

U.S. VIRGIN ISLANDS TRANSPORTATION ELECTRIFICATION ROADMAP



OCTOBER 2022



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It is a coordinated effort between the United States Virgin Islands Energy Office, the Electrification Coalition, the Government of the Virgin Islands, and many local organizations, businesses, and individuals who provided input and feedback to inform the Roadmap.

U.S. Virgin Islands Government Departments

Bureau of Motor Vehicles

Department of Education

Department of Finance

Department of Health

Department of Human Services

Department of Justice

Department of Labor

Department of Licensing and Consumer Affairs

Department of Public Works

Office of the Governor

Virgin Islands Energy Office

Virgin Islands Police Department

Virgin Islands Territorial Emergency Management Agency

Utility

Virgin Islands Water and Power Authority

Local Organizations

Caribbean Green Technology Center

Drive Green VI

Gallows Point Resort

Island Green Living

St. Croix Chamber of Commerce

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Bloomberg Philanthropies works to ensure better, longer lives for the greatest number of people by focusing on five key areas: the arts, education, the environment, government innovation, and public health.



The Secunda Family Foundation was created by Bloomberg LP co-founder Thomas Secunda and his wife, Cindy. The Foundation grants support for several causes including conservation. The Secunda Foundation supports hurricane recovery and resiliency efforts in the USVI.



Love City Strong serves the community of St. John, USVI in the areas of disaster preparedness, response, recovery, and mitigation, with an emphasis on community resilience.



VIRGIN ISLANDS
WATER AND POWER
AUTHORITY



September 22, 2022

The Virgin Islands Water and Power Authority (WAPA) is excited to support the release of the U.S. Virgin Islands Transportation Electrification Roadmap. Electrification provides numerous benefits for the territory, from economic to public health to mobility. A firm policy and regulatory framework will be required for the benefits of EV adoption to reach its full potential in the territory. Given that, WAPA applauds this Roadmap for its careful review of the policy, programmatic, and regulatory actions that must be addressed as electrification gains momentum.

WAPA produces and distributes electricity and drinking water to residential and commercial customers in the U.S. Virgin Islands. In 2020, WAPA released our Strategic Transformation Plan that focuses on providing clean, resilient energy to the U.S. Virgin Islands with our mission to be the leading utility service provider in the Caribbean. We appreciate the reflection of this planning process, and we recognize many parallels between our strategy and the Roadmap's strategy.

Electrification provides opportunities for growth in electricity demand, a chance to strengthen the grid, save money, and provide benefits to all ratepayers. Additionally, it allows the USVI to move towards a more independent and resilient future, which we hope to lead the way in. WAPA staff will continue working with partners to implement the Roadmap's strategies and appreciates the collaborative approaches outlined.

Implementing the Roadmap with our strategic plan will allow the USVI to move more quickly toward financial, economic, and resiliency goals. WAPA is proud to continue serving the USVI and looks forward to a prosperous, electrified future in conjunction with this plan.

Sincerely,



Andrew Smith
Executive Director/CEO



THE UNITED STATES VIRGIN ISLANDS
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October 4, 2022

The Office of the Governor is proud to support the publication of the Transportation Electrification Roadmap for the U.S. Virgin Islands (USVI). In collaboration with our utilities, local organizations, and several governmental entities. This plan is a collaborative effort to spark the Territory's transition to electrification. Electrification of our transportation system provides many opportunities for residents of the USVI and will be essential to our more resilient future.

The deployment of electric vehicles and related infrastructure brings varying benefits to the Territory, ranging in scope from enhancing our economy to improving public health.

Specifically, following this Roadmap brings us:

- The chance to join with other entities across the United States, leading the effort to adopt these strategies.
- Additional Workforce opportunities for installing public charging stations and maintaining said infrastructure and vehicles.
- The ability to significantly save residents money across the Territory.
- The capability to bring enhanced resilience in the face of the many natural disasters our area often sees.

While the plan brings numerous benefits, we are excited for this plan to build on the Territory's other projects happening in the infrastructure and environment realm. Earlier this year, we purchased 23 Tesla vehicles to begin electrifying our fleet. We also work closely with the U.S. Department of Transportation under the Rebuilding America's Infrastructure with Sustainability and Equity grant program. We are already enhancing our roads, sidewalks, and resiliency infrastructure. These actions highlight our commitment to these projects, which greatly complement the strategies in this Roadmap.

The Office of the Governor would like to thank those who provided the input, strategies, and feedback throughout the development of this plan. We look forward to working with partners to implement the strategy in this Roadmap and are hopeful for a more resilient and thriving future.

Best Regards,

A handwritten signature in blue ink, appearing to read "K. Knight", is written over a light blue horizontal line.

Karl Knight
Chief of Staff
Office of the Governor

KEY ABBREVIATIONS AND ACRONYMS

BEV	Battery Electric Vehicle	GPS	Global Positioning System
DC	Direct Current	GVI	Government of the Virgin Islands
DCFC	Direct Current Fast Charger	MUD	Multi-unit Dwelling
DERA	Diesel Emission Reduction Act	MW	Megawatt
DOI	U.S. Department of Interior	PHEV	Plug-in Hybrid Electric Vehicle
DPP	Department of Property and Procurement	PSC	Public Services Commission
DRVE Tool	Dashboard for Rapid Vehicle Electrification	TCO	Total Cost of Ownership
EC	Electrification Coalition	USVI	U.S. Virgin Islands
EV	Electric Vehicle	VIEO	Virgin Islands Energy Office
GHG	Greenhouse Gas	VITRAN	Virgin Islands Transit
GO FLEET	Government Operations Fleet Efficiency and Electrification Transformation	WAPA	Water and Power Authority
		ZEV	Zero-Emission Vehicle



EXECUTIVE SUMMARY

The United States Virgin Islands (USVI) Transportation Electrification Roadmap (Roadmap) outlines actions that support the accelerated adoption of plug-in electric vehicles (EVs) throughout the territory. Electrifying transportation provides many benefits for residents including reduced costs, improved vehicle reliability and air quality, and an opportunity for a more stable grid.

Diversifying transportation fuel to include electricity will unlock significant cost savings for residents and businesses. Within the government fleet, the total cost of ownership (TCO) savings amount to 20 percent or more when a light-duty gas vehicle is replaced by an electric model¹ and for the average USVI resident, switching to an EV can save about \$200 annually on fueling costs.² These savings are due to EVs' higher efficiency when compared to internal combustion engine (ICE) vehicles and EVs' reduced maintenance needs, given that they have fewer moving parts—EVs can also save drivers almost 50% over the life of the vehicle in maintenance compared to a gas vehicle.³ Transitioning USVI's transportation sector to EVs will reduce the territory's dependence on imported transportation fuel, thereby strengthening the local economy.

Electrification is also an opportunity to enhance the USVI's resiliency to extreme weather events. EVs have dense onboard batteries that can serve as mobile power sources if the supply of electricity from the grid is interrupted. In this way, EVs can complement centralized grid operations by serving as a secondary power source for households. This grid redundancy can prove lifesaving during disaster recovery efforts. Under the right circumstances, EVs can even provide ancillary services to the grid and help maintain a reliable electrical system.

¹ See Appendix 4: Public Fleet EV Assessment and Analysis

² Mean travel time to work from the 2010 census (<https://www2.census.gov/programs-surveys/decennial/2010/technical-documentation/complete-tech-docs/island-areas/us-virgin-island/pumsvi.pdf>) in USVI is 25.84 minutes, which is about 9 miles going 21 mph. Using the AFDC vehicle cost calculator (<https://afdc.energy.gov/calc/>) to compare a 2022 Nissan Leaf with a 2022 Nissan Altima to arrive at estimated annual savings.

³ *Consumer Reports* study: <https://www.consumerreports.org/hybrids-evs/evs-offer-big-savings-over-traditional-gas-powered-cars/>

The USVI offers a unique context for transportation electrification. With limited geographic space for driving, it is easier to develop an accessible EV charging network. EVs have exceptional operational performance, so the hilly terrain on the islands of St. Thomas and St. John do not pose an issue to deployment. EV adoption in the USVI will increase electric load and revenue for the local utility, which could support grid reliability upgrades or energy cost reductions for ratepayers. Specialized training for the local workforce on EV servicing and maintenance will be necessary, which is an opportunity to develop inclusive workforce development initiatives that broadly share the benefits of these investments in emissions-free transportation.

The Government of the USVI (GVI) seeks to accelerate the adoption of EVs in the territory and has already taken steps to lead the territory in this transition to EVs. The GVI fleet procured several plug-in vehicles in the mid-2010s and has installed charging equipment in some locations.⁴ To formalize and streamline this work, the governor created the Government Operations Fleet Efficiency and Electrification Transformation (GO FLEET) initiative. This Roadmap outlines the policy and program considerations that GO FLEET, as well as other public and private stakeholders, must address to achieve increased EV adoption and its associated benefits for all USVI residents.

The Roadmap's recommendations advance three overarching goals:

- Cost-effectively transition GVI fleet vehicles in the near term (FY22-23) and deploy supportive charging infrastructure.
- Implement policy, regulatory, and programmatic strategies to support widespread EV adoption and equitable access to the benefits of transportation electrification.
- Align transportation electrification activities



with enhanced grid resiliency and stable, affordable electricity rates.

