB contract and was a part of preparing for the RFP phase.

Another aspect particular to the LA Metro case is the creation of a cost allocation matrix for the RFP. The cost allocation matrix was developed from the PDB contract. The matrix consisted of line items and identified who was responsible for the cost of each item. LA Metro found that that the cost allocation matrix was an effective communication tool that helped clarify risk expectations for all stakeholders during the procurement process.

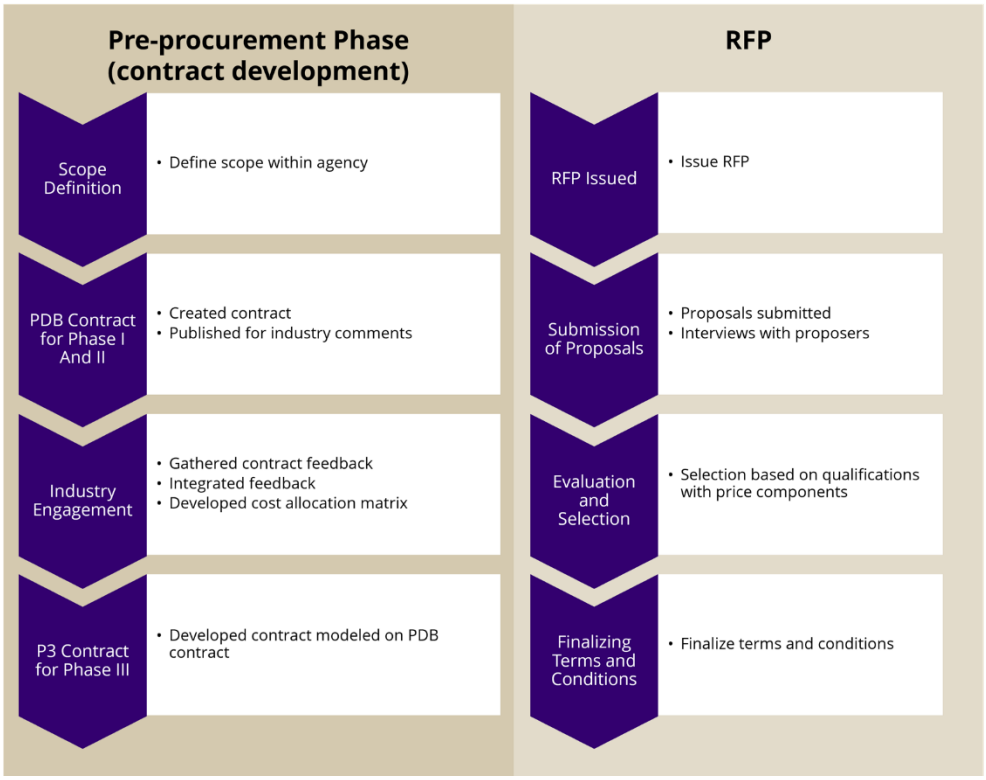

Figure 7: The LA Metro RFP process

LA Metro RFP Practices

- Create a cost allocation matrix to clarify to stakeholders the roles and responsibilities for specific risks
- Focus on the interview process and evaluate the whole team and their ability to work together
- Ensure that your internal stakeholders buy-in on the scope of the project

Placing cases within the P3 Framework

The research team wanted to analyze how different P3 cases fit on the P3 spectrum in relation to two decision-making factors: Utility and O&M. The research team compared the types of P3 used by Brookville, ATN, LA Metro, and KCM's current Design Build BEB facility projects by plotting each project in a four-quadrant grid.

The X axis is the level of P3 based on how much a project was privately or publicly funded. The amount of private versus public funding is what determines whether a project falls under 100% P3, P3-ish, or not a P3. Utility and O&M decision-making factors were selected for the Y axis as these decision-making factors were the most prevalent drivers for pursuing a P3.

In terms of funding and O&M, Brookville most closely resembled a true P3, using private sector O&M and funding on the project. ATN and LA Metro used a mix of public and private funding, however, ATN used private sector O&M whereas LA Metro used public sector O&M. KCM's current BEB facility projects are publicly funded and use their own O&M with private vendor support and equipment (Figure 8).

