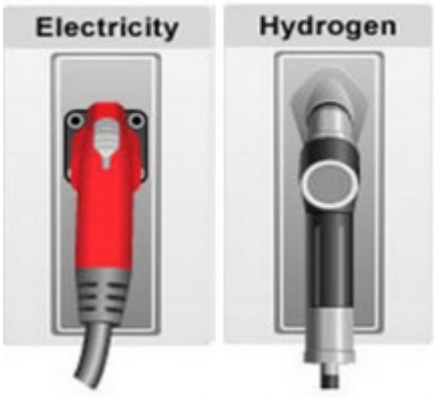
STARK AREA REGIONAL TRANSIT AUTHORITY

Project Proposal

Creating a Midwest States ADVANCED Alternative Fuel Corridor



DISCRETIONARY FUNDING OPPORTUNITY: FY 2020 NATIONAL INFRASTRUCTURE INVESTMENTS

Opportunity ID: DTOS59-20-RA-BUILD

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This proposal contains no Confidential Business Information (CBI)

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Trillium/ Love's Travel Stops (Technology Provider)
CALSTART
Cleveland State University
Dominion Energy Ohio
Energy Harbor Corp
Ohio Fuel Cell Coalition

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0.0 Summary

Amid COVID recovery and global economic competition, the Midwest region must reshape and reimagine its future as America's economic engine. To achieve this, it must create the transportation system of the future to carry the goods of an emerging Midwest supply chain that is positioned to be the world leader in advanced transportation vehicle components. With this Midwest infrastructure in place, connecting transportation from east to west can be a reality. By 2030, it is estimated that there will be well over 240 million electric vehicles (EVs), battery electric and fuel cell, on the road globally. This is being driven by customer choice, policy and increased access to the required infrastructure. Currently, China is in the lead for the greatest number of electric vehicles on the road with greater than 2.3M vehicles or 45% of the EV market, quickly followed by Europe with 24% and then the United States at 22%.[1] The number of EVs on the roads is going to continue to grow exponentially as more and more countries start to implement zero emissions zones and plan to also phase out all diesel and gasoline cars starting with Norway in 2025, Sweden, Denmark, India; Ireland by 2030; and France and the United Kingdom by 2040. The world is moving in this direction, and we must keep pace especially as post-pandemic global economies prepare to kickstart economic growth with a heavy focus on advanced alternative transportation technologies. We must act now otherwise the Midwest's advanced transportation economy will be hit hard and find itself playing a game of 'can I catch up?'

To shape this plan and make sure the actions align with the region's economic imperative, the Stark Area Regional Transit Authority (SARTA) has assembled a team of partners to make that system shovel ready in two years. This team includes major infrastructure operators [Trillium/ Love's Travel Stops (Love's) and Dominion Energy Ohio], advanced alternative fuel providers (Energy Harbor) and transportation technology leaders (CALSTART, Cleveland State University and the Ohio Fuel Cell Coalition), who will develop and detail a comprehensive Midwest States ADVANCED Alternative Fuel Transportation Corridor Action Plan (Action Plan). The Action Plan will expand use of advanced alternative fuels along corridors where refueling infrastructure for these advanced alternative fuels are not currently or sufficiently available. This innovative, public-private plan creates a series of advanced alternative refueling transportation corridors capable of supporting local, regional, and interregional travel by EV and fuel cell electric vehicles (FCEV) powered by hydrogen, which include light, medium- and heavy-duty trucks and buses in the nation's major transportation industry goods movement corridors in the Ohio and Michigan border regions (Figure 1). The planning process addresses several of the obstacles to adoption, incorporating the full supply chain, from hydrogen production, supply and identification of specific sites targeted for deployment of publicly accessible advanced refueling systems. These sites will be screened, selected, and ready for subsequent, near-term construction.

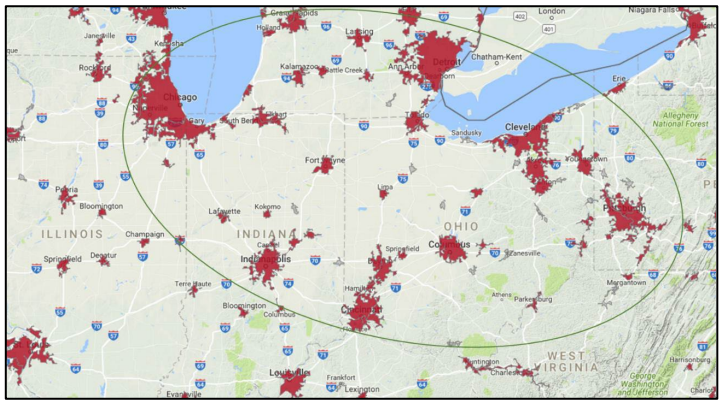

Figure 1. Midwest Priority Region for the Deployment of Advanced Alternative Refueling Infrastructure

The Action Plan directly supports the core of the Midwest's economic expansion strategy as the advanced fuel and vehicle technology providers to the world. As such, the region needs access to the fuels required to power the vehicles their components drive, and equally needs the emissions reductions these advanced alternative fuel vehicles will provide. Because these sites are so linked to the economic and emission goals the region has previously developed, the project team has already pre-identified a source of hydrogen production and supply, and through corridor research and availability of real estate of project partners, recognize there are between 40 and 50 locations along the identified corridors available for consideration of locating

1 Iea.org/reports/global-ev-outlook-2019

infrastructure. For this planning project, the team will review the feasibility of 10 locations with a goal of selecting 5 locations, with capacity to expand, for detailed site review, utility coordination, and construction planning across the priority region. Because much of the pre-work and scoping has been accomplished, plan efforts can accelerate action and will also include gathering information for initial permitting and NEPA planning; and other site-specific planning activities needed to help deploy each site rapidly upon completion of the planning process. This project includes a Site Analysis, which will build upon the feasibility study the project team completed during March through May 2020. The feasibility study conducted targeted initial research to understand baseline conditions, including reviewing and coordinating with existing planning activities; identifying advanced alternative refueling needs along the proposed corridor; initiating outreach to utilities and analyzing regional fleet data; identifying advanced alternative refueling gaps and critical need areas; identifying existing and planned advanced alternative refueling availability; utilizing travel demand forecast modeling to determine future demands; and rural and urban planning, including coordination through Metropolitan Planning Organizations (MPOs) and associated planning organizations. The Site Analysis will complete a Benefit Cost Analysis (BCA) of all sites identified during the feasibility study to identify the most economically viable construction sites along the fuel corridor. The project team will also complete an economic and workforce development analysis along the planning corridors to ensure the greatest economic viability along the corridors.

The backbone of this planning effort is a concerted, targeted outreach leveraging the project team's existing relationships with regional stakeholders active in advanced alternative refueling development. Collectively representing existing partnerships with more than 250 member firms and organizations in the region and globally, the project team will rapidly engage commercial and institutional fleets, commercial fleet trade organizations, transit agencies, utilities, commercial organizations, NGOs, and local government organizations throughout the Planning Area. By engaging partners who provide hydrogen production and supply as part of the planning process, this proposal will develop a comprehensive supply chain to provide advanced alternative fuels and remove many of the obstacles to adoption that currently limit utilization, particularly in rural areas. There is limited availability of all other alternative refueling facilities, especially in rural areas, for hydrogen, and for light, medium- and heavy-duty vehicles across all alternative fuel categories.

Based on the outreach and stakeholder coordination, SARTA will develop the Action Plan, laying the groundwork for a two-state implementation of advanced alternative fuel infrastructure that will work to ensure the Midwest continues to be the world leader in advanced transportation vehicle components, while in turn reducing airborne emissions, reducing greenhouse gas (GHG) emissions. The project team builds upon a number of important regional planning efforts currently underway for the development of advanced alternative fuels corridors in the Midwest region. The project team has carefully reviewed these efforts and identified the Planning Area as a region of critical need for additional planning and implementation of advanced alternative refueling facilities, which can build on the gaseous fuels knowledge and electrical capacity installations already resident for more conventional alternative fuels. The Action Plan will help to fill in critical gaps in this conventional backbone and in supply chain and distribution infrastructure, address challenges, and prioritize the strategic co-location of electric charging and hydrogen fuels needed to support demand from regional alternative fuel vehicle adoption. Future buildout of the Action Plan—under separate funding—will, in turn, drive innovation, create new jobs, and spur economic development in the region's rapidly growing clean transportation economy. Additionally, implementation of the Action Plan will result in significant air quality benefits, particularly in the many rural areas impacted by heavy-trafficked transportation corridors between Ohio and Michigan.

Increased vehicle adoption will help further identify the region as a dominant player in the low- and zero-emissions industries, adding tens of millions of dollars in local economic activity and creating hundreds of new jobs over the next 15 years.

1.0 Project Description

SARTA's project team will execute a comprehensive, coordinated planning effort to provide a clear, collaborative roadmap for the deployment of advanced alternative refueling corridors across the Planning Area, leveraging some conventional alternative fuel site structures, from production, to supply, to adoption. Leveraging other public and private efforts to support advanced alternative fueled vehicles—including those forwarded by the Ohio EPA and through the Volkswagen Settlement Program, DERA, CMAQ, and others—our planning process has a goal of reviewing the feasibility of 10 locations with a goal of selecting 5 locations, with capacity to expand, for detailed site review, utility coordination, and construction planning across Ohio. To achieve this goal the planning process includes:

- **Complete a Fuel Demand Study** across the Midwest priority region of Michigan, Ohio and the bordering states which will be used to identify the priority areas to focus the planning efforts. This study will focus on access to renewable hydrogen generation sources, the number of vehicles registered that are best suited for electrification and high-volume users such as fleets.
- **Conduct Market Acceleration Activities** with relevant stakeholders including transit agencies, commercial fleets, commercial fleet trade organizations, utilities, commercial organizations, NGOs, and local government organizations throughout the Planning Area. This activity will identify and acquire the critical fleet participants that can/will purchase fuel from the proposed refueling stations, broker partnerships for infrastructure commitments, confirm sites, and work to secure contractual agreements with participating fleets to provide refueling services. This activity includes marketing of the project and advocacy for advanced alternative fuels.
- **Perform Site Analysis** to perform a benefit-cost analysis to prioritize infrastructure, fueling sites; develop an economic analysis to ensure the effectiveness of the hydrogen supply chain; collect information needed for site-specific engineering and design; consult with Ohio Environmental Protection Agency and regional utilities; and compliance and coordination with state and federal / DOT requirements.
- **Evaluate Location-Specific Opportunities and Constraints** through identifying how this planned corridor aligns with DOT's existing designated alternative fuel corridor connecting Chicago to Philadelphia and how these advanced alternative fuels, electric charging, and hydrogen, could be added. This will include conducting Hydrogen Production Planning Activities in conjunction with the Davis-Besse nuclear facility. The pilot production operation will be planned and designed to meet each fueling stations requirements, which is expected to be in upwards of 500 kg of hydrogen per day at larger stations. It will also incorporate conducting Hydrogen Delivery Planning Activities in conjunction with the Davis-Besse nuclear facility, the refueling site locations and a fuel transport operator.
- **Conduct Infrastructure Planning Activities** including utility engagement, municipal and zoning engagement, and load management. Planning will include the development of infrastructure cost estimates for each identified site.
- **Organize Economic and Workforce Development activities**, including completion of advanced alternative fuel and vehicle regional economic impact studies, workforce development evaluations, and importantly, identification and planning of specific activities and plan elements designed to further support local and regional economic and workforce development during plan implementation.
- **Develop Comprehensive Site Location Action Plan** to laying out specific sites, technologies, and activities related to the project. Action Plan elements will be ready-to-build by identifying concrete and explicit steps to fast-track the implementation process. The result will be an actionable series of projects and events that the Project team will use as a basis for future fund development and implementation. The Action Plan will include the Site Analysis results, relevant safety plans, maintenance plans and environmental impact analysis, a hydrogen off-take transportation plan, and electric charging and hydrogen fueling end-user identification. See the Scope of Work, Section 5.2 for more a complete list of the subtasks involved with the Action Plan.