The project team reviewed information from public resources about existing conditions in the territory; conducted interviews and analyses with implementation, programmatic and policy-focused partners; and solicited feedback from strategic stakeholder groups to develop recommendations. These recommendations are organized under seven strategies, each with associated actions:

- Consumer and Fleet EV Education and Outreach
- EV Charging Infrastructure Needs and Opportunities
- EV Policies
- EV Incentives
- Utility and Regulatory Engagement and Resiliency
- Public and Private EV Fleet Transition
- Vehicle Availability and Market

The strategies outline ways that the GVI and partners can facilitate widespread, equitable access to EVs. This aligns with the USVI's economic and renewable energy goals, can enhance the territory's resiliency to severe weather events, and can lower transportation and system costs across the territory for residents.

⁴ The USVI Bureau of Motor Vehicles reports that there are currently less than 200 plug-in vehicles registered across the territory, including those registered to the government.

LIST OF STRATEGIES TO ELECTRIFY TRANSPORTATION IN THE USVI

CONSUMER AND FLEET EV EDUCATION AND OUTREACH

EO.1 Target education and outreach to key audiences

EO.2 Maintain a comprehensive EV website

EV CHARGING INFRASTRUCTURE NEEDS AND OPPORTUNITIES

EVC.1 Identify high-traffic, high-visibility locations to install the first iteration of public EV chargers

EVC.2 Install EV charging for GVI fleet

EV POLICIES

POL.1 Become part of the Zero Emission Vehicle (ZEV) Program

POL.2 Create territory policy related to EV charging

POL.3 Develop multi-unit dwelling and commercial building codes to require EV-ready developments

POL.4 Establish and enforce EV parking rules

EV INCENTIVES

INC.1 Incentivize consumer EV purchases

INC.2 Support public charging station installation

INC.3 Recognize local businesses with workplace charging

UTILITY AND REGULATORY ENGAGEMENT AND RESILIENCY

U&R.1 Support smart grid operations for EVs

U&R.2 Increase renewable electricity for EV charging

U&R.3 Upgrade electricity distribution infrastructure

U&R.4 Assess and adjust utility rate structures to benefit EV drivers

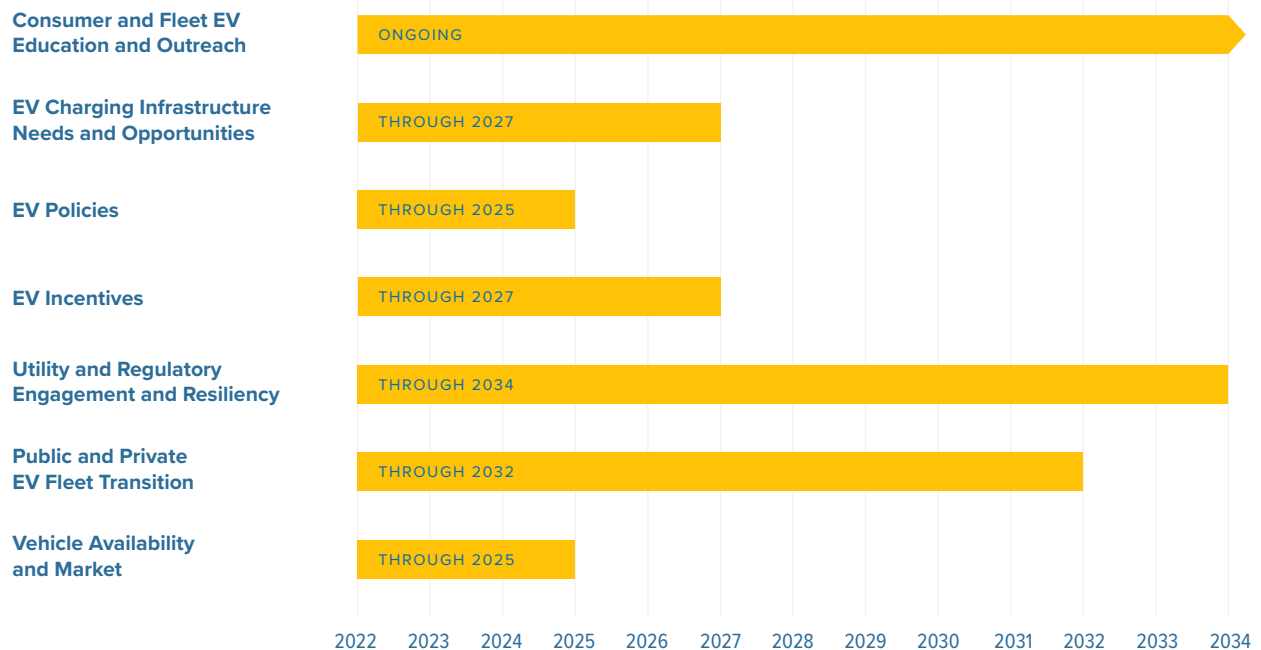
PUBLIC AND PRIVATE EV FLEET TRANSITION

- FT.1** Pursue electrification opportunities within GVI's light-duty fleet
- FT.2** Pursue electrification opportunities within GVI's bus fleet
- FT.3** Encourage EV adoption by GVI employees
- FT.4** Work with large light-duty fleets to transition to EVs
- FT.5** Train first responders in proper techniques for responding to incidents involving EVs

VEHICLE AVAILABILITY AND MARKET

- VA.1** Resident and fleet bulk EV purchase program
- VA.2** Develop a robust secondary market from rental car fleets
- VA.3** Build out an EV and EV charging technician workforce development program

TIMELINE





GOALS

Over a decade of focus on improving the territory's resilience, energy systems, and economy has led GVI to undertake the development of this roadmap. In the following pages, the Roadmap presents strategies for GVI to accelerate the transition to electric vehicles and capitalize on the technology in a manner that benefits residents and businesses.

The Roadmap reviews USVI's current landscape; outlines recommended strategies to advance transportation electrification; and reviews the ongoing transition of the GVI's vehicles, which will serve as an example for commercial fleets and residents alike. It also provides an overview of EV and EV charging technology, the benefits of EVs, and other considerations important to support successful widespread adoption. Comments and concerns about USVI's vehicle electrification were received from local individuals/groups as the Roadmap was developed, and a description of this stakeholder engagement process is also included. Whereas the Roadmap was produced at the request of GVI, it has been designed to be most useful to local partners who will implement and intersect with the Roadmap's recommended activities.

Transportation electrification has multiple benefits for USVI. The strategies outlined in the Roadmap advance three overarching goals:

1. Cost-effectively transition GVI fleet vehicles to EVs in the near term (FY22-23) and deploy charging infrastructure.
2. Implement policy, regulatory, and programmatic strategies to support widespread EV adoption and equitable access to the benefits of transportation electrification.
3. Align transportation electrification activities with enhanced grid resiliency and stable, affordable electricity rates.

Transition GVI's current fleet vehicles to EVs

In 2021, the Virgin Islands Energy Office (VIEO) and the Virgin Islands Water and Power Authority (WAPA) received \$2.15 million under the Energizing Insular Communities (EIC) grant program. This award serves as the formal launch of the Government Operations Fleet Efficiency and Electrification Transformation (GO FLEET) initiative and will support

GVI fleet electrification and the construction of an initial EV charging network. Both the funding and GO FLEET advance USVI's Legislative Act 7075, which mandates the adoption of an Energy Efficiency Fleet Management Plan for the GVI.

The GVI employed the Electrification Coalition's Dashboard for Rapid Vehicle Electrification (DRVE) Tool to analyze its fleet and guide its EV procurements. The DRVE Tool compares a fleet's light-, medium-, and heavy-duty vehicles to EVs by pulling information on the prices and specifications from federal databases, including those of the Department of Energy and the National Highway Safety Administration. The DRVE Tool analysis results show which vehicles would constitute total cost of ownership (TCO) savings if replaced with an EV. Combined with GVI's fleet telematics, this analysis can also help identify locations for strategic EV charging deployment. This analysis is presented in detail in Appendix 4.

To focus on near-term EV procurement opportunities, the GVI only analyzed its light-duty fleet vehicles. Unlike in the medium- and heavy-duty classes, light-duty vehicle electrification has advanced markedly with a growing number of EV models available at mass production. By advancing EV adoption in its fleet and installing shared public/private EV charging, GVI can demonstrate the capabilities of EV technology and the feasibility of driving electric in the territory.

Implement policy, regulatory and programmatic strategies to support widespread EV adoption

For EV adoption to increase equitably in the USVI and provide maximum benefit, stakeholders must initiate a series of coordinated policy, regulatory, and program actions. These actions include measures to: increase EV availability within the territory; prepare the USVI's workforce to meet the new technical demands of EVs and EV charging; deliver market mechanisms that will encourage EV adoption while maintaining affordable costs; and initiate programs and studies to ensure that EVs can enhance the resilience of the USVI electrical system and provide needed resources to communities.