In terms of Utility decision-making, Brookville closely resembles a true P3, using a microgrid for energy generation owned by AlphaStruxure, which is funded entirely by the private partner. ATN and LA Metro have a mix of public and private funding, and both used a microgrid. KCM's current BEB facility projects are publicly funded and use the public utility for energy generation policy (Figure 9).

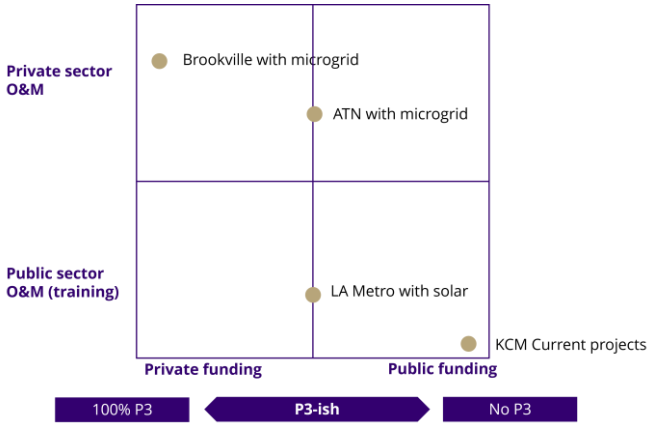

Figure 8: Types of P3 used in case studies by O&M decision-making

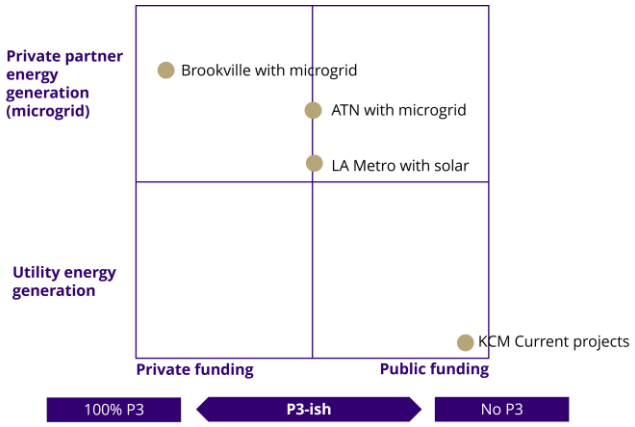

Figure 9: Types of P3 used in case studies by Utility decision-making

If KCM chooses to move forward with a P3, then future KCM projects, such as East Base, would arrange a P3 similar to ATN in terms of Utility decision-making, but more in line with LA Metro in terms of O&M decision-making (Figure 10). These graphs show that multiple forms of P3 are possible within the broad P3-ish spectrum that KCM and other transit agencies can pursue.

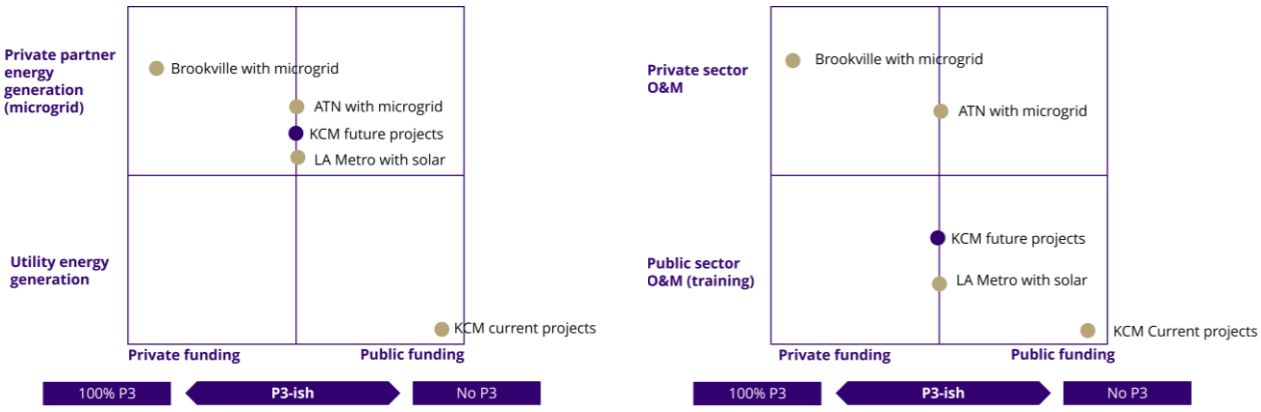

Figure 10: Types of P3 KCM could use in future projects

ENDNOTES

[1] King County Metro (KCM). (2022). *Moving to a zero-emission bus fleet: Transition plan.* https://kingcounty.gov/~/media/depts/metro/accountability/reports/2022/zero-emission-bus-fleet-transition-plan-may-2022#:~:text=The%20fleet%20plan%20considers%20planned,onward%20will%20be%20zero-emission