This project will leverage existing and planned public/private partnerships between federal and local agencies and the private

sector supporting economic and jobs development, clean fuels deployment and associated economic and environmental benefits which have been identified as critical priorities to the continued economic security of the transportation supply chain in the region.

1.1 Transportation Challenges

In May 2020, CALSTART in coordination with SARTA developed the *Midwest States Hydrogen Fuel Cell Demand Study*. See ***Appendix 5 Hydrogen Demand Study***. The Demand Study completed an in-depth study of the regional need for FCEV technologies and notes that in a recent survey of 22 trucking fleets operating in the Midwest (conducted by the Ohio Fuel Cell Coalition and the North American Council for Freight Efficiency – OFCC/NACFE), 26% of the respondents indicated they planned to introduce hydrogen fuel cell trucks into their fleets in the next 1-3 years, and over 50% indicated they would in the next 4-7 years.[2] Further, they expect to convert about 25% of their fleet to hydrogen fuel cell electric drive. Yet, this introduction will be impossible without first planning a refueling infrastructure responsive to this demand. Also see ***Appendix 6 OFCC Survey-Final Report*** for the survey summary results reference above.

In the midst of COVID recovery and global economic competition, the Midwest region must reshape and reimagine its future as America's economic engine. To achieve this, it must create the transport system of the future to carry the goods from an emerging Midwest supply chain to one that is planning to be the world leader in advanced transportation vehicle components. Providing the infrastructure for refueling advanced alternative fuel vehicles is crucial to meet the demand as the world moves towards zero emission vehicles. The global hydrogen storage market is projected to grow from $467 million in 2016 to $1 billion in 2026.[3] The electric vehicle global market is expected to grow $568.2 billion by 2026.[4] The advanced alternative fuels market is being driven by the combination of an increasing demand for industrial and transportation use. The U.S. must move to capture and complete projects to bring advanced alternative fueling infrastructure up to meet future demand or the nation will be left behind other countries. Adding advanced alternative fueling stations to the Midwest along these priority interstate corridors will provide the U.S. the opportunity to narrow the lead other world leaders have established in zero-emission adoption and infrastructure.

To date, 8,285 FCEVs have been sold or leased and are on the road in the U.S.[5] In fact, a recent Global Automotive Executive Survey showed that 78% of executives believe that FCEVs will be the main mobility solution for the future.[6] The push toward zero emission vehicles across the U.S. continues to grow every day. The California Air Resources Board (CARB) just proposed a revision to their Advanced Clean Trucks regulation which increases the sales requirements across vehicle classes 2 to 8. Under the new version of the standard, at least 20% of trucks on the road in California will be electric by 2035 and this could equate to more than 17,000 class 8 trucks. This revised standard during these changing economic times confirms that the U.S. is demanding alignment of sales with the continued desire to promote carbon neutrality and meet zero emission standards for vehicles in the future. Providing opportunity for this advanced alternative fueling has proven to correlate directly to the purchase and use of hydrogen fuel cell vehicles. The 8,285 FCEV vehicles sold to date in the U.S. were purchased in areas where there is access to hydrogen fueling stations. One can be guaranteed that vehicle and fleet owners in across Michigan and Ohio, including those with fleets in surrounding states, are waiting for that same infrastructure. Fleet owners are prepared to purchase FCEVs once they can be refueled along this corridor.

This proposed priority areas were defined based on recent studies run by CSU where it was determined that the I-80/90 and

[2] http://www.midwesthydrogen.org/site/assets/files/1413/measuring_interest_in_hydrogen_initiative_-_fleet_and_infrastructure_outreach_5_8_20.pdf.
[3] https://www.marketsandmarkets.com/Market-Reports/hydrogen-storage-market-15698551.html
[4] https://www.globenewswire.com/news-release/2020/02/20/1987850/0/en/Electric-Vehicle-Charging-Station-Infrastructure-Market-Size-Hit-US-55-347-8-Mn-by-2026.html
[5] https://cafcp.org/by_the_numbers
[6] KPMG, Global Automotive Executive Survey 2017 (Jan. 2017)

I-75 (priority 1) and I-70 and I-71 (priority 2) corridors are the most heavily travelled interstates in the Michigan and Ohio region. These interstates are not only the key to the Midwest manufacturing epicenter in Michigan and Ohio, but they provide the opening for this Midwest location to lead the way to further projects for advanced alternative fuel infrastructure. This project would be the first piece in the puzzle ultimately connecting advanced alternative refueling to fleets across the country.

There are many fleets in the priority corridor that would be able to convert their vehicles to advanced alternative fuels as the opportunity for refueling arises. As of 2019, in the priority corridor area, there were a total of 532,744 registered vehicles ranging from class 2B to class 8 set forth in Figure 2 shown, below. This information clearly shows how hydrogen demand will expand across all classes of vehicles, indicating a strong need to build the infrastructure now to allow these vehicles to refuel in the Midwest corridor.

These future market demand numbers will never be met nor surpassed without action and moving the levers of change. These critical levers of change include championing advanced alternative fuels to meet ambitious goals, mitigation of barriers of advanced alternative fuel vehicle adoption using collaboration to address priorities with state and regional support, leadership of business to embrace the opportunity to achieve sustainability and decarbonization goals, and setting policies in place to drive the market to greater levels of decarbonization in the U.S. Business leaders, consumers and fleets are watching the market and are interested in selecting alternative fuel options. They are ready to jump in and make the purchase decisions but cannot move forward without access to fuel. For further information on the transportation challenges and demand, refer to the ***Appendix 5 Hydrogen Demand Study.***

Developing the hydrogen economy will be crucial to maintaining US global competitiveness across multiple industries. Transportation is the backbone of national productivity and supports every industry in the country. The hydrogen economy will not only significantly impact transportation, but at the same time, development of hydrogen / electric infrastructure in transportation is key to expanding the overall hydrogen economy and will have a cascading effect on the rest of the US economy.

"Infrastructure is the backbone of the U.S. economy and a necessary input to every economic output. The role of infrastructure in economic growth is critical to the nation's prosperity and the public's health and welfare. Infrastructure's condition has a cascading impact on our nation's economy, impacting business productivity, gross domestic product (GDP), employment, personal income, and international competitiveness."[7]

According to the World Nuclear Association: "World oil refineries and chemical plants today have a demand for hydrogen which exceeds the US nuclear output in thermal terms. The rapidly growing demand for hydrogen favors technologies with low fuel costs, and the scale of hydrogen demand is appropriate to its production by nuclear reactors. Limited hydrogen pipeline networks already exist, allowing production facilities to be some way from users.[8] In September 2018 EU energy ministers signed the Hydrogen Initiative (***See Appendix 7 The Hydrogen Initiative***), a non-binding political declaration of support for hydrogen development.

[7] https://www.infrastructurereportcard.org/the-impact/economic-impact/
[8] https://www.world-nuclear.org/information-library/non-power-nuclear-applications/transport/transport-and-the-hydrogen-economy.aspx

Category	Class	Gross Vehicle Weight Rated (GVWR)	Vehicle Platform Examples	Total Registered Vehicles (IN, MI, OH)	Market Demand Projections								
					Near-Term			Mid-Term			Far-Term		
					2025			2030			2050		
					% Market	# of vehicles	Est. Annual Fuel Usage[25-26] (H2kg)	% Market	# of vehicles	Est. Annual Fuel Usage[25 26] (H2kg)	% Market	# of vehicles	Est. Annual Fuel Usage[25 26] (H2kg)
Light-duty (LD)	2	6001-10,000		213,434	0.01-0.02%	21-43	14,190	0.1-0.25%	213-533	175,890	20-22%	42,886-47,175	15,567,750
	3	10,001-14,000		32,770	0.03-0.055%	9-19	47,291	0.1-0.3%	32-98	243,922	20-22%	6,554-7,209	17,943,201
Medium-duty (MD)	4	14,001-16,000		46,519	0.02-0.04%	9-18	37,413	0.04-0.08%	18-36	74,826	20-22%	9,308-10,234	21,271,369
	5	16,001-19,500		7,332	0.01-0.02%	7-14	13,293	0.2-0.4%	14-28	26,586	20-22%	1,466-1,613	1,531,544
	6	19,501—26,000		37,222	0.05-0.1%	18-37	52,085	0.1-0.25%	37-93	130,916	22-25%	8,188-9,305	13,098,648

Category	Class	Gross Vehicle Weight Rated (GVWR)	Vehicle Platform Examples	Total Registered Vehicles (IN, MI, OH)	Market Demand Projections								
					Near-Term			Mid-Term			Far-Term		
					2025			2030			2050		
					% Market	# of vehicles	Est. Annual Fuel Usage[25] [26] (H2kg)	% Market	# of vehicles	Est. Annual Fuel Usage[25] [26] (H2kg)	% Market	# of vehicles	Est. Annual Fuel Usage[25] [26] (H2kg)
Heavy-duty (HD)	7	26,001—33,000		24,517	0.05-0.15%	12-36	282,261	0.15-0.3%	36-73	572,364	22-25%	5,393-6,129	48,055,037
	8	33,001+		170,950	0.05-0.01%	85-170	1,385,500	0.1-0.25%	170-427	3,480,050	30-35%	51,285-59,832	48,753,300
				Total Registered Vehicles	Near-Term – 2025			Mid-Term - 2030			Far-Term -2050		
						# of vehicles	Fuel (H2kg)		# of vehicles	Fuel (H2kg)		# of vehicles	Fuel (H2kg)
GRAND TOTALS				532,744		161-337	1,832,033		337-795	4,705,004		125,080-141,497	166,220,849

Figure 2: Future Market Demand Based on Vehicle Registrations Across Corridor Demand Study Area

25https://afdc.energy.gov/data/10308

26Using annual GGE and the efficiency factor https://afleet-web.es.anl.gov/afleet/ efficiency

This data is important because regional and long-haul freight carrying applications are particularly well suited for fuel cell electric drivetrains, and as a result, are likely to create the first high demand for hydrogen refueling in the Midwest. Today, in states like California, the hydrogen market continues to accelerate, but until the infrastructure expands beyond the state of California, it will be difficult to drive vehicles and move goods and products.[9] We need to take steps now to ensure that access to hydrogen and the infrastructure required is available in all regions across the U.S., including the Midwest, within the next five years. Without taking the first steps to bring the infrastructure to meet the growing demand, the potential for the Midwest hydrogen economy will stagnate. The decisions made today will have a lasting, long-term impact on the future of a successful hydrogen economy.

This project is important because it addresses multiple elements of the hydrogen / electric economy in a single coherent planning effort:

- Planning light, medium and heavy-duty hydrogen and electric refueling infrastructure across the region, connecting the eastern seaport of New York to the central hub of Chicago and supporting regional north-south routes to accommodate movement of freight and people.
- Prioritizing regional hydrogen / electric refueling infrastructure locations based on national connectivity needs and expected national, regional, and local demand and commitments from fleets.
- Planning for clean hydrogen production for distribution to the regional infrastructure locations and a methodology for expanding localized production capacity to keep pace with demand.
- Laying the groundwork for further decarbonization of industries in the region through the development of a robust regional hydrogen / electric infrastructure. For example, hydrogen fuel cell generators are recommended by the DOE as the best source for backup power for cell towers.