There is also growing public interest in EVs based on their economic value proposition, though some common misconceptions persist. GVI is uniquely positioned to lead by example, provide EV-related education, develop policies and incentives, and work with WAPA and the Public Services Commission to create a more robust and resilient grid.

Align transportation electrification activities with enhanced grid resiliency and stable, affordable electricity rates

Increasing EV adoption can present challenges to the utility and the existing grid, but these challenges must be considered in the broad context of system planning, which offers opportunities for EVs to also strengthen the grid. With the right technological controls, electric cars, trucks, buses, and other transportation assets act as "extensions" of the central grid and increase its responsiveness to local needs. One such need is easing electricity demand during "peak" hours of consumption by charging EVs during periods of low consumption. EVs can even supply energy to the grid during peak periods, negating the use of expensive, inefficient, "on-call" generation assets to meet excess demand.

Vehicle electrification will mean more electricity demand but also a welcome increase in the utility's customers. This means a larger base across which WAPA can spread the cost of necessary grid upgrades, lowering each customer's associated utility fee.

Additionally, USVI's transportation electrification is not happening independently of grid improvements. In parallel with local momentum around EVs and distributed renewable energy, WAPA is developing a 12-month strategic plan to address the most pressing needs of its system to deliver enhanced service and reliability to its customers. The evolution of USVI's grid is an iterative process towards long-term affordability and resilience, and the transition to transportation electrification is one part of the story.

ROADMAP STRATEGIES

The Roadmap is the USVI's strategic plan to increase EV adoption throughout the territory. It provides specific strategies for the territory to implement, either independently or in coordination with partners, in support of its climate, environmental, and transportation goals.





Implementing the Roadmap

To effectively pursue the recommended Roadmap strategies that follow, the territory must first establish ownership of overarching EV efforts, continue to engage key partners, and commit to implementing, revisiting, and revising the Roadmap. Continued evaluation will ensure that activities remain coordinated and aligned with the territory's goals.

While collaboration is necessary for EV matters, one entity must take a leadership role in directing the implementation of the Roadmap. Of the many governmental departments, agencies, and offices that are crucial to support EV adoption, VIEO is best suited to lead overall Roadmap efforts. VIEO is uniquely positioned to collaborate with a wide range of internal and external organizations, such as the Department of Property and Procurement, WAPA, the Caribbean

Green Technology Center, and Island Green Living.

For transportation electrification to be successful and ongoing, efforts must be sustained independently of staff tenure or short-term projects.

To support ongoing coordination, VIEO should appoint and convene an interdepartmental EV-focused working group at least twice each fiscal year. The working group should evolve from the GO FLEET initiative and include departments, agencies, and offices that are instrumental in accelerating the adoption of EVs. Working group meetings present an opportunity to report on progress, coordinate activities, and plan for future initiatives. Guided by the policy-focused strategies outlined herein, this working group should develop autonomous processes across involved agencies to ensure consistent progress on electrification despite changes in political appointments.

The local utility is a natural stakeholder in this space, and it is recommended that WAPA formally appoint a team to monitor, manage, and facilitate transportation electrification as it increases. The governmental EV-focused working group should engage regularly with the utility on EV-related issues like system impacts, new rate measures, V2G technology deployment, challenges experienced during implementation, and new EV charging installation projects. As needed, this working group should also consult with local private entities. These check-ins will be particularly beneficial early in the Roadmap's implementation when the learning curve is steep.

VIEO, together with the working group, must continually revisit the Roadmap to determine both progress and challenges. As the technology continues to improve, Roadmap goals and strategies will need to adjust to the new electrified landscape. For example, as more EV models become available, the GVI fleet should be empowered by its work on light-duty electrification to expand EV adoption into medium- and heavy-duty (MHD) applications. The confidence that GVI staff and representatives project with respect to fleet electrification will serve as the standard for impactful education and outreach to the public as EV adoption gains ground. On an annual basis, the territory should assess progress on Roadmap strategies and goals, EV sales and stock, charging station availability, and the effectiveness of community activations.

Strategies

Strategies to achieve the Roadmap goals are outlined in this section and organized into seven categories, as follows:

- Consumer and Fleet EV Education and Outreach
- EV Charging Infrastructure Needs and Opportunities
- EV Policies
- EV Incentives

- Utility and Regulatory Engagement and Resiliency
- Public and Private EV Fleet Transition
- Vehicle Availability and Market

Each readiness strategy description in this section includes:

Actions

A series of actions to advance the strategy.

Lead Department

Department(s) responsible for initiating and owning the strategy.

Partners

Key partners that must be consulted to move forward with related actions.

Timeline

Suggested timelines for when a strategy should be implemented. Most strategies will require follow-up after they are completed to ensure continued success (e.g., electrifying the GVI fleet will need to be constantly revisited), and some will be ongoing (e.g., outreach and education).

Budget

Funding, other than staff time, needed from the GVI to complete the strategy. Budget is noted using a low, medium, and high indicator, and budget level is relative among the strategies. "Low" budget items may be accomplished with existing resources.

Level of Effort

Staff time and work needed to complete the strategy. Level of effort is noted using a low, medium, and high indicator. As with budget, level of effort is relative among the strategies, and a "low" level of effort is meant to indicate that a strategy could be accomplished with existing resources.

Potential Impact

A gauge of the extent to which the completion or achievement of a strategy will affect the Roadmap goals (i.e., increased EV adoption and readiness). Potential impact is noted using a low, medium,



and high indicator. Because many factors determine success, the Roadmap does not identify impact in terms of emissions reduction or other quantifiable metrics. For example, it is difficult to estimate the environmental impact that results from behavior change due to outreach and education events. Many assumptions would need to be made to accurately quantify the impact of strategies. Further, concrete numbers would be largely subjective. Instead, the impact is considered in the context of how well the execution of a strategy will achieve the vision and goals of the Roadmap.

Together, Budget and Level of Effort indicate the resource needs for strategy implementation. Both should be considered scalable, based on available resources. Potential Impact can also be considered scalable since it will depend on how actively a strategy

is pursued and the extent to which resources are dedicated to actions. By acknowledging that impacts can be scalable and are a result of a level of effort and available funding, the Roadmap is intended to reflect the reality of the USVI budget process.

While all of the strategies are important, strategies designated as relatively low impact may also be low effort and should be considered “easy wins.” High-impact strategies may be more difficult to execute, and therefore need to be pursued if the territory intends to meet its aggressive Roadmap goals. USVI should use the budget, level of effort, potential impact, and timeline information to determine the priority of each strategy (and their respective actions).

CONSUMER AND FLEET EV EDUCATION AND OUTREACH

Engagement and education with territory residents, businesses, organizations, and local officials are critical to accelerating local EV adoption and lowering the territory's dependence on oil. As seen throughout stakeholder discussions, residents of the territory had a wide range of knowledge of EVs. Some residents and organizations understood EVs, while many other residents lacked basic knowledge of EVs and infrastructure.



EO.1

TARGET EDUCATION AND OUTREACH TO KEY AUDIENCES

Education and outreach should be targeted to specific audiences, including but not limited to local businesses, fleets, low-income communities, multi-family housing tenants and landlords, building developers, and employers.

Actions

Engage and partner with key stakeholders to conduct targeted outreach to:

General public: Provide EV and charging fact sheets that emphasize the associated cost savings, offer a step-by-step process for installing a home charger, list public charging locations, and describe EVs' abilities to strengthen the grid and provide energy storage.

Dealerships: Inform local dealerships about the Roadmap, as well as the importance and benefits of their participation. Providing them with EV information and opportunities to engage with prospective EV buyers can increase EV sales. This engagement can also establish dealers as valuable information sources for consumers. Target dealerships should receive basic EV and charging documents and information to support their consumer interactions.

Developers, multi-family-housing building managers, and governing boards: Highlight the benefits of installing conduit/wiring and charging stations. Refer to key guidance on ownership models, installation options, and applicable funding or incentive programs.

Employers: Summarize the benefits of workplace charging for both employers and employees. Refer to applicable funding or incentive programs. Encourage employee education about EVs.

Businesses (destinations): Summarize the business case for public charging and opportunities to partner with neighboring businesses. Refer to applicable funding or incentive programs.

Private fleets: Encourage organizations to lead by example with EV use and charger installation. Make connections between fleets for peer-to-peer information exchange. Rental car fleets offer an entry point for drivers to learn more about EVs. As those vehicles are replaced in the rental car fleet, more EVs become available for residents to purchase.

LEAD AGENCY VIEO		
PARTNERS Key stakeholders, including local businesses, developers, property managers, employers, non-profits, the University of Virgin Islands, and the U.S. Virgin Islands Economic Development Authority		
TIMELINE Ongoing		
BUDGET Low	LEVEL OF EFFORT Low to Medium	POTENTIAL IMPACT Medium

EO.2

MAINTAIN A COMPREHENSIVE EV WEBSITE

The territory should create a website to provide residents, businesses, and visitors with specific and relevant information. The website should address USVI EV parking and charging stations, residential and public charging permitting, EV building codes, and local initiatives, incentives, and considerations. The site can link to external sources about national EV efforts, as well as general EV information. Electrification will occur parallel to WAPA grid resiliency improvements, and this website could provide information on projects that support both efforts.