[2] *Performance-based contracts for water conservation services, solid waste reduction services, and energy equipment and services*, RCW 39.35A. https://app.leg.wa.gov/RCW/default.aspx?cite=39.35A.030

[3] KCM. (2022). *Moving to a zero-emission bus fleet.*

[4] Smith, N., de la Peña, P., Kussy, E., Sethi, S., Wheeler, P., Gifford, J., & Ybarra, S. (2019). *Public-private partnership (P3) procurement: A guide for public owners*. U.S. Department of Transportation (USDOT), Federal Highway Administration (FHA). https://www.fhwa.dot.gov/ipd/pdfs/p3/toolkit/p3_procurement_guide_0319.pdf

[5] World Bank. (2018). *Public-private partnerships: Reference guide version 2.0*. http://documents.worldbank.org/curated/en/600511468336720455/Public-private-partnerships-reference-guide-version-2-0

[6] Mallett, W. (2021). *Public-private partnerships (P3s) in transportation*. Congressional Research Service. https://sgp.fas.org/crs/misc/R45010.pdf

[7] Ibid.

[8] Center for Innovative Finance Support. *Project profile: Montgomery microgrid charging depot P3, Maryland*. USDOT: FHA. Accessed September 9, 2023, https://www.fhwa.dot.gov/ipd/project_profiles/md_montgomery_micrgrid.aspx; and ATN. (2020, August 26). *Agenda item 13: bp pulse fleet P3 summary*.

[9] Gurman, R. O. (2021). *Taking commercial fleet electrification to scale: Financing barriers and solutions*. CALSTART, Inc. https://globaldrivetozero.org/site/wp-content/uploads/2021/03/Taking-Commercial-Fleet-Electrification-to-Scale-White-Paper.pdf

[10] For example, see Gurman, R. O. (2021). *Taking commercial fleet electrification to scale*; and Better Buildings. (2021). *EaaS vs. ESPC*. U.S. Department of Energy. https://betterbuildingssolutioncenter.energy.gov/sites/default/files/attachments/BBC%20Financial%20Allies%20Resource%20ESPC%20vs.%20EaaS%201.8.2021.pdf

[11] Crawford, K., Finke, J., Merewitz, S., & Legbandt, V. (2021). *Public-private partnerships (P3s): How to deliver innovative, local-serving projects*. League of California Cities. https://www.cacities.org/Resources-Documents/Member-Engagement/Professional-Departments/City-Attorneys/Library/2021/21-Spring/5-2021-Spring;-Crawford-Merewitz-Public-Private-Pa.aspx#:~:text=%E2%80%9CP3s%20involve%20transfer%20of%20public,also%20ultimately%20owns%20the%20asset; and Hewes, W. (2018). *Public-private partnerships in California: How governments can innovate, attract investment, and improve infrastructure performance*. Bay Area Council Economic Institute. http://www.bayareaeconomy.org/files/pdf/P3inCaliforniaWeb.pdf

[12] Crawford, K., Finke, J., Merewitz, S., & Legbandt, V. (2021). *Public-private partnerships (P3s)*; and Hewes, W. (2018). *Public-private partnerships in California*.

[13] Ibid.