Establishing a robust hydrogen production and distribution infrastructure in the Midwest will enable the region to support immediate light, medium and heavy-duty hydrogen vehicles, and future marine and air hydrogen transportation and a wide array of stationary industrial applications, such as the backup generator sector, helping to move the region and the nation forward in both its environmental and economic/ employment goals.

To ensure the timely development of the hydrogen/battery electric economy it is critical that action be taken today, action that requires significant coordinated efforts by multiple stakeholders across multiple industries, levels and agencies of government and NGOs. As the world economy is moving ahead steadily on this front, failure of the United States to keep pace will have potentially significant economic and competitiveness impacts on the country in the decades ahead. While a Benefit-Cost Analysis is not required for a planning project, we have included one with this application that identifies and calculates significant positive benefits ($100,726,689) from taking this planning and regional development action now. See ***Appendix 4 BCA Calculations***. The benefits from this planning project and its subsequent implementation project(s) include:

- Economic expansion, new jobs and businesses, new products and technologies, new exports;
- Reduced GHG emissions, reduced negative health impacts, improved quality of life;
- Reduced traffic and congestion, increased eco-friendly tourism;
- Improved regional and national economic competitiveness and attractiveness to businesses.

1.2 Addressing Transportation Challenges

The project will address these key challenges by developing a comprehensive, targeted Action Plan to deploy advanced alternative refueling stations and associated systems, including hydrogen production and supply. When complete, this Plan will identify 5 site locations where analysis has shown strong market and site host support exists for an advanced alternative fuel station providing electricity or hydrogen. With this submission, the Project Team has already identified hydrogen

[9] https://www.trucks.com/2020/04/21/daimler-volvo-hydrogen-fuel-cell-truck/

production and supply partners, and recognize there are between 40 to 50 locations along the identified priority corridors available for consideration (these locations are not restricted to Trillium/Love's locations only), which will enable the Project Team to jumpstart work on site-specific planning early in the project, while also conducting analysis and developing a complete supply chain from production to refueling.

While one of the key goals will be providing individuals and fleet owners access to advanced alternative fuels, the Project Team will also focus on other factors. For example, site analysis will include evaluation of the site's ability to closely mimic the driver experience at conventional refueling locations. Additionally, the Project Team will evaluate sites located along freight lanes, significant highway corridors, and, to a lesser extent, routes in urban centers where drivers commute and conduct business daily. To remove barriers to adoption, we will build driver confidence that any given advanced alternative fuel will be available when they need it and easily purchased using cash or credit card.

Many of Trillium/Love's existing refueling stations—where many of the proposed advanced alternative vehicle refueling stations would be located—are located just outside of urban areas, largely in rural locations and away from urban congestion sites at easy-to-access locations near regional transportation corridors and urban areas. These locations carry significant congestion-reduction benefits. While individual urban fleets relying on their own refueling stations can contribute to urban congestion, refueling stations located just outside of core urban areas will draw refueling traffic away from crowded urban streets to carefully designed sites already used for conventional refueling. This provides these rural areas with economic development and access to advanced alternative fueling sites that residents and businesses of these communities can access to realize the cost savings and environmental benefits offered by advanced alternative fuel vehicles.

By supporting refueling infrastructure for advanced alternative fueled vehicles—including battery electric and hydrogen fuel-cell vehicles—the project could greatly reduce airborne emissions along the proposed corridor. Specifically, the project could reduce on-road emissions by up to 100% for electric vehicle and hydrogen refueling options, while substantially reducing NO_x emissions to near-zero levels and eliminating particulate emissions entirely. For detailed information on emissions reductions, see ***Appendix 4 BCA Calculations***.

1.3 History and Context with Other Infrastructure Investments and Planning

Infrastructure Investments. Over the past 10 years, SARTA, CALSTART, Trillium/Love's, Ohio Fuel Cell Coalition, and many other stakeholders have made efforts to develop alternative fueling opportunities, including road-mapping and in some cases identifying corridor locations for CNG, EV charging, hydrogen, and other alternative fuels.

SARTA has been actively developing and deploying alternative fuel solutions in its service area and across the region for nearly a decade. Since 2012, SARTA has transitioned from not owning a single low- or zero- emission transit vehicle to today's fleet of almost 100 vehicles including 41 converted low- emission CNG-powered transit buses and four low-emission diesel-electric hybrid transit buses. SARTA also funded (totaling nearly $20 million) twelve 40 ft hydrogen fuel cell buses and 5 <30 ft hydrogen fuel cell paratransit buses deployed at the end of 2020. SARTA currently operates a publicly accessible CNG refueling station and has invested in an existing hydrogen refueling station, commissioned in 2016, with additional hydrogen system upgrades planned to meet future hydrogen vehicle deployments.

Concurrently, SARTA has been working with CALSTART and various regional entities to develop Ohio into a regional hub for clean, advanced alternative fueled vehicles by developing and deploying clean fuel vehicles and infrastructure throughout the region. This project will directly support SARTA's ongoing emissions reduction and energy security goals, while leveraging key regional planning and implementation efforts to save on fuel costs, support local employment and economic development, support energy security, and reduce emissions. These efforts have culminated, to date, in the Midwest States Hydrogen Fuel Cell Demand Study (2020), the Hydrogen Roadmap for the U.S. Midwest Region (2017)

and the Renewable Hydrogen Fuel Center Collaborative (2017). The plan is a direct precursor to this project, outlining a high-level and generalized roadmap for future implementation of hydrogen refueling and fuel cell vehicle deployment across the region.

Partner Trillium/Love's Travel Stops, through the 2016 purchase of Trillium, has acquired 20+ years of direct experience in the planning, development, deployment, and operation of clean fuel infrastructure. Love's and Trillium collectively offer alternative vehicle refueling at 67 sites nationwide, delivering over 100 million gasoline gallon equivalents of CNG each year. Led by Trillium, Love's is identifying new and optimal locations where additional advanced alternative fueling could be deployed, building on hundreds of millions of dollars of existing refueling system infrastructure already completed by the company, helping to spearhead a new round of clean refueling infrastructure, replicable at hundreds of Love's stops nationwide. In February 2020, Trillium began operations of North America's largest hydrogen transit refueling stations in Santa Ana, CA, powering the Orange County Transportation Authority's transit buses.

SARTA is collaborating with Energy Harbor, which owns and operates three nuclear power plants within the region: Davis-Besse Nuclear Power Station (DBNPS), Perry Nuclear Power Plant, and Beaver Valley Power Station. DBNPS is a single-unit pressurized LWR located in Oak Harbor, OH (east of Toledo, OH) and is operated by Energy Harbor. The original 40-year operating license of DBNPS was granted on April 22, 1977 and on December 8, 2015, the license was renewed to extend operation 20 additional years, until April 22, 2037. Energy Harbor also operates the Perry Nuclear Power Plant, a single-unit boiling LWR located in Perry, OH and the Beaver Valley Power Station, a dual-unit pressurized LWR located along the Ohio River in Shippingport, PA. Energy Harbor is currently planning the development of hydrogen energy storage production facilities at DBNPS, with an anticipated operation date in May of 2022.

In September 2019, Energy Harbor in partnership with Idaho National Laboratory (INL), Xcel Energy of Minnesota and Arizona Public Service was awarded U.S. Department of Energy (DOE) funds to develop and demonstrate an integrated light water reactor hybrid energy system to produce commercial quantities of hydrogen. The first unit is planned for installation in 2020 Energy Harbor's Davis-Besse plant. There are plans to use the hydrogen produced to supply public transport fleets in Ohio as well as in commercial industrial applications.[10]

Planning Coordination. Efforts have supported installation of advanced alternative refueling capacity at specific locations across Ohio and Michigan which have helped to drive private investment. Clean Ohio Fuels' planning process, as noted above, led to the development of public-access CNG stations at six locations, helping to spur private investment in CNG refueling development and in additional sites across the Planning Area. These initial planning efforts, along with other regional and federal level planning efforts, have developed information on next steps needed for advanced alternative fueling infrastructure development. Our project will leverage these efforts to take the next step in advanced alternative refueling development in Ohio—the development of a comprehensive supply chain from development of hydrogen production and supply, identification and screening review of specific sites and the performance of site-specific planning needed to transition to advanced alternative fueling facility construction.

We will also leverage other plans and advanced alternative vehicle refueling activities including:

[10] https://world-nuclear-news.org/Articles/US-DOE-awards-funds-to-support-industry-innovation

- **FHWA Designated Alternative Fuels Corridor.** The Fixing America's Surface Transportation (FAST) Act requires the Secretary of Transportation to designate national EV charging, hydrogen, propane, and natural gas fueling corridors.
- **FHWA Alternative Fuel Corridor Convenings (Co-Organized/Led by CALSTART).** In 2018, FHWA initiated a series of regional convenings to encourage multi-state and regional coordination for the development and implementation of alternative fueling infrastructure.
- **I-80 Corridor Coalition.** The Corridor Coalition involves partners coordinating alternative dual infrastructure and development along I-80 in the Midwest.
- **Michigan to Montana (M2M).** This corridor project covers I-94 from Billings, Montana to Huron, Michigan.
- **Volkswagen Mitigation Plan.** Ohio's VW mitigation plan calls for an approximately $12 million investment in EV charging infrastructure over three years.

1.4 Benefits to Rural Areas

The project will specifically focus on rural areas in Ohio and Michigan, providing strong infrastructure development benefits. Of the 88 counties in Ohio, 50 are considered rural, and of the 83 counties in Michigan, 58 are rural, according to a report released by HRSA in 2018.[11] The project will focus on four corridors as described in Section 2.0, focusing first on I-80/I-90 and I-75 ((priority area 1) for planning then I-70 and I-71 (priority area 2). The listed highways travel through the states' rural counties, sporadically entering metropolitan areas along the way. The majority of refueling station locations will be in rural areas to address the importance of developing advanced infrastructure in underserved rural areas, alleviating range anxiety, supporting economic development and jobs in rural areas and reducing emissions along key rural corridors. The project will also yield several other key benefits for rural locations:

- Support domiciling of vehicles in rural areas, enabling rural economic development
- Increase vehicle traffic in rural locations, providing opportunities for secondary economic development and minimizing new pollution compared to conventional vehicles
- Provide advanced vehicle refueling in rural areas, which are often late to receive new advanced technologies

1.5 Independent Utility and Relationship of Project Components

This planning effort will engage public/private partnerships to plan needed advanced alternative refueling infrastructure. We anticipate that most proposed planned project elements will have independent utility. Specifically, hydrogen production and supply efforts and each refueling station will be planned to have independent utility, such that they could each viably operate independently. Beyond independent utility, providing a complete supply chain and implementing a larger number of stations will provide additional benefits as connectivity increases and range anxiety is reduced. Therefore, each additional station that is deployed will provide increased opportunity for regional (rather than just local) operating fleets and individuals to invest in advanced alternative fueled vehicles.

2.0 Project Location

Priority corridors were identified from recent studies run by Cleveland State University, which identified the most heavily travelled interstates, starting with the heaviest, are:

- Priority 1: I-80/90: An East - West interstate that takes individuals and products from New Jersey to Iowa
- Priority 1: I-75: A North - South interstate that takes individuals and products from Michigan to Florida
- Priority 2: I-70: An East - West interstate that takes individuals and products from Utah to Maryland
- Priority 2: I-71: A Northeast - Southwest interstate that connects I-75/I-70 to I-80/90 across Ohio

[11] https://www.hrsa.gov/sites/default/files/hrsa/ruralhealth/resources/forhpeligibleareas.pdf

The overall area that has been analyzed for demand can be seen in Figure 2, below.