Actions

- Establish a central website maintained by VIEO. Consolidate existing content, and establish links to Virgin Islands Electric Vehicle Association, Drive Green VI, Island Green Living, the Alternative Fuels Data Center, and other resources that provide relevant and current information.

LEAD AGENCY VIEO		
PARTNERS Virgin Islands Electric Vehicle Association, Drive Green VI, Island Green Living		
TIMELINE Ongoing		
BUDGET Low	LEVEL OF EFFORT Low	POTENTIAL IMPACT Medium



EV CHARGING INFRASTRUCTURE NEEDS AND OPPORTUNITIES

Charging access is a crucial component of EV ownership. Publicly accessible EV charging supports current EV owners and encourages adoption for those unable to install EV chargers at home, including residents who live in multi-unit dwellings (MUDs) or lack off-street parking.





The primary priority is deploying EV charging infrastructure to support access for MUDs, and across public, private, and workplace locations. Charging strategies must consider both Level 2 EV charging and direct current fast charging (DCFC) to meet various charging needs.

The VIEO has identified several prime locations for public and departmental charging on St. Thomas, St. John, and St. Croix (Figures 1-3).

be quickly restored after power outages to ensure rapid ability to recharge. Identify EV charging locations that can both be powered by the grid and independent of the grid through renewable energy sources with energy storage. Such locations can still charge in the event of longer power outages.

- Determine which entity is best suited to own/operate the initial iteration of public EV chargers.

EVC.1

IDENTIFY HIGH-TRAFFIC, HIGH-VISIBILITY LOCATIONS TO INSTALL THE FIRST ITERATION OF PUBLIC EV CHARGERS

EV chargers that are visible and operational shortly after power outages will create a reliable charging system and increase the confidence of residents and visitors.

Actions

- Coordinate with WAPA about infrastructure demands at public charging locations.
- Prioritize locations where electricity will

LEAD AGENCY	VIEO
PARTNERS	WAPA, DPP
TIMELINE	Within six months
BUDGET	High (the GVI has initial grant funding from the U.S. Department of Interior to begin installations)
LEVEL OF EFFORT	High
POTENTIAL IMPACT	High

FIG. 1

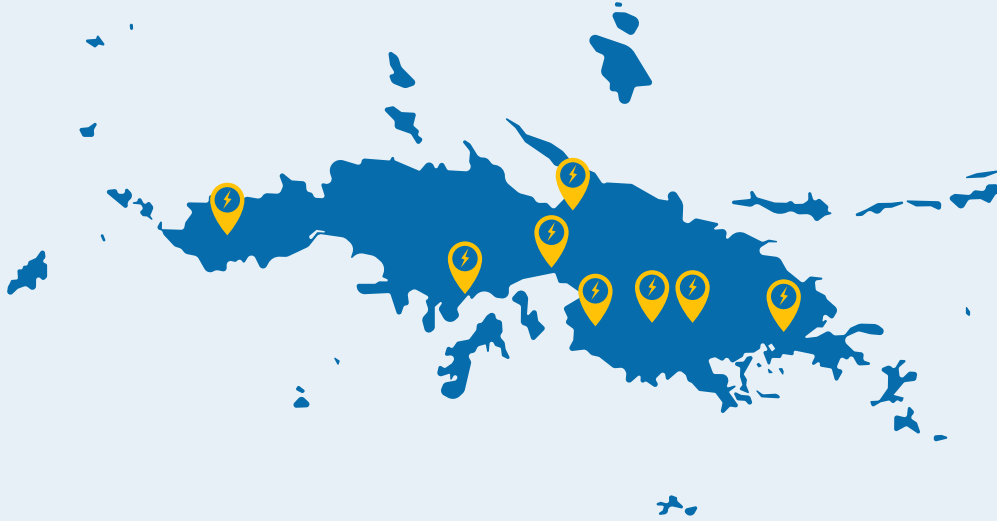
St. Thomas: Potential Public EV Charging Locations

FIG. 2

St. John: Potential Public EV Charging Locations

FIG. 3

St. Croix: Potential Public EV Charging Locations

EVC.2

INSTALL EV CHARGING FOR GVI FLEET

To support the territory's EV fleet adoption goals, GVI must install adequate charging infrastructure to ensure EVs perform as well as conventional vehicles. Once GVI, Virgin Islands Transit (VITRAN), and the Department of Education establish plans for an electric transition, GVI must install adequate bus charging infrastructure to meet the needs of battery electric buses.

Actions

- Use global positioning system (GPS) fleet data to determine vehicle domicile locations for near-term EV replacements and install chargers.
- Assess utilization of existing light-duty charging infrastructure to determine optimal siting. Consider relocating underused charging stations.
- Pursue EV charger funding via the U.S. Environmental Protection Agency's Diesel Emission

Reduction Act (DERA), the U.S. Department of Interior (DOI), and other sources.

- Pursue funding opportunities for battery electric bus charging infrastructure, assessing the feasibility of both depot charging and options along the route.

LEAD AGENCY

GO FLEET

PARTNERS

Department of Property and Procurement (DPP), VIEO, WAPA, VITRAN/Department of Public Works, Department of Education

TIMELINE

Within 5 years

BUDGET

High (the GVI has initial grant funding from the U.S. Department of Interior to begin installations)

LEVEL OF EFFORT

Medium

POTENTIAL IMPACT

High



EV POLICIES

Cities and states with the greatest EV adoption have strong, comprehensive, supportive policies that are combined with a mix of actions from local entities, regional groups, and utilities.⁵ The following section provides a framework to maximize EV adoption in the territory's transportation sector.



POL.1**BECOME PART OF THE ZERO-EMISSION VEHICLE (ZEV) PROGRAM**

The territory can demonstrate its commitment to EVs by adopting California's Zero-Emission Vehicle (ZEV) regulation. This would require auto manufacturers operating in the USVI to make an increasing proportion of EVs available for sale.⁶

Actions

- Pass legislation to adopt California's ZEV regulation.

LEAD AGENCY Governor's Office		
PARTNERS Dealerships		
TIMELINE Within 1 year		
BUDGET Low	LEVEL OF EFFORT Medium	POTENTIAL IMPACT High

POL.2**CREATE TERRITORY POLICY RELATED TO EV CHARGING**

The territory should document, streamline, and provide guidance for residential and commercial EV charging station installation procedures. Updated regulations or statutes may be needed.⁷

Actions

- Clearly summarize the steps residents, businesses, and developers must follow to install EV charging infrastructure.
- Establish a residential EV charging permitting process notification mechanism for WAPA.
- Establish wayfinding and signage guidance, coordinated throughout the territory.

LEAD AGENCY Department of Planning and Natural Resources		
PARTNERS WAPA, Virgin Islands Housing Authority, Virgin Islands Housing Finance Authority, Virgin Islands Economic Development Authority		
TIMELINE Within 1 year		
BUDGET Low	LEVEL OF EFFORT Low	POTENTIAL IMPACT Low

5 The International Council on Clean Transportation. Evaluating electric vehicle market growth across U.S. cities. September 2021. <https://theicct.org/publications/ev-us-market-growth-cities-sept21>.

6 To adopt this policy, a state must submit, and the EPA must accept, a waiver to implement the standard. Waivers must demonstrate a need for the legislation, like dense populations, poor air quality, and climate change. Read more about the legislation at <https://www.transportpolicy.net/standard/us-section-177-states/> and see https://ndep.nv.gov/uploads/air-ccn-docs/clean_cars_nv_reg.pdf for legislation from Nevada, the state that most recently adopted ZEV regulations.

7 See this (https://energycenter.org/sites/default/files/docs/nav/programs/pev-planning/san-diego/fact-sheets/ResComm%20EVSE%20Permit%20Guidelines%20v3_Final_attach.pdf) helpful guide from the Center for Sustainable Energy on the permitting and inspection of residential and commercial EV charging station installation.

POL.3**DEVELOP MULTI-UNIT DWELLING AND COMMERCIAL BUILDING CODES TO REQUIRE EV-READY DEVELOPMENTS**

New code mandates and policy incentives for charging stations in both multi-unit dwellings and new commercial construction will increase access to charging stations.

Actions

- Update building and land use codes to require infrastructure necessary for EV charging stations (conduit, etc.) in all new multi-unit dwellings and commercial developments.⁸
- Provide incentives for charging station installation in new commercial and multi-unit dwelling buildings.
- Phase out incentives and implement charging station mandates in new commercial and multi-unit dwelling buildings through the building code.

LEAD AGENCY Department of Planning and Natural Resources		
PARTNERS Local developers, WAPA, the VI Housing and Finance Authority		
TIMELINE Within 3 years		
BUDGET Low	LEVEL OF EFFORT Medium	POTENTIAL IMPACT High

⁸ Read adopted ordinances and related information from the City of Ann Arbor, MI ([https://www.a2gov.org/departments/city-clerk/Documents/ORD-20-35 Approval notice.pdf](https://www.a2gov.org/departments/city-clerk/Documents/ORD-20-35%20Approval%20notice.pdf)) and St. Louis, MO (<https://www.stlouis-mo.gov/government/departments/planning/sustainability/documents/upload/EV-Ordinances-Overview-final.pdf>).