[14] AECOM Enterprises Inc. (2012). *Evaluation of public-private partnerships: For safe transportation projects*. https://leg.wa.gov/JTC/Documents/Studies/P3/P3FinalReport_Jan2012Web.pdf

[15] Bipartisan Policy Center. (2015, December). *Public-private partnership (P3) model state legislation*. https://bipartisanpolicy.org/download/?file=/wp-content/uploads/2019/03/BPC-P3-Enabling-Model-Legislation.pdf

[16] Concerning the authority for state public entities to enter into public-private partnerships for public projects, and, in connection therewith, making an appropriation. (2022). Senate Bill 22-130. General Assembly of the State of Colorado. https://leg.colorado.gov/sites/default/files/2022a_130_signed.pdf; PPTA implementation 2017 manual and guidelines for the Public-Private Transportation Act of 1995 (as amended). (2017, October). Virginia Department of Transportation. https://p3.virginia.gov/docs/2017-PPTA-Manual-and-Guidelines_FINAL.pdf; Public-private partnerships. Section 255.065. Florida Legislature. http://www.leg.state.fl.us/statutes/index.cfm?App_mode=Display_Statute&URL=0200-0299/0255/Sections/0255.065.html

[17]AECOM Enterprises Inc. (2012). *Evaluation of public-private partnerships*; and Association For the Improvement of American Infrastructure (AIAI). *P3 snapshot: Washington.* Association For the Improvement of American Infrastructure. Accessed September 9, 2023, https://aiai-infra.org/wp-content/uploads/P3-Snapshot-WASHINGTON.pdf

[18] AECOM Enterprises Inc. (2012). *Evaluation of public-private partnerships*; and AIAI. *P3 snapshot*.

[19] Transportation Innovative Partnership Program (TIPP), Chapter 47.29 RCW. https://app.leg.wa.gov/RCW/default.aspx?cite=47.29; and TIPP, Chapter 468-600 WAC. https://app.leg.wa.gov/WAC/default.aspx?cite=468-600

[20] Parker, P., Ford, R., O'Neal, D., Moser, C., Hill, L., & Griffith, R. (2011). *Best practices review of Washington State public private partnership programs and laws for non-toll facility projects*. https://wstc.wa.gov/wp-content/uploads/2019/09/Studies-2011-PPP-nontoll-facilityprojects.pdf

[21] Ibid.

[22] AECOM Enterprises Inc. (2012). *Evaluation of public-private partnerships*

[23] Ibid.

[24] Ibid.

[25] Ibid.