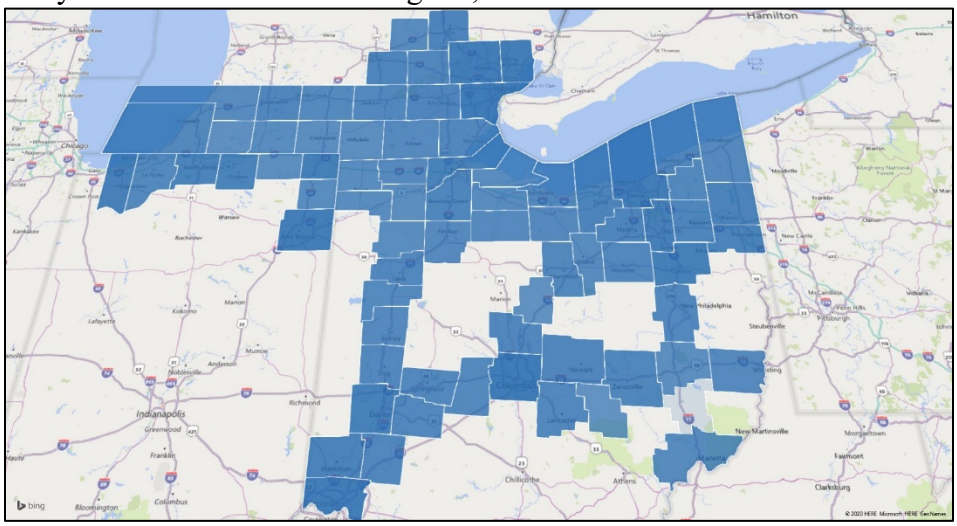

Figure 3. IHS Market Demand Area Across Michigan and Ohio and into Indiana

The proposed corridors are a prime opportunity due to the high volume of fleet traffic and proximity to manufacturing facilities. Not only is the I-75 corridor the key to the Midwest manufacturing epicenter in Michigan and Ohio, but the I-80/90 and I-70 corridors also stretch from as far east as New York City and as far west as Sacramento. This provides the opportunity for the Midwest to lead the way to further projects for advanced alternative fuel infrastructure, as this would be the first piece in the puzzle of allowing alternative refueling to fleets in the area and across the country. For the foreseeable future, Midwestern states are not expected to adopt California-style incentives, such as Zero Emission Light, Medium- or Heavy-Duty Vehicle Programs which fund the early commercial implementation of zero emission trucks and buses.[12] Adoption rates will depend on identifying barriers and challenges and taking action to eliminate them quickly. The key is to drive the hydrogen and advanced alternative fleet market forward outside the 13 ZEV states through the migration of advanced alternative fuel infrastructure and help support fleet decision makers through the access to fuel alternatives. Neither Michigan nor Ohio is one of the 13 zero emission vehicle (ZEV) states, and there is not an established revenue stream in place that supports the accelerated deployment of zero emission technologies. However, zero emission technology is critical to the growth of the area's economy and the health of its residents. Within the U.S., California and the Northeast have recognized the benefits of hydrogen and its potential to transform the transportation sector. The Midwest, with Michigan and Ohio's lead, stands to also gain from the current market as it has a vast hydrogen fuel cell supplier network and expertise about the technology with initiatives already underway that have introduced the first stations and FCEVs to the State.[13] The states of Michigan and Ohio are critical to the U.S. automotive market as the majority of OEMs and suppliers are located in the region. Ohio specifically has a vast fuel cell supplier. Among its strengths, the region boasts a strong manufacturing base with a focus on the automotive. The project will plan to deploy advanced alternative refueling stations across the priority Planning Area, with a focus on rural sites in the areas shown in Figure 2.

3.0 Grant Funds, Sources, and Uses of All Project Funding

SARTA requests a total of $2,329,990 funding to support development of the proposed Action Plan, including all elements proposed in the Work Plan (Section 5.2). To this amount, the project team will add an additional $481,000 in local, non-federal public funds and private-capital-based funding from the sources listed below. Please see ***Appendix 1 Letters of Commitment*** and ***Appendix 3 Budget Spreadsheet***.

[12] Alternative Fuels Data Center. "Hydrogen Laws and Incentives in California." https://afdc.energy.gov/fuels/laws/HY?state=CA

[13] H2 Roadmap – SARTA/CALSTART

Table 1. Matching Funds

Project Partner	Match Amount
SARTA	$34,950
CALSTART	$20,000
Trillium	$350,050
OFCC	$45,000
Energy Harbor Corp	$16,000
Dominion Energy Ohio	$15,000
TOTAL	**$481,000**

Collectively, match funds will total a 21% cost share for this project. Match will be spent on tasks as shown in Table 2. No federal funds will be used as match.

Table 2. Project Budget Spreadsheet

Project Task / Subtask	Federal BUILD Amount	Cost Share, Non- Federal	Total Amount	% of Project
1.0. Administration	36,000	34,950	70,950	2.5%
2.1. Fuel Demand Study	280,000	35,000	315,000	11%
2.2. Market Acceleration Actions	400,000	111,300	511,300	18%
2.3. Site Analysis	0.00	8,750	8,750	.5%
2.4. Evaluate Location Specific Opportunities and Constraints	256,000	64,000	320,000	11%
2.5. Infrastructure Planning	359,000	64,750	423,750	15%
2.6. Infrastructure Cost Estimates	570,000	142,500	712,500	25%
2.7. Corridor Economic and Workforce Development and Analysis	120,000	10,000	130,000	5%
3.0. Action Plan Development	308,990	9,750	318,740	11%
TOTAL	**2,329,990**	**481,000**	**2,810,990**	**100%**

3.1 Constraints on Project Funds

No constraints on project match funds have been identified. All match funds are available or will be available, based on existing and approved budgets, on the schedule required for grant implementation.

3.2 Costs for Components with Independent Utility

Not Applicable. See Section 1.5.

4.0 Merit Criteria

4.1 Safety

Project Outcomes that Support Safety. Safety will be integrated throughout all phases of supply chain planning by SARTA and its partners to ensure safe and automatically monitored refueling infrastructure to help to reduce the number, rate, and consequences of transportation-related accidents and injuries related to refueling. Refueling systems implemented by Trillium/Love's under the project will comply with the company's current standard safety specifications, industry standards and regulated safety specifications. Specifically, all proposed systems will meet NEC and IEEE specifications, as well as state regulations. Each station is maintained and managed through a centralized control system that constantly monitors station activity and performance. In the event of off-normal conditions (for example if a leak or electrical fault is detected), the station will automatically and immediately shut down, simultaneously informing Trillium/Love's's call center

of the issue. Call center staff will initiate remote repairs. If remote repairs are not possible, a responder is dispatched to the site to assess and fix the problem and get the station back up and running normally. Trillium/Love's automated system and response procedure is unique in the industry, and greatly supports staff and user safety, while maximizing facility uptime. Safety plans will be developed in this project to address the refueling stations and the transportation of fuel to the stations from the production source(s).

Trillium/Love's carefully planned maintenance and upkeep plan contributes to safety performance. All proposed stations would become part of this network, with the Operations & Maintenance (O&M) database of preventative maintenance schedules for each facility updated to include this project.

The project team also seeks to deploy proposed facilities primarily in rural areas having sufficient road capacity and safe access. This siting policy will reduce urban congestion by moving refueling traffic out of high-traffic urban areas. By maximizing accessibility and minimizing traffic interference, the proposed refueling stations will further reduce risk of congestion and congestion-related transportation accidents, injuries, and deaths.

Prevention of Release of Hazardous Materials. All proposed refueling facilities will include automated shutoff systems that will shut down the system in case of a fuel leak to prevent or greatly minimize release of hydrocarbons or hydrogen into the atmosphere. Additionally, the deployment of advanced alternative fuels will, over time, reduce reliance on conventional gasoline and diesel, which can escape from underground storage tanks, releasing hazardous fuels into the subsurface, increasing soils and groundwater pollution. Transition to advanced alternative fuels will also incrementally reduce air pollution, delivering public health benefits through improved air quality across the target region. Increased alternative refueling opportunities will support deployment of low-emission and zero-emission advanced alternative fueled vehicles, which will in turn result in significant reductions in emissions of GHGs, NO_x, SO_x, reactive organic gases (ROG; an ozone precursor), PM_{10}, and $PM_{2.5}$. The most important of these pollutant reductions are sulfur dioxide (SO_2) and NO_x because they contribute to the formation of airborne fine particulate matter (PM2.5) and ozone, both of which are harmful to health. Many of the proposed stations are located in non-attainment areas due to poor air quality.

Short-term exposures to SO_2 can harm the human respiratory system and make breathing difficult. Children, the elderly, and those who suffer from asthma are particularly sensitive to effects of SO_2. SO_2 emissions that lead to high concentrations of SO_2 in the air generally also lead to the formation of other sulfur oxides (SO_x). SO_x can react with other compounds in the atmosphere to form small particles. These particles contribute to PM pollution: particles may penetrate deeply into sensitive parts of the lungs and cause additional health problems. High NO_x emissions also contribute to formation of secondary particles and ozone, resulting in an increased number of respiratory and cardio-vascular diseases among affected populations. PM2.5 and ozone also cause premature death and adverse health effects such as chronic bronchitis; non-fatal heart attacks; hospitalizations for cardiopulmonary disease, asthma, or cardiovascular events. By reducing these and other hazardous emissions, the project is likely to reduce:

- The number of annual premature deaths in the affected region
- Asthma symptoms among children
- The number of emergency department visits for asthma
- Lost workdays
- Missed school days
- Hospital admissions for cardiovascular or respiratory symptoms

4.2 State of Good Repair

Current Conditions and State of Good Repair Improvement. A comprehensive planning process as proposed would

ultimately result in the installation of new advanced alternative refueling facilities primarily at rural locations where such facilities do not currently exist. On the whole, by installing new refueling stations, the project will contribute to the state of good repair for target locations. Additionally, increased dependence on alternative fuel systems will, over time, decrease dependence on aging and often leaky underground storage infrastructure associated with conventional refueling stations. Deployment of the facilities and activities identified during the planning process, especially when combined with similar future planning and implementation efforts, will greatly benefit the state of good repair for transportation sector refueling infrastructure. Part of the planning process will include development of an integrated maintenance plan that will ensure facilities are sustained via regular maintenance and upkeep. A detailed timeline with schedule and milestones is provided in Section 5.2 Scope of Work.

4.3 Economic Competitiveness

Jobs and Economic Growth - The project will strongly support the development of new jobs and economic growth in the region and is an economic imperative to the region. CALSTART estimates that development of hydrogen vehicle markets and refueling infrastructure will support 65,000 new jobs, based on the installation of a total of 250 hydrogen stations regionally and approximately 135,000 fuel cell electric vehicles. Based on the proposed Action Plan and information provided by Trillium/Love's regarding jobs development, the project is expected to generate approximately 1.5 long-term operations jobs for every fueling station deployed, resulting in approximately 90 jobs generated at plan buildout. Additionally, the installation of equipment at each station would generate the equivalent of four FTE jobs for a duration of two months, for an annualized 40 FTE construction period jobs. Finally, direct investment in the Action Plan plus the infrastructure proposed under the Action Plan is expected to indirectly generate approximately 2,223 jobs per years, which is $93,366,000 per year in job-related revenue. See ***Appendix 4 BCA Calculations***. Domestic fuel production, where hydrogen is produced from domestic natural gas, production of hydrogen from nuclear facilities, and electricity for EV charging produced by local utilities, strongly supports Planning Area job development.

The proposed fuels corridor, once in place, will also strongly support the sale of advanced alternative fuel vehicles in the Priority Planning Area, initially for fleets looking to convert, and ultimately for the public at large. Secondary services to support the sector, including maintenance and repair facilities for the vehicles, will provide jobs for vocational technicians and development of new and upgraded facilities needed to support maintenance activities. All of these activities will support job growth and economic development. Finally, developing advanced alternative fueling in rural areas will help keep rural areas competitive with urban areas that presently have more readily available access to such infrastructure.