POL.4**ESTABLISH AND ENFORCE EV PARKING RULES**

Create regulations to enforce parking spaces designated as EV-only.^{9,10}

Actions

- Update the traffic code to enforce EV-only parking.
- Allocate fines associated with the enforcement of EV-only parking spaces to funding for EV charging stations or EV projects.
- Conduct outreach to educate the public about EV parking space policies.

LEAD AGENCY Virgin Islands Police Department		
PARTNERS Bureau of Motor Vehicles		
TIMELINE Within 1 year		
BUDGET Low	LEVEL OF EFFORT Medium	POTENTIAL IMPACT High

⁹ Read more about Cincinnati, OH's free EV parking ordinance: <https://www.cincinnati-oh.gov/oes/mobility/electric-vehicle-free-parking/>

¹⁰ Nashville, TN provides special parking permits to clean technology vehicles in the downtown business districts. Read details about the provisions at: <https://www.nashville.gov/departments/county-clerk/motor-vehicle-services/green-parking-permit>



The Zero-Emission Vehicle (ZEV) Program is a California-led regulation that requires automakers to sell EVs in the states that have adopted it. The exact number of vehicles is linked to the automaker's overall gasoline and diesel sales within each state.

As of May 2022, 14 other states have also adopted California's Low-Emission Vehicle (LEV) criteria pollutant and greenhouse gas (GHG) emission regulations and Zero-Emission Vehicle (ZEV) regulations, under Section 177 of the Clean Air Act (42 U.S.C. §7507).

EV INCENTIVES

Providing incentives for EV purchases and the installation of EV charging stations increases access to EVs. The USVI government can educate the public about available incentives, provide direct financial incentives, encourage local businesses and organizations to provide incentives, coordinate and provide access to external financial resources, and recognize community leaders. GVI will continue to leverage federal funding to support transportation electrification, including consumer rebates and other incentives to encourage EV adoption.

As the Roadmap is implemented, the need for a local government strategy will be evaluated among interdepartmental stakeholders.



INC.1**INCENTIVIZE CONSUMER EV PURCHASES**

By decreasing the cost of EVs, USVI can help make EVs more affordable, even if only for a limited time.

Actions

- Issue a point-of-sale rebate for new and used EVs.
- Work with local financial institutions and organizations serving moderate- and low-income residents to offer special financing options for EVs, at low interest rates.
- Exempt EVs from road tax, or allocate road tax on EVs to fund EV charging projects.
- Exempt EVs from import fees and subsidize import costs.
- Create an EV license plate with lower registration fees.
- Consider reviving the VIEO's EV and EV charging station rebate program.

LEAD AGENCY Governor's Office		
PARTNERS Local EV dealerships, Virgin Islands Economic Development Authority, Bureau of Motor Vehicles		
TIMELINE Within 5 years		
BUDGET High	LEVEL OF EFFORT High	POTENTIAL IMPACT High

INC.2**SUPPORT PUBLIC CHARGING STATION INSTALLATION**

USVI should encourage and provide funding for public charging station installations.

Actions

Provide grants to private-sector entities for the installation of public, workplace, and multi-family housing charging stations.

- Stay up to date on funding opportunities and notify local partners when funding is available for station installation.
- Support the installation of solar-powered charging stations when possible and where feasible.

LEAD AGENCY VIEO		
PARTNERS Private businesses, commercial and multi-unit dwelling developers, Virgin Islands Economic Development Authority		
TIMELINE Medium		
BUDGET High	LEVEL OF EFFORT High	POTENTIAL IMPACT High

INC.3**RECOGNIZE LOCAL BUSINESSES WITH WORKPLACE CHARGING**

Providing recognition to local employers is a way the territory can support workplace charging and increase access to charging infrastructure for USVI residents.

Actions

Provide grants to private-sector entities for the installation of public, workplace, and multi-family housing charging stations.

- Either collaborate with an existing sustainable recognition or create a new recognition for providing workplace charging.
- Create resources to help local businesses implement workplace charging programs.
- Facilitate peer-to-peer information exchange between local employers about workplace charging.

LEAD AGENCY VIEO		
PARTNERS Local employers, Virgin Islands Economic Development Authority		
TIMELINE Within 2 years		
BUDGET Low	LEVEL OF EFFORT Low	POTENTIAL IMPACT Medium



UTILITY AND REGULATORY ENGAGEMENT AND RESILIENCY

It is important for WAPA to coordinate with VIEO to seamlessly incorporate additional EVs into the grid. WAPA is working to increase the share of renewable energy in its electricity mix and should continue to reduce dependence on imported petroleum products. WAPA must also ensure that residents, especially EV drivers, have affordable electricity rates. Lower fuel costs mean EVs have a lower lifetime cost than comparable conventional vehicles. GVI will have to work with the Public Services Commission to ensure that this new revenue source benefits both WAPA and its customers.



U&R.1

SUPPORT SMART GRID OPERATIONS FOR EVS

WAPA, the Public Services Commission (PSC), the entity that regulates WAPA, and GVI must work to ensure that EVs will act as an asset to the grid and will be fully supported.

Actions

- Formalize and identify staff to join an internal WAPA task force related to EVs.
- Support pilot studies of EV impacts on the grid.
- Review and update utility standards for EV charging stations to stay below hosting capacity limits.
- Investigate the implications of vehicle-to-grid technology.
- Explore opportunities to capture and study data on EV charging habits to inform grid management practices. Consider incentives for charging infrastructure capable of capturing and sharing usage data with WAPA.

LEAD AGENCY WAPA		
PARTNERS VIEO, PSC		
TIMELINE Within 5 years		
BUDGET Medium	LEVEL OF EFFORT High	POTENTIAL IMPACT Medium

U&R.2

INCREASE RENEWABLE ELECTRICITY FOR EV CHARGING

Although EVs already offer tailpipe and lower well-to-wheel (life cycle) emissions, they depend on a clean grid. By supporting renewable energy, USVI can strengthen EVs' environmental benefits.

Actions

- Pursue rates that can incentivize EV charging when excess renewable energy is available.
- Investigate the feasibility of providing EV owners with 100% renewable energy.
- Investigate the feasibility of connecting EV chargers to the grid with independent renewable energy generation and battery storage.

LEAD AGENCY WAPA		
PARTNERS VIEO, PSC		
TIMELINE Within 7 years		
BUDGET Medium	LEVEL OF EFFORT High	POTENTIAL IMPACT High

U&R.3

UPGRADE ELECTRICITY DISTRIBUTION INFRASTRUCTURE

WAPA should work in tandem with ongoing modernization to ensure that the existing distribution infrastructure is adequate for future EV needs. WAPA should also investigate other non-capital, behavioral methods to increase system capacity.

Actions

- Coordinate WAPA and DPP communication to ensure that WAPA is consulted before installing large charging projects.
- Use the EC charging location maps and continued demand analysis to determine areas that may need upgrades.
- Consider incentives to encourage managed EV charging or charging at grid nodes where there is already excess capacity.
- Explore opportunities for EVs to actively participate in electric grid operations, such as through demand response or vehicle-to-grid (V2G) connections.

LEAD AGENCY WAPA, DPP		
PARTNERS VIEO, PSC		
TIMELINE Within 12 years		
BUDGET Medium	LEVEL OF EFFORT High	POTENTIAL IMPACT High

U&R.4

ASSESS AND ADJUST UTILITY RATE STRUCTURES TO BENEFIT EV DRIVERS

The PSC and WAPA can incentivize EVs by providing EV drivers with favorable charging rates. WAPA is encouraged to evaluate the separate, complimentary rate design adjustments that could be made to support enhanced grid management and economic efficiency as EV adoption increases.

Actions

- Evaluate the need for a time-of-use discount rate pilot program for EVs, with special attention to the net effect of peak-demand (~5–7 pm) charging and solar PV generation decreasing in the evenings.
- Evaluate the need for and impact of demand charges for DCFC in the USVI. Determine the feasibility of exempting DCFC from demand charges in the short- and long-term.

LEAD AGENCY WAPA		
PARTNERS VIEO, PSC		
TIMELINE Within 5 years		
BUDGET Medium	LEVEL OF EFFORT High	POTENTIAL IMPACT High



PUBLIC AND PRIVATE EV FLEET TRANSITION

The territory must lead by example for both fleets and consumers. Incorporating EVs into the municipal fleet (including transit) and installing necessary charging infrastructure are key steps in reducing overall municipal emissions.

Supporting employees' choice to drive electric is an opportunity for GVI to provide a strong example to local employers. When fleet owners decide to transition, it can have a large impact.



FT.1**PURSUE ELECTRIFICATION OPPORTUNITIES WITHIN GVI'S LIGHT-DUTY FLEET**

To reduce municipal fleet emissions, GVI should incorporate EVs into its light-duty vehicle fleet.

Actions

- Use the fleet analysis conducted to determine the best near-term EV replacements.
- Activate the gasoline vehicle moratorium and create procurement guidance to require justification for non-electric vehicle purchases.
- Develop partnerships to ensure the provision of EV-related maintenance and upkeep services that will support successful deployment and build fleet electrification skills and capacity among government staff.