[26] For legislation, see Miscellaneous Projects. https://app.leg.wa.gov/rcw/default.aspx?cite=47.20
[27] It is unclear whether bus electrification would fall under 47.12 for types of properties authorized for acquisition. See RCW 47.12.010 https://app.leg.wa.gov/RCW/default.aspx?cite=47.12.010.
[28] Public contracts—energy services and equipment—performance-based contracting, House Bill 1777, (2023). https://lawfilesext.leg.wa.gov/biennium/2023-24/Pdf/Bills/Session%20Laws/House/1777.SL.pdf?q=20230524142219
[29] Energy Conservation Projects. Chapter 39.35C. https://app.leg.wa.gov/RCW/default.aspx?cite=; and Performance-Based Contracts for Water Conservation, Solid Waste Reduction, And Energy Equipment. Chapter 39.35A. https://app.leg.wa.gov/RCW/default.aspx?cite=39.35A
[30] Public contracts—energy services and equipment—performance-based contracting, House Bill 1777, (2023).
[31] Administrative code waivers—SFMTA Potrero Yard modernization project—project delivery procedure, Ordinance No. 38-21 (2021). https://sfgov.legistar.com/View.ashx?M=F&ID=9268595&GUID=0104525E-0145-4947-B2E6-952402A593BE; and San Francisco Municipal Transportation Agency (SFMTA). *Potrero Yard Modernization Project: Planning History*. Accessed June 12, 2023, from https://www.sfmta.com/potrero-yard-modernization-project-planning-history
[32] AlphaStruxture. (2022). *A sustainable transformation for transit*. https://alphastruxure.com/wp-content/uploads/2022/10/AlphaStruxure-Written-Customer-Story_-FINAL.pdf
[33] See Public-private partnership program, Title 11, Chapter 17, 11.01.17. Accessed September 6, 2023, https://www.mdot.maryland.gov/MDOTDocuments/MDOTP3ComarReg.pdf and Exemptions-Regulations, Chapter 11, Section 11B-4. Accessed September 6, 2023, https://www.montgomerycountymd.gov/DOT-Parking/Resources/Files/CHAPTER11B.pdf
[34] California Infrastructure Financing Act. California Government Code Section 5956. https://california.public.law/codes/ca_gov't_code_section_5956
[35] Energy Conservation Contracts. California Code Chapter 3.2. https://california.public.law/codes/ca_gov't_code_title_1_div_5_chap_3.2
[36] Rhode Island Public Transit Authority (RIPTA). (2023). *Dorrance Street transit center joint development project: Request for proposals*. Accessed September 6, 2023, https://purchasing.ri.gov/RIVIP/ExternalBids/QuasiPublicAgencies/RIPublicTransitAuthBids/23-22.pdf; and State of Rhode Island. (2023, January 11). *Governor McKee announces nationwide RFP for new, innovative downtown transit center*. https://governor.ri.gov/press-releases/governor-mckee-announces-nationwide-rfp-new-innovative-downtown-transit-center
[37] Anderson, P. (2023, May 25). RIPTA asks to change state contracting laws over Dorrance Street hub. Here's why. *The Providence Journal*. https://www.providencejournal.com/story/news/state/2023/05/25/new-ripta-bus-hub-dorrance-street-station-project-stuck/70252585007/
[38] Center for Innovative Finance Support. *Project profile: Montgomery microgrid charging depot P3, Maryland*.
[39] Center for Innovative Finance Support. *Special Purpose IRS 63-20 Alternative Project Delivery*. US DOT Federal Highway Administration. Accessed August 18, 2023, https://www.fhwa.dot.gov/ipd/alternative_project_delivery/defined/new_build_facilities/irs_rule_63_20.aspx; and white paper draft, *King County Metro: Public-private partnerships: Transit zero emissions opportunities*.
[40] Parker, P., et.al. (2011). *Best practices review of Washington State public private partnership programs and laws for non-toll facility projects*.
[41] KCM. (2022). *Moving to a zero-emission bus fleet: Transition plan*. https://kingcounty.gov/~/media/depts/metro/accountability/reports/2022/zero-emission-bus-fleet-transition-plan-may-2022#:~:text=The%20fleet%20plan%20considers%20planned,onward%20will%20be%20zero-emission
[42] Ibid.
[43] Performance-Based Contracts for Water Conservation, Solid Waste Reduction, And Energy Equipment. Chapter 39.35A. https://app.leg.wa.gov/RCW/default.aspx?cite=39.35A; and Energy Conservation Projects. Chapter 39.35C. https://app.leg.wa.gov/RCW/default.aspx?cite=
[44] For more information on IRS 63-20, see https://www.fhwa.dot.gov/ipd/alternative_project_delivery/defined/new_build_facilities/irs_rule_63_20.aspx.
[45] E000305-Transit system electrification planning power needs coordination with PSE, King County Metro, November 2, 2022.
[46] Parametrix & HDR. (2023, June). Transit system electrification planning (TSEP) solar energy feasibility report
[47] HDR. (2023, July). Transit system electrification planning (TSEP) battery electric bus charging resiliency overview–Final report.
[48] KCM. (2022, May). Moving to a zero-emission bus fleet: Transition plan. https://cdn.kingcounty.gov/-/media/depts/metro/accountability/reports/2022/zero-emission-bus-fleet-transition-plan-may-2022
[49] KCM. (2022, May). Moving to a zero-emission bus fleet; King County. (2016). *Equity and Social Justice Strategic Plan*: *2016-2022*. https://aqua.kingcounty.gov/dnrp/library/dnrp-directors-office/equity-social-justice/201609-ESJ-SP-FULL.pdf; and King County. *Equity & Social Justice (ESJ) Innovation Plan: Building Equity in Design Contracting*. Accessed September 6, 2023, https://kingcounty.gov/~/media/depts/dnrp/solid-waste/about/documents/swd-projects-2019-07-esj.ashx?la=en.
[50] KCM. (2022, May). Moving to a zero-emission bus fleet.
[51] AlphaStruxture. (2022). *A sustainable transformation for transit*.
[52] bp pulse. *Anaheim Transportation Network*. Accessed September 6, 2023, https://bppulsefleet.com/customer-stories/anaheim-transportation-network/
[53] Smith, et.al. (2019). *Public-private partnership (P3) procurement.*

MOBILITY INNOVATION CENTER
at the UNIVERSITY of WASHINGTON

King County METRO
Moving forward together

DEPARTMENT OF CONSTRUCTION MANAGEMENT
UNIVERSITY of WASHINGTON
College of Built Environments

CoMotion
Your Innovation Partner