Freight Connectivity. The project will support significant strides forward in freight connectivity for advanced alternative fueled vehicles in the region. Presently, transport of freight using alternative fuels is severely hampered by a lack of refueling opportunities (i.e., service gaps) along key transit corridors. Today, advanced alternative fuels use in Ohio and Michigan is limited to local fleets that have a restricted range, such as last-mile delivery vehicles, municipal fleets, and transit agency fleets. Travel by private EV users is much more common within an urban area where chargers are readily available. Advanced alternative fuels usage in rural areas, however, is extremely limited, as is alternative fuels usage for mid- to long-distance freight transfer and shipping, including inter-city and inter-state transport. The project will enhance freight connectivity by strategically locating alternative refueling infrastructure along key corridors where insufficient infrastructure is available today. Upon buildout of the Action Plan, freight carriers traveling along the region's key interstates (including I-90, 80, 75, 70, 71, and various others) will have easy access to advanced alternative refueling stations. These proposed stations and those additional stations developed during execution of the planning project will further provide east-west connectivity across current dead-zones in hydrogen refueling, light, medium and heavy-duty EV charging, and other alternative fuels in the target region.

Congestion Reduction. The project's careful and strategic siting of the proposed refueling facilities will help to reduce road

congestion by deploying refueling facilities primarily in rural areas having sufficient road capacity and safe access aligned with current industry standards as well as federal, state, and local safety regulations and requirements. Trillium/Love's in particular seeks to site refueling infrastructure along rural corridors and interstate junctions, maximizing traffic to those stations, reducing refueling traffic in high-traffic urban areas. Thus, by carefully siting facilities to maximize accessibility and minimize traffic interference, the proposed refueling stations will further reduce risk of congestion.

Service Gaps in Rural Areas. Advanced alternative refueling options for EV charging for light, medium and heavy-duty vehicles, and for hydrogen generally, are limited or non-existent in rural areas targeted by the project. Additionally, facilities hosting recharging and refueling equipment may also offer a range of other services useful to drivers of alternative-fuel vehicles. For example, there is the potential for advanced alternative refueling stations located at Love's sites to have co-located light maintenance facilities capable of servicing advanced alternative fueled vehicles. These anticipated services will include lubrication and fluids, tire care, auxiliary systems, and other non-engine components of advanced alternative fuel vehicles.

Expansion of Private Economic Development. SARTA's project is a collaborative public-private partnership, addressing public need and private economic development, incorporating input from a wide range of public entities working closely with a variety of non-profits and private businesses to plan a regional alternative fuel corridor that incorporates input and non-federal financial resources. Within this larger framework, Trillium/Love's will serve as a cornerstone for the project with the expectation to look towards other fueling station providers to ensure equitable market availability. Our approach will enable the project team to move quickly into the installation of an initial round of charging and refueling equipment, while completing pre-construction activities associated with other future site hosts, resulting in "steel in the ground" well in advance of the 2027 deadline for spending 2020 BUILD infrastructure funds. In this manner, the Action Plan will help to fast-track equipment installation at facilities across Ohio and Southern Michigan, thereby supporting private sector jobs and economic development generally. Federal support for this planning project is considered critical for rapid deployment of these facilities and will help deploy these projects at a fair return. Increased availability of alternative refueling will support private economic development. Many regional private (and public) fleets are seeking to transition to alternative fuels to support internal sustainability goals, reduce emissions, and save money on fueling costs. Freight carriers, delivery vehicles, and various other regional fleets will directly benefit from the project, which will support their respective business models and profitability. At the heart of the Utica and Marcellus shale gas plays, Ohio produced around 1,500 billion cubic feet of shale gas in 2017 alone. The project will help the region accelerate its transition toward locally produced fuels by providing a new market for locally produced shale gas.

Guidance to Support Economic Development Strategy in the Region. The transportation corridors targeted under the Action Plan relate directly to two critical areas of economic development in the region: automobile/truck manufacturing and the oil and gas industry. The region is home to several major car manufacturers, the largest natural gas fields in the United States, and a nascent petrochemical industry. The adoption of advanced alternative fuel technologies and smart transportation systems can help drive economic development opportunity for the region, especially for hydrogen-based transportation.

Experts project that a full transition to a hydrogen economy will require around 14 trillion cubic feet per year of additional natural gas supplies for Class 8 trucks alone, pending the development of hydrogen supplies from nuclear and wind generation. The long-term supplies of natural gas being developed in the Appalachian Basin make the target region an ideal location to install infrastructure necessary for a transition to a hydrogen economy. Currently, around 95% of hydrogen is manufactured through stream-reformation of natural gas. Transition to zero-emission hydrogen will require several years to re-purpose nuclear fleets from electricity to hydrogen generation, and/or the development of improved carbon capture technologies.

The local economy will benefit through the manufacturing of electric vehicles, the deployment of electric recharging stations and through the deployment of enhanced communication systems to operate automated and smart transportation technologies. The corridors identified in the planning grant will connect the communities developing these technologies. For instance, Ford Motor Company is converting a former downtown Detroit train station just off I-75 into its headquarters for its "future of mobility" technology development. Action Plan implementation will help the region assimilate and understand the disruptive role of ongoing research and development and translate R&D into benefits to local economies and the regional workforce. See the ***Appendix 4 BCA Calculations*** for additional information on relevant regional economics related to advanced alternative refueling opportunities.

4.4 Environmental Protection

Under existing conditions, private and public fleets continue to rely overwhelmingly on diesel and gasoline—fuels that are effective in powering transportation and transit, but that generate elevated levels of pollution and contribute to energy security concerns. The project is estimated to replace 115,467,337 diesel gallon equivalents (DGE) per year. First and foremost, the project will reduce reliance on these fuels, and will instead support the transition to alternative fuels. Refer to Section 4.1 Safety / Prevention of Release of Hazardous Materials for information on how reducing air emissions will benefit public health, including in rural areas.

By helping to transition away from liquid fuels that must be stored for long periods underground, the project will ultimately help reduce the volume of fuels accidentally released into the subsurface from thousands of underground storage tanks (USTs) in Ohio and Michigan. Unlike conventional diesel and gasoline, hydrogen does not remain in the subsurface even if accidentally released, and do not contribute to environmental problems like poor groundwater quality or drinking water contamination. Increased reliance on these fuels will reduce deployment of new or reliance on existing USTs, thereby reducing potential for future environmental contamination. In addition to the cost savings shown in the BCA, we have incorporated in this project plans to incorporate zero emissions hydrogen production from nuclear power facilities which will increase the emissions cost savings.

Finally, all the locations identified to date would be located at existing refueling facilities or other existing transit facilities. By co-locating the proposed equipment at existing facilities, Action Plan implementation will minimize the use of greenfield sites, and minimize or avoid entirely footprint related environmental impacts, including potential destruction of habitat, harm to endangered species, and disturbance to sensitive waterways and wetlands or to sensitive historic and cultural resources.

4.5 Quality of Life

Increased Transportation Choices. In the initial implementation of the proposed Action Plan, SARTA anticipates the installation of charging and advanced alternative refueling equipment in at least 5 sites (with capacity to expand), planned to be built out by 2027 In this manner, Action Plan implementation will greatly improve transportation choice opportunities, by providing individual travelers (as well as fleets) with new options for the use of advanced alternative fueled vehicles along the proposed corridors.

Expansion of Essential Services. The project will directly expand and extend essential refueling opportunities—that are currently available to users of conventional gasoline and diesel—to individuals (and fleets) who choose to use alternative fuels, along the identified corridors. Refueling opportunities along the proposed corridors are currently limited and are especially sparse outside of established urban areas. The project will therefore provide strong support for expansion of fueling services in rural areas. Additionally, project partner Trillium/Love's proposes to expand its current suite of vehicle services to include advanced alternative fueled vehicles. Trillium/Love's could also provide access to basic maintenance services including oil changes, tire care, and repair for alternative vehicles at the identified alternative fueling locations at

Love's facilities.

Improved Connectivity. The project will improve connectivity for citizens to jobs, healthcare, and other critical destinations, including in rural communities. Today, the vast majority of alternative fuel vehicle users live and operate their vehicles primarily within urban areas. The project will help those who live in rural areas, or those who seek to travel to or from rural areas or through rural areas to access jobs, healthcare, and other critical destinations, by providing new fueling opportunities, including in rural areas. The project will also support transit fleet transition to advanced alternative fuels, which will ultimately reduce fuel costs, reduce emissions, improve transit economics, and therefore provide new opportunities for fixed route and rural transit option expansion by SARTA and other transit agencies. Improved transit service will in turn support improved connectivity.

Quality of Life. The project will not install roads or other linear features, and therefore will not support installation of new broadband or other utilities. The project will, however, provide a framework for greatly improving air quality emissions reductions across the Planning Area, which will in turn provide health benefits (reduced asthma, reduced cancer occurrence, etc.) to urban and rural community members. It will also provide improved access to advanced alternative fueled vehicles, helping to narrow the technology gap and associated quality of life benefits between rural and urban areas. Analysis from CSU predicts that the medium and heavy-duty freight trucking industries in Ohio has a demand for hydrogen between 2,000-3,000 MT annually, with the overall hydrogen demand in Ohio estimated at 161,000MT per year; the dominant user being industrial facilities and refineries. As local nuclear power generation considers advancing Integrated Energy Systems for the production of Hydrogen, the project team has begun preliminary conversations with First Energy Solutions regarding this potential new hydrogen source. Preliminary estimates indicate the potential for production of 900kg/day by August 2020, roughly 10-16% of Ohio's freight trucking hydrogen demand. Subsequent expansions could greatly surpass the total hydrogen demand of Ohio's freight trucking industry based on the available energy resources at the Davis Besse Nuclear Power Station. The National Renewable Energy Laboratory's (NREL) June 2019 hydrogen infrastructure buildout analysis indicates a moderate rate of adoption of hydrogen refueling in Ohio, with a market that is spread out throughout the state compared to the highly urbanized demand in most regions of the US. With that in mind, this project's innovative hydrogen sourcing, and rural distribution strategy is unique in its potential to catalyze hydrogen adoption in the planning area.

4.6 Innovation

SARTA has developed an innovative public-private partnership to facilitate the widespread adoption of a major transportation innovation: advanced alternative fuel vehicles.

Innovative Technologies to be Deployed. The development of the proposed Action Plan will seek to deploy a wide array of innovative technologies to support vehicle refueling along the proposed corridors. The Action Plan will be technology agnostic to support fair and open competition. The following are examples of the types of innovative technologies that would be proposed under the Action Plan:

- ***Advanced refueling controls***. Deploy an advanced controls package for hydrogen refueling stations. These proprietary systems regulate fuel delivery and operation to provide higher uptime and loading rate for its compression system, reduced power demand, and faster refueling that is comparable to a traditional petroleum refueling experience.
- ***Hydraulic intensifying compressor (HyC)***. Trillium specifically is the first to deploy a hydraulic compression system (HyC technology) in the delivery of CNG. The technology is commonly used in the oil industry to move large quantities of gas very quickly. When integrated with the advanced control system, the technology delivers petroleum-like refueling rates to CNG vehicles. This benefit is especially useful when refueling large trucks that demand 120 to 170 diesel gallon equivalents (DGE) per fueling event. Standard delivery rates for less

sophisticated and similarly sized Hydrogen stations can require 30 to 45 minutes to fully refuel, which greatly slows throughput and wastes the driver's time. Trillium's HyC technology uses a two-stage hydraulic ram to deliver 10 to 15 DGE per minute, meaning that even a large truck can be refueled in about 10 minutes. Refueling time is a critical component for commercial trucking fleets.