LEAD AGENCY GO FLEET
PARTNERS DPP
TIMELINE Over the next 10 years
BUDGET High (for procuring vehicles)
LEVEL OF EFFORT Medium
POTENTIAL IMPACT High

FT.2**PURSUE ELECTRIFICATION OPPORTUNITIES WITHIN GVI'S BUS FLEET**

To reduce municipal fleet emissions, the transit authority should begin a pilot program for electric transit and school buses.

Actions

- Pursue funding for battery electric buses. DERA offers funding opportunities for school buses.
- Pilot a two-year program comprising one or two transit buses in the VITRAN fleet.
- Pilot a two-year program comprising one or two school buses in the school bus fleet.
- Track data and compile lessons learned about electric bus routes, how to optimize bus routes, charging, maintenance, and operations.
- Investigate the feasibility of employing battery electric buses in underserved communities.

LEAD AGENCY VITRAN/Department of Public Works, Department of Education
PARTNERS DPP
TIMELINE Over the next 3 years
BUDGET High (for procuring vehicles)
LEVEL OF EFFORT High
POTENTIAL IMPACT High

FT.3**ENCOURAGE EV ADOPTION BY GVI EMPLOYEES**

GVI should encourage municipal employees to drive EVs as personal vehicles.

Actions

- Survey government employees about current and future EV ownership and commuting habits.
- Install workplace charging stations at government buildings to meet employee demand.

LEAD AGENCY DPP, Department of Personnel		
PARTNERS N/A		
TIMELINE Within 3 years		
BUDGET Medium	LEVEL OF EFFORT High	POTENTIAL IMPACT Medium

FT.4**WORK WITH LARGE LIGHT-DUTY FLEETS TO TRANSITION TO EVS**

GVI can partner with fleet owners and local businesses to transition large numbers of fleet vehicles to electric. GVI has the authority to convene these fleets and provide implementation best practices and guidance based on their own electrification experience.

Actions

Work with rental car agencies and taxicabs to help transition their fleet to EVs.

- Offer educational materials about EVs and EV chargers.
- Organize bulk purchase opportunities for EVs.
- Offer incentives to businesses and fleets for the purchase of EVs and installing EV chargers.
- Develop an infrastructure plan at hotels and other destinations to support the creation of a territory-wide charging network to increase visibility of the EV charging amenity, and support fleet electrification and the secondary market for EVs by shortening fleet-vehicle retirement ages.

LEAD AGENCY GO FLEET		
PARTNERS Hotels and resorts, dealerships, rental car agencies		
TIMELINE Within 5 years		
BUDGET Medium	LEVEL OF EFFORT High	POTENTIAL IMPACT Medium

FT.5

TRAIN FIRST RESPONDERS IN PROPER TECHNIQUES TO RESPOND TO INCIDENTS INVOLVING EVS

When EVs are involved in accidents, those responding to the incident must be properly trained to protect health and human safety in the context of damage to battery technology, high voltage lines, and possible battery fires.

Actions

- Establish safety training curriculum, i.e., from the National Fire Protection Association, to train first responders, such as the fire department, police department, utility service personnel, and the Virgin Islands Territorial Emergency Management Agency.

LEAD AGENCY Virgin Islands Fire Services		
PARTNERS Virgin Islands Police Department, Virgin Islands Territorial Emergency Management Agency		
TIMELINE Ongoing		
BUDGET Medium	LEVEL OF EFFORT High	POTENTIAL IMPACT Medium



VEHICLE AVAILABILITY AND MARKET

The USVI represents a small, remote market. This geographic circumstance poses a financial challenge to accessing goods not produced within the territory. All vehicles are imported and costly to ship to the USVI; however, bulk purchasing can reduce costs. Many Virgin Islands residents buy vehicles on the secondary market due to the high import costs of new vehicle purchases.

Strategy POL.1 encourages the USVI to adopt the ZEV program, which requires that car manufacturers sell an increasing number of EVs over time in the territory.



VA.1**RESIDENT AND FLEET BULK EV PURCHASE PROGRAM**

Bulk purchase programs are a way to demonstrate demand for a product while also reducing purchase prices for consumers. Bulk or “group buy” coordinated purchasing programs for EVs harness a large-volume sales order to reduce unit purchase prices, thereby creating momentum around a consumer sales event. This can be organized for both residents and fleets.

Actions

- Develop a bulk purchase program through which residents can purchase EVs.
- Develop a bulk purchase program for fleets to coordinate EV purchases in larger numbers.

LEAD AGENCY DPP		
PARTNERS Financing institutions		
TIMELINE Within 3 years		
BUDGET Medium	LEVEL OF EFFORT High	POTENTIAL IMPACT High

VA.2**DEVELOP A ROBUST SECONDARY MARKET FROM RENTAL CAR FLEETS**

Many residents purchase personal vehicles on the secondary (used or pre-owned) market, which is supplied to a large degree by rental car agencies. These rental agencies typically retire their current assets for newer models every three to five years. As these fleets transition to electric (See FT.4 on transitioning rental car agency fleets), more EVs will become available on the secondary market.

Actions

- Partner with rental car agencies to ensure they have the infrastructure to sell vehicles on the local secondary market.
- Offer educational materials in conjunction with advertising vehicle sales.

LEAD AGENCY Department of Licensing and Consumer Affairs		
PARTNERS DPP, VIEO		
TIMELINE Within 3 years		
BUDGET Low	LEVEL OF EFFORT Low	POTENTIAL IMPACT Low

VA.3**BUILD OUT AN EV AND EV CHARGING TECHNICIAN WORKFORCE DEVELOPMENT PROGRAM**

To keep EVs in good working order, current vehicle service technicians will need to learn new EV-related skills and become familiar with EV systems. As EV adoption increases, ensuring equitable outcomes means investing in the development of local talent in the EV servicing and maintenance space.

Actions

- Work with car manufacturers to train technicians to service EV models.
- Partner with trade schools to offer training for EVs and charging infrastructure.

- Offer funding or programs for the current vehicle-servicing workforce to be trained in the new vehicle technology.
- Work with trade unions to develop and fund updated training and apprenticeships for union members.

LEAD AGENCY Department of Labor		
PARTNERS Department of Licensing and Consumer Affairs, local dealerships, local electricians, Virgin Islands Department of Education (Territorial Career and Technical Education centers)		
TIMELINE Within 2 years		
BUDGET High	LEVEL OF EFFORT Medium	POTENTIAL IMPACT High





CONCLUSION

The Roadmap details the territory's plan of action to expedite the local transportation sector's transition to zero-emission vehicles. This effort will lead to cost savings for households, the territory government, and businesses as they adopt more efficient vehicles and become less dependent on expensive, imported fuel. Properly managed, this transition will also create a more resilient local electrical grid and lower electricity rates.

The GVI has already begun its transition to EVs and must continue to communicate the savings, challenges, and successes related to this effort in the context of planned energy-sector investments in the coming decades. By thoughtfully considering policy options available to the territory, the pathways that are chosen

will be the ones that have the highest level of impact and fill gaps that will result in the advancement of the EV market and the territory. Together, these strategies will ensure that the territory achieves its ambitious electrification goals toward a prosperous future and long-term stability.





APPENDIX 1

ELECTRIC VEHICLE AND CHARGING OVERVIEW

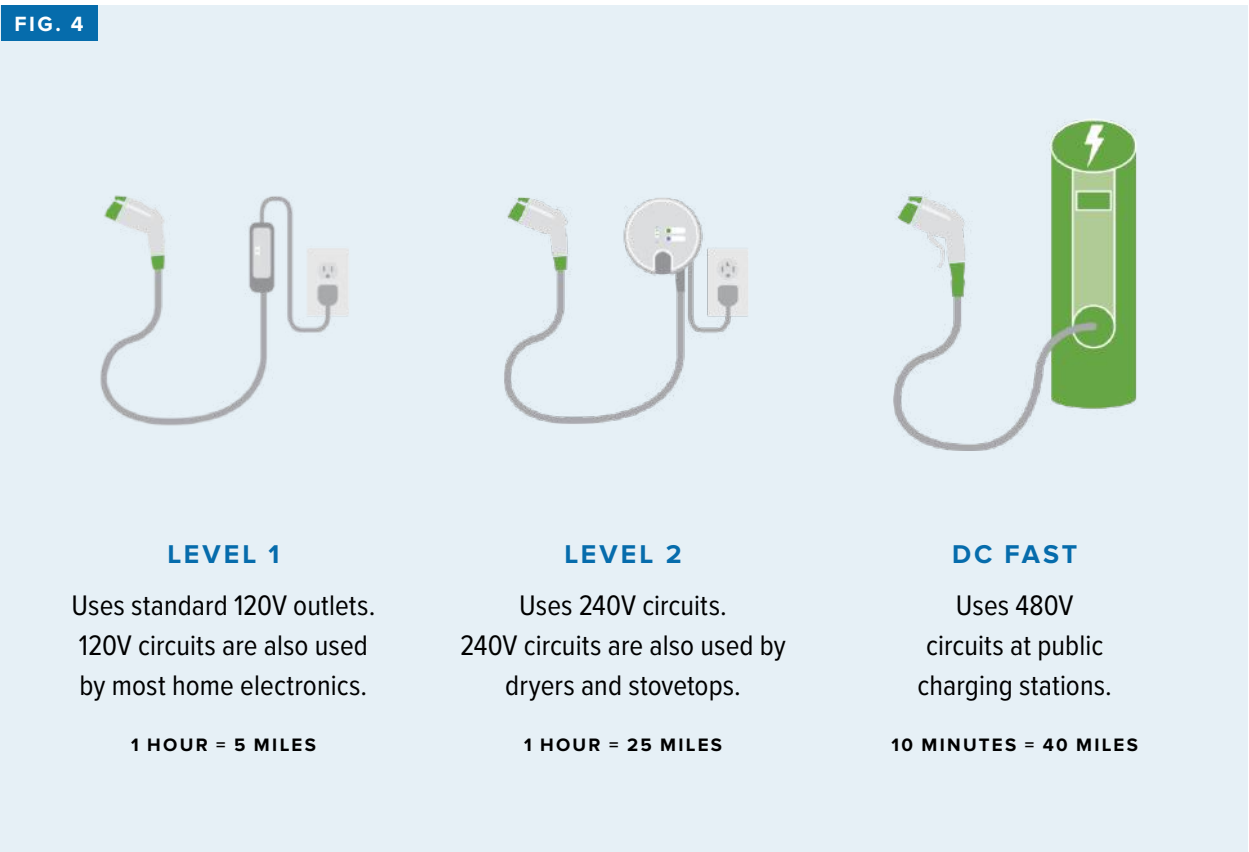
Electric Vehicles

All EVs can be plugged in and powered by electricity; however, some are also powered using an engine and gasoline. There are a couple of different terms to make that distinction (Table 1). EVs are available for use in applications other than light-duty passenger

vehicles. Transit buses and medium-duty and heavy-duty applications include long-haul trucking, refuse, cargo vans, and box trucks. EVs are also becoming more available to the marine industry for both private and commercial boats.

Table 1 | EV characteristics

VEHICLE TYPE	DESCRIPTION	EXAMPLE
Plug-in Hybrid Electric Vehicle (PHEV)	PHEVs are powered by both an internal combustion engine and an electric motor. The vehicle can be plugged into an electric power source to charge the battery. Some can travel up to 100 miles on battery alone, and all can operate solely on gasoline if needed.	Toyota Prius Prime
Battery Electric Vehicle (BEV)	BEVs use a battery to store the electric energy that powers the motor. EV batteries are charged by plugging the vehicle into a power source. Because there is no internal combustion engine, zero tailpipe emissions are produced.	Nissan LEAF



LEVEL 1	LEVEL 2	DIRECT CURRENT
CHARGING PORTS		
J1772	J1772	CHAdeMo CCS Combo Tesla
TYPICAL APPLICATIONS		
Residential Workplace Fleet	Residential Workplace Fleet Public	Fleet Public
TYPICAL MILES ADDED		
~5 miles per hour	25–45 miles per hour	40+ miles in 10 minutes

Previously, the up-front purchase cost of an EV was typically more expensive than a comparative conventional gas vehicle due to the high cost of the large battery. In the current market, new conventional gas vehicles are similar in price to some EVs. As technology advances and battery manufacturing capacity increases, vehicle cost continues to decrease. There are various incentives available to reduce the purchase cost of EVs, including those mentioned later in this section. In addition, EVs are typically less expensive to operate due to lower fuel and maintenance costs.

Electric vehicle charging

Charging equipment for EVs, also called charging stations, is available at different levels based on the rate the battery is able to be charged. The time needed to fully charge an EV will vary based on the size of the battery, how depleted the battery is, and the electric voltage of the EV charging equipment.

Light-duty vehicle charging

EV drivers have the flexibility to charge at a variety of locations, including home (single-family and multi-family), work, and other destinations, such as shopping centers, restaurants, and fleet parking facilities. Figure 4 on the previous page provides an overview of EV charging levels, including the amount of range each level provides an EV, the charging ports used, and typical applications.

Most EV charging occurs at home. However, there are some challenges with the deployment of charging infrastructure at multi-family developments, including access to reliable parking, billing, sufficient power supply, and ownership concerns. Workplace charging is another opportunity for GVI and local employers, as workplace charging helps increase the convenience of driving electric for employees. The availability of EV charging at work would not only provide enhanced convenience for employees but also increase EV charging during morning and midday business hours, reducing the need for charging during the evening “peak” hours for electric loads in the USVI. Similarly,

access to public charging is a key factor in decreasing range anxiety and increasing the convenience of driving EVs in the territory. For all charging applications, dwell time (or the amount of time a vehicle is typically parked) should be considered when determining what charging level to install.

Heavy-duty vehicle charging

While charging for heavy-duty trucks is still being developed, electric transit bus technology has been widely implemented with much success. Battery electric buses can charge through wireless (or inductive) charging, on-route overhead DCFC, and in-depot plug-in charging. Plug-in charging is one of the slower charging methods and is typically used for overnight refueling at vehicle depots.



APPENDIX 2

BENEFITS OF EVS

The GVI supports the adoption of EVs and sees the transition to EVs as an undertaking to help the territory reduce overall costs, improve operational efficiency, enhance its sustainability and resiliency efforts, and provide the public benefit of reduced tailpipe emissions. EVs can also enhance resiliency benefits, which is of specific relevance to USVI—not only can EVs represent mobile emergency power sources, but they can also help relieve the stress of gas-station refueling logistics, providing needed time to focus on recovery efforts. These benefits align well with the territory’s 20-year economic development plan (Vision 2040), as well as the 2019 Virgin Islands Legislative Act 7075, which directs all government departments to acquire the most efficient alternative-fuel vehicles for its fleet.

The benefits of EVs include:

- EVs, particularly BEVs, which do not have an internal combustion engine, require very little maintenance. Because of these lower maintenance and fuel costs, EVs have a lower lifetime cost of ownership than conventional vehicles—see Appendix 4 for details on the results of GVI fleet’s analysis using the DRIVE Tool.
- EVs eliminate dependence on imported and price-volatile petroleum products to fuel vehicles. This fuel procurement is costly and distribution is more difficult during periods of severe weather and global upheaval.
- All-electric vehicles have no tailpipe emissions, meaning their deployment improves public health, reduces ground-level air pollution, and reduces climate-impacting carbon emissions.
- EVs have the capability to use cleaner sources of electricity, such as solar, to charge. The USVI can use EVs to justify the diversification of electricity sources to include renewable fuels¹¹, in the effort to increase the emissions benefits of EVs. Even in areas that primarily use coal as an electricity source, EVs offer life cycle GHG emissions reductions.¹²

11 For the purpose of this Roadmap, renewable electricity includes non-fossil fuel sources, including electricity derived from wind, solar, hydroelectricity, geothermal sources, and other means that may become available that do not add GHG emissions to the atmosphere.

12 McLaren, J., Miller, J., O’Shaughnessy, E., Wood, E., Shapiro, E. Emissions Associated with Electric Vehicle Charging: Impact of Electricity Generation Mix, Charging Infrastructure Availability, and Vehicle Type. National Renewable Energy Laboratory. 2016. Accessed May 9, 2022, from https://afdc.energy.gov/files/publication/ev_emissions_impact.pdf.



APPENDIX 3

USVI LANDSCAPE

Economic and demographic landscape

Developed in 2020, USVI Vision 2040 lays the foundation for ensuring prosperity for all in the USVI. Despite setbacks from the closure of the Hovesna oil refinery on the heels of the 2008 global recession and the devastation caused by Hurricanes Irma and Maria in 2017, residents and businesses remain optimistic about the USVI's future. Significant job growth over the next decade is necessary to achieve the Vision's targets, however. These goals include a population increase of 10 percent, increasing the renewable portion of energy consumption to 75 percent, and increasing the contribution of extended stays, authentic experiences, and cultural offerings to total tourism-related revenue. Additionally, there is a strong focus on increasing investment and employment in the technology, research, and climate-focused sectors.

Renewable energy projects

Pairing EVs with renewable energy provides a powerful tool to address pollution, resiliency, and climate change. In 2009, a renewable portfolio target was approved requiring WAPA to increase the renewable content of its peak-demand generating capacity to 50 percent by 2044. Whereas the interim 2020 target was not met, there are planned capacity additions to bring WAPA in line with the legislated targets.

As of 2020, approximately 90 percent of utility-supplied electricity in the USVI was generated from fossil fuels, with the remainder generated from solar. Small-scale private solar arrays generate an additional 17 megawatt (MW) of

energy. Large-scale systems include:

- 450 kW King Airport Array, which came online in 2011;
- 6.4 MW Donoe Solar Farm, which was rebuilt after being severely damaged by Hurricane Irma; and
- 4 MW Spanish Town Solar Farm.