- ***EV Charging Software.*** Advanced EV charging software, including that forwarded by Trillium as well as other industry players, includes an app for mobile devices used to effectively track usage and use sites, which directly interfaces with its stations, offering payment, availability tracking, charging technical support, and other key services.
- ***Alternative Charging Sources.*** Most EV charging stations by default rely on grid power as an energy source. However, the Action Plan will also consider deployment of renewable energy sources (including on site generation) to supply EV charging. Potential sources include solar arrays as well as on-site generation from a reciprocating engine or microturbine. These power sources could also help to provide electricity during peak demand periods, thereby reducing reliance and strain on grid services during those periods.
- ***On-Site Hydrogen Production***. The Action Plan will consider installation of technologies to support on-site production of hydrogen. This process will reduce the need for shipping of liquid hydrogen in tanker type trucks, potentially reducing fuel costs. The Action Plan will consider the production of hydrogen from both steam methane (natural gas) reforming and from electrolysis, where the cost of the latter is dropping considerably as new, more efficient systems are developed. Steam reforming of renewable natural gas may also be considered. Using nuclear power to produce hydrogen for fuel is consistent with the Department of Energy's H2@Scale Initiative and plan.
- ***Hydrogen Offloading*** The action plan will consider methods of transporting hydrogen from production at regional nuclear power generation facilities, expected to begin in 2021.

Applicant's Capacity to Implement Innovative Technologies. SARTA and its partners in this project have demonstrated commitment and ability to realizing the benefits of advanced alternative fuels for this region. SARTA is a regional leader, implementing innovative refueling technologies and advanced vehicles. The organization commissioned its existing Gateway Hydrogen Refueling Station in 2016 and is already planning for capacity expansion and upgrade of the station. The first Hydrogen fuel cell bus went through Altoona testing from SARTA. SARTA at the end of 2018 had 7 40' hydrogen buses and 1 30' bus. SARTA will add 5 more 40' and 5 less than 30' buses by the end of 2019. SARTA operates a fleet of 40 CNG-fueled buses. At the close of 2018, SARTA had converted approximately half of its fleet of 100 vehicles to clean technologies and maintains a goal of retaining only 25 diesel-powered vehicles in its fleet. SARTA has also successfully administered and completed federally funded projects targeting alternative fueled vehicles under the following: (1) 2014 Federal Transit Authority Low and No (LowNo) Emission Vehicles (2) 2016 Federal Transit Authority Low and No (LowNo) Emission Vehicles (5339 grant CFDA 20.526); 10% complete, 80% obligated; on budget and on schedule. Finally, SARTA also co-funded and participated in development of the Hydrogen Roadmap for the U.S. Midwest Region (2017), which will serve as background material for implementation of the project. Other project team members also exhibit exceptional capacity to implement innovative transportation technologies. Please refer to Section 4.7 for additional details on project partner qualifications and experience.

Figure 5: Ribbon cutting ceremony for SARTA's existing hydrogen refueling station, October, 2016.

Extraordinary Permits. No extraordinary permits will be required for the project. Development of the Action Plan itself will require no permitting. Subsequent installation of the facilities proposed under the Action Plan will require permitting, but these will be like those permits and approvals needed during the normal course of business for other refueling equipment installation. Permitting as required for implementation is included as part of the Action Plan.

Innovative Project Delivery Methods. Development of advanced alternative refueling infrastructure will greatly support both public and private entities across Ohio and southern Michigan. Thus, SARTA has assembled a project team that strongly leverages public private partnership (P3) to develop the Action Plan. Other innovative project delivery methods focus on facilities implementation projects, rather than planning projects. However, the project will also seek opportunities to support innovative project delivery during Action Plan implementation. During Action Plan development, the project team will seek to identify candidate projects for the following categories on innovative project delivery:

- Public-private partnership, which will support facilities that have the potential to benefit both public and private fleets and/or facility owners/operators;
- Design-Build or turnkey construction, which could be selected as a construction option for entities who choose to deploy an advanced alternative refueling station;
- Indefinite Delivery / Indefinite Quantity (ID/IQ), which could be appropriate for development of engineering and/or installation of multiple facilities where the total number of facilities has not been determined;
- Warranty Contracting, which could be applicable to contracts for any facility or equipment deployed during Action Plan implementation;
- Performance Contracting, which could be applicable when seeking to standardize facilities to target specifications or performance parameters;
- Alternative Technical Concepts / Practical Design, which could be applicable where a specific functionality or purpose is needed, the specifications of which can be worked out as needed to ensure but not surpass functionality needs;
- Construction Management/General Contractor, which could be applicable to facilities that would benefit from the use of a construction manager to facilitate project design and construction.

Benefits of Innovative Project Delivery. The proposed P3 will greatly improve the depth and breadth of the proposed Action Plan. By running the project as a partnership between public and private entities, the project will greatly support critically needed outreach to and collaboration among public and private entities. Based on internal research completed by the project team, public and private fleets and refueling facility owners / operators share many of the same needs regarding advanced alternative refueling in Ohio and southern Michigan. The proposed P3 will help to identify key infrastructure needs, develop facilities and refueling locations that can serve both public and private entities, accelerate advanced alternative refueling markets much faster than either private industry or public agencies working alone, identify innovative project implementation and project financing methods that encompass and encourage public and private participation, and provide a framework for future P3 cooperation during the implementation phase of the Action Plan. Other innovative project delivery methods, including those identified under the *Innovative Project Delivery Methods* header, will support reduced project cost, schedule improvements, improved innovation, improved reliability through beneficial quality guarantee or service structures, and more effective procurement and construction process management.

Reliance on SEP-14 or SEP-15. The project will develop an Action Plan that will support future implementation of advanced alternative refueling facilities across Ohio and southern Michigan. Therefore, while the project provides an excellent example of a public-private partnership (P3), it will not require the use of Special Experimental Projects No. 14 or No. 15 (SEP-14 or SEP-15). Similarly, installation of the specific facilities proposed under the Action Plan are not expected to require the future use of SEP-14 for experimental contracting procedures, or SEP-15 supporting P3 delivery of

transportation projects. These issues will be researched and addressed in full during the planning process, and the project team retains the ability to leverage SEP-14 or SEP-15 if deemed to be beneficial to project implementation.

Project Need for SEP-14 or SEP-15. Because the project involves planning rather than construction, it is not subject to SEP-14 or SEP-15. See also the previous subheading, Reliance on SEP-14 and SEP-15.

Innovative Financing. The project will rely extensively on public/private partnership to support both the Action Plan development process, and ultimately, to implement and install the advanced alternative refueling facilities identified under the Action Plan. Match funding provided for the project reflects a mix of public and private sources (Section 3.0). Ultimate funding for the project will also include funds from a variety of sources, including alternative refueling industry participants; private and public fleets; local transit authorities, cities, and other local government entities; utilities; state agencies; as well as federal funds. SARTA and CALSTART will seek to identify specific innovative financing techniques that could provide benefit during implementation of Action Plan elements / facilities. Certain innovative financing techniques—including federal loans, advance construction (AC) and partial conversion of construction (PCAC), tapered match, flexible match, grant anticipation revenue vehicles, Section 129 loans, and State Infrastructure Banks—could help to expedite funding and therefore construction of additional refueling facilities. Such opportunities will be evaluated and incorporated during the planning process.

4.7 Partnership

SARTA has assembled an expert project team that exemplifies an active public-private partnership, along with university and key nongovernmental organizations. The Stark Area Regional Transit Authority (SARTA), a regional transit agency serving Stark County, Ohio, will serve as the lead applicant, the primary recipient of the award, and the primary point of contact for the project. SARTA has played a foundational role in bringing advanced, clean vehicle technology to the Ohio region. SARTA maintains an extensive transit network, providing over 2.8 million rides each year in and around Stark County, in northeastern Ohio. In operation since 1997, SARTA currently operates 34 fixed routes in Alliance, Akron, Canton, Cleveland, Hartville, Jackson Township, Louisville, Massillon, North Canton and Uniontown, with 79% of Stark County's population living within one-half mile of one of SARTA's fixed routes. To provide reliable service to as many as possible in Stark County, these fixed routes operate over 20 hours and over 7,500 miles each day, Monday through Saturday. SARTA also works as a regional transit partner and leader in advanced vehicle deployments, interfacing with green transit development occurring in Dublin, Smart City development in Columbus, alternative refueling development in Canton, and other project team partners and regional transit authorities.

SARTA maintains a long-term, forward looking commitment to deploying advanced transport vehicle systems and technologies, supporting improved access, reduced congestion, optimized transit system performance, and emissions reduction. SARTA has been highly successful in leveraging existing partnerships with regional universities, private businesses, and local governments to create a rapidly developing regional hub for advanced transit vehicles. SARTA's current fleet of 100 vehicles includes 40 converted low-emission compressed natural gas (CNG)-powered vehicles and four low- emission diesel-electric hybrid transit buses. SARTA is now taking delivery of, and will soon have in revenue service, 10 zero-emission fuel cell buses, and is actively pursuing additional deployments. These activities have been funded, to date, through a combination of federal grants ($8.9 million in federal grant funding in 2015, $4.0 million in federal grant funding through the FTA's Low-No program in 2016), agency funding, and partnerships with other local municipalities and corporations. In the near term, SARTA anticipates retaining only 25 diesel-powered transit buses, with the goal of a mostly zero-emissions fleet. The organization is also committed to deploying advanced tracking technologies and systems, including its existing PinPoint GPS system, and integration with regional smart cities.

In its desire to advance zero-emission technologies, SARTA has joined into collaboration with Ohio State University-Center for Automotive Research (OSU-CAR), Columbus State Community College and Cleveland State University to form the Renewable Hydrogen and Fuel Cell Collaborative (RHFCC), funded in part by the U.S. Department of Transportation. The group's mission is to encourage Ohio and US global leaders in the adoption of renewable hydrogen in transportation. The RHFCC is initiating programs in education, outreach, and vehicle and infrastructure deployment; constructing a website; and developing regional and national partnerships to make hydrogen happen in the region. SARTA has co-sponsored hydrogen road-mapping efforts by CALSTART to support development of the Ohio region as a hub for advanced hydrogen-fueled vehicle and infrastructure deployment.

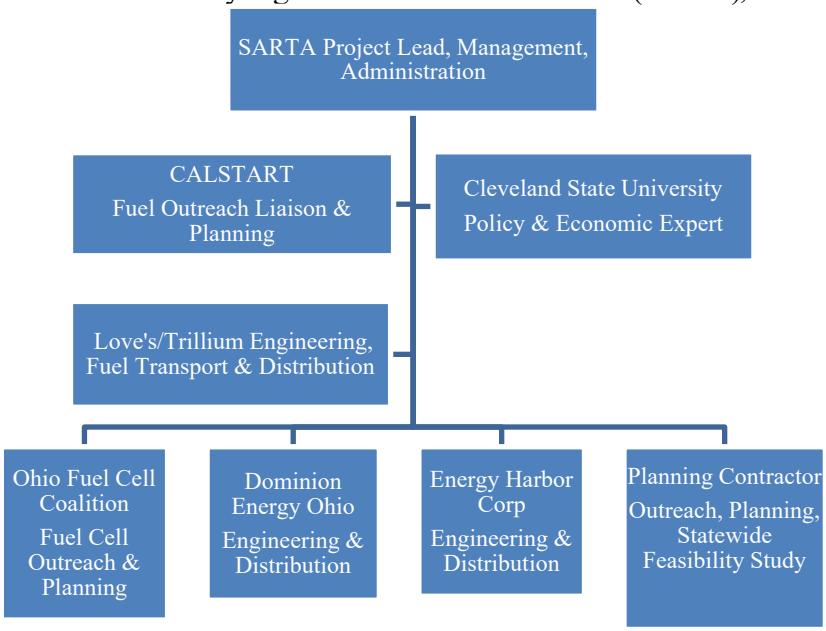

Figure 4. Organizational Chart

SARTA applied for a 2018 BUILD grant and has been highly successful in the acquisition and implementation of other federal and state grants. SARTA will serve as the grant administrator and project manager, and as technical lead for planning of refueling infrastructure at its facilities. We have assembled a strong team with capabilities and commitment to the deployment of alternative fuels in a public private partnership.

Trillium/Love's. Founded in 1964 and headquartered in Oklahoma City, Love's Travel Stops & Country Stores maintains 500+ locations in 41 states, providing professional truck drivers and motorists with 24- hour access to clean and safe places to purchase gasoline, diesel fuel, CNG, renewable CNG, travel items, electronics, food, and other products. In 2016, Love's completed acquisition of Trillium (then Trillium CNG), a CNG and renewable fuels infrastructure developer and facility operator.

CALSTART is North America's leading advanced transportation technologies consortium; a member-supported non-profit organization of more than 250 organizations, fleets, and agencies worldwide dedicated to supporting the growth of the high-tech, clean transportation industry. CALSTART has been working as an effective catalyst for the global advanced transportation technology industry for over two decades, supporting public private partnership and implementation strategies in the advanced transportation industry. CALSTART has successfully led or participated in many projects that have planned for and installed alternative fuel infrastructure; demonstrated alternative fuel vehicles (AFV); lead engagements and outreach efforts and/or allowed users to experience AFVs, analyze their benefits, and/or leverage incentive programs to purchase them. These programs include but are not limited to the Hybrid and Zero-Emission Truck and Bus Voucher Incentive Project (HVIP), Drive Clean Chicago, West Coast Collaborative an Alternative Fuel Infrastructure Corridor Coalition focused on medium and heavy-duty infrastructure planning, and SARTA's hydrogen (H2) bus deployments. In addition, CALSTART authored the Hydrogen Roadmap for the Midwest and are working closely with our industry members as well as the military here in the Midwest advancing AFV technologies and

infrastructure in support of.

Cleveland State University (CSU). Established in 1964, Cleveland State University (CSU) is a public research institution, ranking in the top 20 percent of U.S. universities for research and development, according to the National Science Foundation. The university's applied research programs link heavily with local and nationwide industry, supporting engineering and policy development for new technologies including in advanced transportation.

Energy Harbor Corp owns and operates three nuclear power plants: Davis-Besse Nuclear Power Station (DBNPS), Perry Nuclear Power Plant, and Beaver Valley Power Station. Energy Harbor is currently developing a hydrogen energy production and storage facility at its nuclear facility near Toledo, Ohio, with an anticipated operation date in May 2022. Energy Harbor, in conjunction with the Idaho National Labs, has received funding from the Department of Energy for a demonstration project relating to hydrogen production at Davis Besse which is strategically located along our proposed corridor and can serve as off-take for our distribution network.

Dominion Energy Ohio, based in Cleveland, and its more than 1,600 employees deliver safe and efficient natural gas service to more than 1.2 million customers. Other major service areas include Akron, Ashtabula, Canton, Lima, Marietta, New Philadelphia, Warren, Wooster, and Youngstown. Dominion Energy Ohio, part of Dominion Energy, Inc., based in Richmond, Virginia, has served Ohio customers since its founding in 1898 as The East Ohio Gas Company. The company recorded total throughout of 336.3 billion cubic feet in 2019.

More than 7 million customers in 20 states energize their homes and businesses with electricity or natural gas from Dominion Energy (NYSE: D), headquartered in Richmond, Va. The company is committed to sustainable, reliable, affordable and safe energy and is one of the nation's largest producers and transporters of energy with more than $100 billion of assets providing electric generation, transmission and distribution, as well as natural gas storage, transmission, distribution and import/export services. The company is committed to achieving net zero carbon dioxide and methane emissions from its power generation and
gas infrastructure operations by 2050.

Ohio Fuel Cell Coalition (OFCC) is a united group of industry, academic, and government leaders working collectively to strengthen Ohio's fuel cell industry and to accelerate the transformation of the region to global leadership in fuel cell technology. The coalition strongly supports industry/academic partnerships through research and development, advanced manufacturing, advanced materials technologies, components, and services to advance the integration of a coordinated, robust fuel cell infrastructure and supply chain.

Transportation Planning Contractor (TBD). SARTA plans to retain a transportation planning contractor to coordinate Market Acceleration Activities, the Site Analysis, Infrastructure Planning, and the Site Location Action Plan. This work will be completed by a transportation planning contracting consultant who specializes in regional and alternative transportation planning in Ohio and Michigan. SARTA's standard process for hired contractors requires the organization to follow a standardized bid process once the grant has been awarded. To this end, SARTA will release a detailed request for proposals with an expanded version of the scope of work. SARTA will select the most qualified consultant based on the proposed work plan, approach, expertise/qualifications, budget, and schedule.

4.8 Non-Federal Revenue for Transportation Infrastructure Investment

SARTA generates non-Federal revenue through a 0.25% local sales tax levied across Stark County. Evidence for this revenue and its availability is provided in SARTA's Letter of Commitment (***Appendix 1 Letter of Commitment***). SARTA's funds necessary for plan implementation are already available to SARTA and will be committed to the project

upon approval of the grant award by DOT. Any revenue derived from the grant would not supplant existing revenue sources, as these are generated through an entirely separate mechanism that is not tied to the acquisition of grant funds. In total, SARTA's 0.25% local sales tax allocation provides the organization with sufficient funds to support operation as well as future infrastructure investments and project implementation. There are no constraints on the spending of this revenue that are relevant to or that would affect implementation of the project. Refer to Section 3.0 for additional details regarding source of other non-federal match funds.

5.0 Project Readiness

5.1 Demonstrated Technical Feasibility

Engineering Design Studies. The proposed Action Plan will develop a priority list of at least 5 initial advanced alternative vehicle refueling stations that will be deployed in the next 10 year. For this project, the team will complete preliminary engineering and initial design as a part of Action Plan development. The team will also complete as much of the initial planning process as possible to support rapid deployment of infrastructure as soon as the Action Plan is complete. These activities are identified in the Task 3 bullets in the Statement of Work. Therefore, the project will provide detailed information to serve as a basis for design, as a part of the Action Plan implementation process.

Design Criteria. The Action Plan is a planning effort; its development does not require specific engineering design criteria. The facilities to be deployed under the Action Plan will allow for the use of design criteria that meet implementation / installation goals and requirements specific to each site. Specific design criteria will be developed in coordination with participating parties during the planning process.

Cost Estimate Basis and Basis for Future Design. The budget provided in Section 3.0 was developed based on input from each of the project participants, and in close coordination with transportation systems and transportation planning specialists from an outside firm. The cost estimate carefully considers each of the proposed activities that would be completed by each project team member. These individual estimates were in turn based on decades of implementation experience from other similar projects and efforts completed previously. Future cost estimates for facilities identified under the Action Plan will be developed using standard engineering and design criteria and associated methods of cost estimation, in order to ensure accurate cost estimates with limited potential for overrun. Potential risks and mitigation strategies, including those relevant to budget, are summarized in Section 5.5.

5.2 Statement of Work

The project team will complete the proposed Action Plan through the following tasks; See Section [5.5] for a discussion of project risks and risk mitigation measures.

Table 3. Scope of Work

Task # / Title	Task Description
Task 1.0 Administration and Meetings	SARTA's as the lead project manager will serve as the single point of contact with DOT. SARTA will complete all grant administration including completion of subcontracts, oversight of sub-awardees, and day to day grant implementation, budget management, invoicing and grant progress and final reports.
Task 2.0 Project Execution- Station Location Identification	
Subtask 2.1 Fuel Demand Study	CALSTART and CSU will lead the research and development of a current, mid- and far-term Fuel Demand Study with stakeholder relevant input and data provided by project partners. The Fuel Demand Study will also include a Market Demand Study related to EV and FCEV vehicles and infrastructure. **Deliverable:** Fuel Demand Study, to be appended to the Action Plan.
Subtask 2.2 Market Acceleration Actions	SARTA, including the transportation contracting consultant, and CALSTART will work closely with OFCC to lead and coordinate Market Growth Action activities, including Communications, Marketing, Identification/Acquisition of fleets, and Advocacy Support. Trillium support the work to identify end user

	and fleet identification and acquisition. **Deliverable:** Market Acceleration Report, to be appended to the Action Plan.
Subtask 2.3 Site Analysis	The transportation contracting consultant who specializes in regional and alternative transportation planning in Ohio and Michigan will lead the Site Analysis with input from all partners. The contractor will complete a Site Analysis, which will include the following: • Complete Benefit-Cost Analysis to confirm optimal infrastructure sites; • Coordinate and collaborate with Ohio EPA and the Volkswagen Beneficiary Mitigation Planner (BMP) on settlement implementation process, and other key stakeholders seeking to deploy advanced alternative vehicle refueling in the region to ensure limited overlap and maximum range-extending benefit to vehicle users; • Evaluate the costs and benefits of delivering electricity from the grid versus on site generation from renewable sources (i.e. solar, wind, or an onsite generator; • Review other applicable federal, state, and local plans, regulations, and requirements relating to advanced alternative refueling. **Deliverables**: Site Analysis Report, to be included in the Action Plan.
Subtask 2.4 Evaluate Location Specific Opportunities and Constraints	Trillium will lead site location evaluation activities with the assistance of CALSTART and SARTA, which will include the following: • Determining the benefits of the site location based on access to power and hydrogen; • Evaluating the economic benefits to the location; • While accessing he constraints and analyzing courses of action that help to mitigate the constraints, as an effort to allow for the best economic and environmental opportunity for the location; • Conducting Hydrogen Production Planning Activities in conjunction with the Davis-Besse nuclear facility. The pilot production operation will be planned / designed to meet each fueling stations requirements, which is expected to be in upwards of 500 hydrogen per day at larger stations; • Conducting Hydrogen Delivery Planning Activities in conjunction with the Davis-Besse nuclear facility, the refueling site locations and a fuel transport operator. **Deliverables:** Report on detailing opportunities and constraints, to be included in the Action Plan
Subtask 2.5 Infrastructure Planning	Trillium in coordination with the transportation contracting consultant will carry out infrastructure planning activities including: • Working with utilities to ensure that sufficient infrastructure is available to support development of the proposed refueling infrastructure (i.e., electricity for EV charging and hydrogen production). • Ensure and provide for regulatory compliance with federal / DOT requirements including NEPA process, as well as adherence to state and local, rural and urban / MPO planning, policies, and requirements. • Complete environmental screening and red flag analysis for sites above and beyond the initial 5 specific sites that are explicitly identified with this submission. **Deliverables:** Report and detailing findings, to be included in the Action Plan
Subtask 2.6 Infrastructure Cost Estimates	Trillium working with SARTA will develop infrastructure cost estimates for each identified site. **Deliverables:** Report, detailing cost estimates, to be appended to the Action Plan
Subtask 2.7 Corridor Economic and Workforce Development and Analysis	CSU and CALSTART will perform hydrogen refueling infrastructure regional economic impact studies, using Input-Output Modeling. The project team will also evaluate local and regional workforce planning in light of changes due to the transition to a hydrogen economy. This will include outreach to targeted stakeholders to identify potential activities that could further understanding of workforce requirements. Specifically, the plan will evaluate the effects of the project on existing regional economies, including rural economies, due to the following technology changes: • Deployment of hydrogen refueling infrastructure;

	• Development of regional hydrogen markets; • Hydrogen generation from nuclear power, natural gas and petrochemical industries; • Transition to fuel cell transportation fleets, including effects on vehicle manufacturing, supply chain and operational industries. Deliverables: Economic Development Plan, to be incorporated into Plan Development
Task 3.0 Final Reporting.	Under this task, the project team will develop a comprehensive and replicable Advanced Alternative Fuel Transportation Corridor Action Plan identifying specific sites and activities to be deployed in support of the project. Action Plan elements will ensure that all specific target sites are either ready-to-build or have concrete steps to fast-track the implementation process, strongly supporting near-term future corridor infrastructure implementation. Plan development will include, as relevant: • Fuel Demand Study • Market Acceleration Plan • Site-specific opportunities and constraints • Site Analysis Report including potential for integration of on-site generation (electricity and hydrogen) • Infrastructure cost estimates • Initial utility outreach including projected load information and review of infrastructure availability • Innovative project delivery opportunities and implementation procedures The Action Plan will also include the following components that look at the entire project and all constituent sites: • Strategic locations with a focus on the priority areas of advanced alternative refueling stations to maximize benefit • Environmental Impact Analysis The project team will also develop discussion and decision-making pathways (Roadmap) to address any remaining key barriers and identify solutions. Additionally, based on feedback received under Task 2.0, the Plan will consider and develop other project elements including development of market acceleration/incentive programs such as scrappage programs, voucher incentive programs, and other programs to support development and implementation of clean transportation. The Planning Action Plan will identify specific implementation target. The project plan will run through 2027 and will include deployment of the 5 initial stations (with capacity to expand) identified above, at minimum (capital funding will be sourced separately from this present scope of work). The resulting plan will lay out an actionable series of projects and events that the Project team will use as a basis for future grant funding and implementation. Future funding sources will seek to strongly leverage local and state funding, as well as private capital, in addition to federal funding sources. **Deliverables**: Draft and Final Action Plan

5.3 Project Schedule

SARTA and the project team will complete the project over 24 months, which will include approximately 3 months to initially complete the TIP / STIP process, followed by 21 months of plan development and completion, as shown in the Gantt Chart, below.

Table 4. Project Schedule / Gantt Chart

Tsk	Description	Month																							
		1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
1.0	**Admin, Mtgs, Reporting**																								
1.0	TIP / STIP Process																								
2.0	**Project Execution**																								
2.1	Fuel Demand Study																								
2.2	Market Acceleration Actions																								
2.3	Site Analysis																								
2.4	Location Specific Opportunities and Constraints Evaluation																								
2.5	Infrastructure Planning																								
2.6	Infrastructure Cost Estimates																								
2.7	Economic & Workforce																								
3.0	**Action Plan Development**																								

All activities needed to achieve BUILD funds obligation will be completed well in advance of the 9/30/2022 deadline. SARTA anticipates that it will be ready to obligate funds by or before Q2, 2021. Delays are not anticipated. Unexpected events could conceivably delay funds obligation, but it is extremely unlikely that such a delay would delay obligation beyond Q2, 2021, which remains well in advance of the obligation deadline. The project team will begin the planning process immediately upon obligation of BUILD funds. Completion of funds obligation will initiate the 15-month planning and development period for the project, which will be complete by early Q3, 2021—years in advance of the 9/30/2027 BUILD spending deadline. Additionally, the project team intends to select sites for the proposed facilities that would not require real property or right of way acquisition.

Table 5. Milestones

T#	Task or Subtask	Milestone #	Milestone Description	Anticipated Mth
1	Administration	M1.1	Contract with FTA	M1
1	Administration	M1.2	Execute subcontracts	M2
1	Administration	M1.3	Complete TIP/STIP Process	M3
2	Fuel Demand Study (2.1)	M2.1	Final Fuel Demand Study	M6
2	Market Acceleration Actions (2.2)	M2.2	Final Market Acceleration Report	M10
2	Site Analysis (2.3)	M2.3	Final Site Analysis Report	M12
2	Location Specific Opps. & Constraints (2.4)	M2.4	Opps. & Constraints Report	M15
2	Infrastructure Planning (2.5)	M2.5	Infrastructure Planning Report	M20
2	Infrastructure Cost Estimates (2.6)	M2.6	Cost Estimate Report	M20
2	Econ. & Workforce Dev. (2.7)	M2.7	Economic Dev. Plan	M20
3	Action Plan Development	M3.1	Draft Action Plan	M22
3	Action Plan Development	M3.2	Final Action Plan	M24

Once the Action Plan is complete, SARTA and the project team seeks to immediately deploy the elements of the Action Plan. Plan implementation is not part of the funded scope of work for this present grant application. However, assuming completion of the Action Plan by June 2021, SARTA and the project team plan to deploy the Construction Action Plan between 2021 and 2031 dependent on funding. Due to the current operations climate brought about by the COVID-19 pandemic, the project team has extended the project timeline to account for future uncertainties.

5.4 Required Approvals

As a planning project, the project will not trigger NEPA, nor will it trigger other permitting or environmental approvals or requirements. No NEPA reviews or documentation will be required for the project. During the planning process, the project team will complete a preliminary NEPA assessment for each project site and, if applicable, initiate the NEPA process, to ensure timely completion of subsequent NEPA determinations. Based on a preliminary review of proposed sites, the proposed facilities are expected to require either a Categorical Exemption or an Environmental Assessment/FONSI, due to their limited size, and their location at existing facilities (which would be expanded during plan implementation). Planning proposed under the project will not require reviews, approvals, or permits from other agencies. However, any needed approvals, reviews, or permits that would be required for implementation of the plan, following its completion (and outside of this scope of work) will be wholly considered for each proposed facility within the Action Plan. This early consideration will help to identify potential permitting snags and ensure that all project elements can be implemented in a streamlined manner. Plan development will not require approval actions by permitting agencies for impacts to wetlands, species, cultural, or historic sites. Any such approvals that would be required during installation of the facilities proposed under the Action Plan will be identified during the planning process.

No relevant discussions with DOT were completed regarding NEPA and other federal environmental approvals because the project includes only planning. No facilities would be built at this time, and therefore no permits would be triggered. Similarly, no environmental studies or related documents describing project impacts or mitigation have been completed to date, and none are required.

5.5 Project Risks and Mitigation Strategies

To help manage risk, SARTA will prepare detailed monthly project reviews. The reviews include a progress analysis, a summary of costs, participants analysis, and a quarterly internal meeting to review potential risks of the Project. SARTA will identify and score for likelihood and severity all potential risks to the project. The resulting scores will be reported to SARTA's project manager (PM) for review and discussion, and then recorded and incorporated into project reports. SARTA's project management team and the PM will then work with other Project participants, as relevant, to develop and deploy mitigation strategies for identified risks. Potential risks are summarized in the following table (Table 6).

Table 6. Summary of project risks and mitigation strategies

Risk	Mitigation Strategy
Schedule	PM shall closely track progress via informal weekly conference calls, and formal, detailed bi-monthly progress reviews, to identify/address potential issues and concerns early. Technical progress will be compared to schedule progress, and task effort adjusted as needed.
Budget	PM shall closely track budget, and will complete at least bimonthly check-ins, as well as formal bi-monthly progress reviews with staff and team members to ensure that costs remain on target.
Contracting process delays	Most of the Project team has worked together previously on federal grants; use existing templates and previously approved contract language to the extent feasible.
Proposed sites not available	The planning process seeks to identify new sites in addition to those already identified in this application. If a proposed site becomes unavailable or if it is found to be undesirable, our planning process will seek to identify new sites to replace the lost site.

Unexpected environmental or permitting requirements	Part of the purpose of the planning process is to complete a detailed review of environmental and permitting requirements on a site by site basis. If environmental and permitting requirements are found to be excessive for a given site, the project team will seek an alternative / replacement site with reduced permitting burden.
Delayed design process	The project has been structured to allow initiation of design work as soon as each proposed site is confirmed. Early design during the planning process will help to ensure each site is ready to construct upon completion of the plan.
Lack of stakeholder participation	SARTA has engaged Trillium, CALSTART, CSU, OFCC, Dominion Energy Ohio and Energy Harbor as part of the team and has already initiated outreach to support the planning process. CALSTART maintains deep industry connections with regional fleets, utilities, and other interested stakeholders, and has already completed preliminary outreach to confirm that several relevant parties are interested in participating in the project. Therefore, lack of stakeholder participation is not anticipated, and will be further mitigated by the project team's targeted outreach during the planning process.

6.0 Benefit Cost Analysis Summary

Although not required for planning grants, SARTA has completed a preliminary benefit cost analysis (BCA) for the project, based on information that is presently available. Because the BCA reflects a planning level effort, and because many specifics of the individual projects that will ultimately be built out are not yet available, the completed BCA reflects a streamlined scope and analysis. Detailed planning efforts, including transportation modeling for the Planning Area and other technical and economic studies, will be completed during the planning process. The BCA is included as a supporting document, ***Appendix 4. BCA Calculations***.

The BCA provides a preliminary review of the ultimate benefits of the project, after planning is complete and during the implementation phase. To that end, the BCA estimates future project deployment / implementation costs and benefits across multiple relevant categories. Future project deployment would involve the costs shown in the table below. These costs were compared to a no-build base case scenario in which no construction, construction planning, or operation expenses would occur or be required. The base case would represent no change from present conditions, and therefore would incur zero capital, planning, or operations / maintenance costs.

Key assumptions of the analysis include the following: hydrogen refueling stations (50 total deployed) would cost $1.9 million per unit, while EV charging stations would cost $35,000 each for MHD (50 total) and $17,000 each for light duty systems (50 total). These would be deployed at a rate of up to 5 of each station type per year, starting in 2023. Operation and maintenance costs are assumed to be 2% of capital costs incurred to date. The model was run for a period of 20 years, to be consistent with the expected lifetime of the proposed equipment.

Emissions (criteria air pollutants and GHG emissions) reduction benefits were calculated based on the anticipated reduction in emissions for hydrogen or electric powered vehicles, in comparison to conventional fossil fuel. Economic activity associated with fuel sales was calculated based on an assumed sale price of $4.50/kg with a net revenue of $0.75/kg, or $0.84/DGE. Electricity sales were assumed to generate $0.054/kWh in net revenue, or $0.56/DGE. Project implementation is expected to generate 225 jobs, or 2,223 full time equivalents over the projection period, at $42,000/job. Additional regional economic activity caused by project implementation was estimated using a conservatively low multiplier of 1.1 against capital costs. Data sources are documented in Appendix 4.

Results from the preliminary BCA indicate an exceptionally strong net present value of $100,726,698, with a benefit cost ratio of 2.76, as shown in Table 6.

Table 7. Summary of Project Implementation Costs and Benefits

Category	Amount
Costs	
Action Plan Development	$2,810,000
H2 Refueling Stations (50) Stations	$95,000,000
MHD EV Charging Station Construction (50 Stations)	$1,750,000
Light Duty EV Charging Station Construction (50 Stations)	$850,000
Operations & Maintenance (20-yr total)	$19,285,760
Base Case Costs: Capital + Planning Costs; Operations & Maintenance Costs	$0; $0
Total Costs	**$57,393,227**
Benefits	
CAP Emissions Reduction	$24,949,275
CO2 Emissions Reduction	$6,312,826
Hydrogen Sales Net Revenue	$20,985,488
Electricity Sales Net Revenue	$10,474,050
Jobs	$35,255,620
Regional Economic Activity	$60,142,658
Total Benefits	**$158,119,917**
Net Present Value (NPV)	**$100,726,689**
Benefit Cost Ratio (BCR)	**2.76**