There are also a few microgrid projects underway in response to the recovery efforts from the 2017 Hurricanes Irma and Maria. Through support from Bloomberg Philanthropies, there are plans for a 4 MW microgrid in St. John and an 18 MW microgrid in St. Croix. Additional opportunities with biomass and landfill gas are being considered, and there are plans for 28.5 MW of wind generation to be built by 2024.

There is a growing demand for distributed energy generation by households, especially rooftop solar. In 2019, GVI implemented a new net metering program after the inaugural program's limits of a 15 MW cap territory-wide had been reached in 2017. WAPA has faced declining revenue in recent years as more households invest in solar power, meaning that the utility has had to think creatively about ways to grow its customer base and maintain necessary cash flows. EV adoption, therefore, provides an exciting opportunity for WAPA in these respects.

Legislative landscape

Three significant policy-focused actions have helped to reduce the USVI's reliance on fossil fuels. The first is Act 7075, passed by the legislature in 2009. This law established a renewable portfolio standard requiring

25 percent of WAPA's peak-demand generating capacity to be met with renewables by 2020, 30 percent by 2025, and 50 percent by 2044. Act 7075 also allowed for net metering, enabling residents, businesses, and the government to generate their own electricity while staying connected to the grid. Additionally, it mandated solar water heating to be a part of every new building and major renovation. To support this effort, VIEO allocated \$32 million of Recovery Act funds to deploying distributed energy solutions as well as energy efficiency.

As net metering limits were being reached, Act 7586 was passed by the legislature, establishing a feed-in tariff allowing residents to participate in the generation market.

Landscape

Electric Grid Reliability and Costs

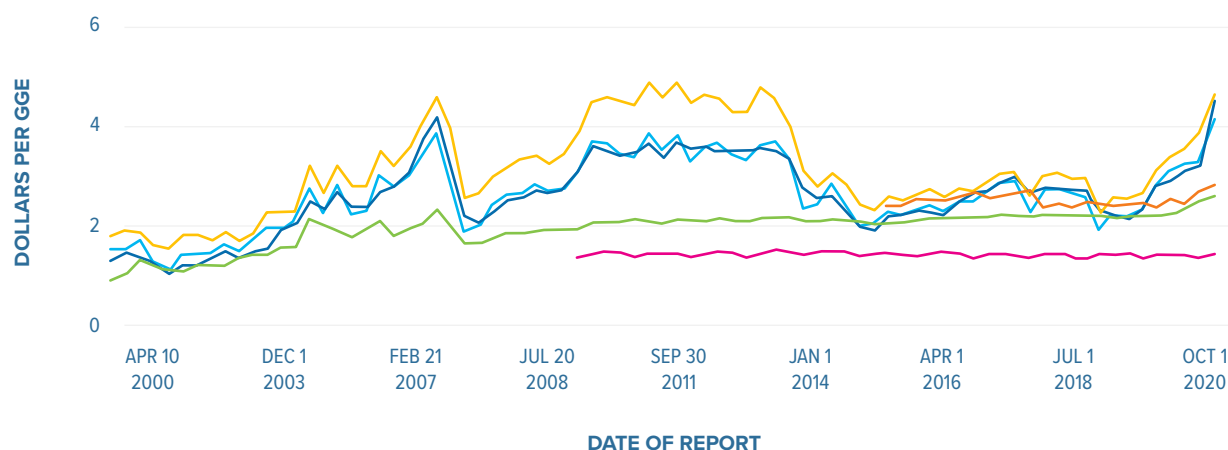
The territory's electric grid infrastructure is owned and operated by the Virgin Islands Water and Power Authority (WAPA), which is a public utility overseen by a board of directors and regulated by the USVI Public Services Commission. The power grid historically has been unreliable and expensive, but ongoing actions to

improve service include a new, more efficient thermal generation facility. More renewable energy generation is also being developed across multiple islands, which should align well with progress on Roadmap actions to additionally put downward pressure on rates.

By providing a new revenue source for WAPA, EVs can help address that entity's cash flow constraints to create more financial health within the local system. This additional revenue source can also help offset distribution system upgrades or other needs to accommodate increased EVs charging. There is inherent value in keeping the costs for transportation fuel within the territory (i.e., transitioning to electricity and paying WAPA) as opposed to purchasing from external fossil-fuel companies. EVs can help manage demand from the electrical grid by charging when demand is low and operating as energy storage that can provide energy back to the grid when demand is high. They can also operate as mobile power sources during times of power outages.

The Territory's cost of electricity per kilowatt hour (\$0.41) is much higher than the average for the rest of the United States (\$0.15). Fuel prices for gasoline per gallon (\$5.66) and diesel are also more expensive

Average Retail Fuel Prices in the United States



Last updated:
June 2022
Printed on:
August 16

Gasoline E85 CNG LNG Diesel Electricity

June 2022 U.S. Department of Energy Clean Cities Alternative Fuel Price Report

for the USVI.¹³ However, while gasoline rates have historically been below electrical rates in the Territory, this year, gas prices have outpaced stable electricity costs due to fluctuating oil markets. This paired with the investment and aggressive renewable energy adoption targets will allow electricity costs to be further reduced.

Steep Terrain

The territory's geography has some steep inclines, especially on the islands of St. Thomas and St. John. EVs operate using an electric motor, have immediate torque and power to handle these slope changes, and also utilize regenerative braking technology to offset any reduced efficiency from going uphill.

Regenerative braking means that on hilly terrain, EVs are more efficient than gas-powered vehicles. This braking technology means that when going downhill in an EV and easing off the accelerator, the wheels of the car turn the motor that generates electricity, which is then stored in the EV's battery. So for a set distance on hilly terrain, EVs would achieve similar energy-per-mile as they would when being driven on flat terrain for the same distance. Comparatively, an internal combustion engine will achieve worse miles-per-gallon on a hilly trip than on a flat trip.

Vehicle market ecosystem

As a new technology, EVs will have an impact on existing markets and business models. The extent to which these impacts are positive or negative may change over time. According to data from the Bureau of Motor Vehicles, there are 132 EVs registered in the territory. With an estimated 78,000 vehicles registered in the territory, the market share of EVs is currently very low (0.17%).

Vehicle Servicing

To maintain successful EV deployment, service technicians and mechanics will need to be trained or retrained to service EVs. Some routine automobile maintenance, such as servicing tires, the ventilation and air conditioning system, and the starter battery, is the same, but there are also major differences between conventional vehicles and EVs. BEVs do not have an engine or components that require regular maintenance, but they do have battery packs and high-voltage cables that require certain safety precautions and may also need servicing.

The estimated scheduled maintenance cost for a light-duty BEV totals 6.1 cents per mile, while a conventional vehicle totals 10.1 cents per mile. While lower maintenance costs are a considerable benefit to EV owners, measures must be taken to develop the local capacity to attend to these needs and ensure that residents and businesses alike experience as little disruption to their routines as possible due to vehicle maintenance needs. Training and certifying EV technicians is still an emerging sector outside of Original Equipment Manufacturers (OEMs), but the GVI's investment in EV assets is a catalyst for building an EV servicing and training network in the territory. These efforts will further boost consumer confidence in EVs and hasten the pace of adoption, and they will also empower local workers with the skills to meet the demands of advanced transportation.

Fueling

EV drivers can charge at home, at work, and at destinations such as grocery stores and shopping centers. The current gas station business model may be less relevant with widespread EV adoption. Co-locating EV chargers, especially faster chargers at convenience stores, could still be a viable business strategy.

13 USVI kilowatt hour price noted is an average price from WAPA, effective February 2020. <https://www.viwapa.vi/customer-service/rates/kilowatt-per-hour-rate>. The U.S. average kilowatt hour price comes from the U.S. Energy Information Administration. Electric Power Monthly. Average Price of Electricity to Ultimate Customers by End-Use Sector, March 2022. https://www.eia.gov/electricity/monthly/epm_table_grapher.php?t=epmt_5_6_a. U.S. Virgin Island gasoline fuel prices from March 2022.

14 Burnham, Andrew, Gohlke, David, Rush, Luke, Stephens, Thomas, Zhou, Yan, Delucchi, Mark A., Birky, Alicia, Hunter, Chad, Lin, Zhenhong, Ou, Shiqi, Xie, Fei, Proctor, Camron, Wiryadinata, Steven, Liu, Nawei, and Boloor, Madhur. Comprehensive Total Cost of Ownership Quantification for Vehicles with Different Size Classes and Powertrains. United States: N. p., 2021. Web. doi:10.2172/1780970.



APPENDIX 4

PUBLIC FLEET EV ASSESSMENT AND ANALYSIS

A fleet analysis was performed on the GVI light-duty fleet. The following pie charts illustrate the departments and offices with the most vehicles (Figure 5) and the typical vehicle breakdown for each district's fleet (Figure 6). St. Croix and the combined St. Thomas/St. John districts generally had similar percentage breakdowns for each inquiry.

The subsequent column graph (Figure 7) compares the nominal cost per mile of operating each type of gas-powered vehicle on the GVI fleet (all districts) with the nominal cost per mile of operating the EV replacement selected for each vehicle type. The December 2021 analysis confirms total cost of ownership (TCO) savings from a transition to EVs for most vehicle types, with electric sedans and vans performing best.

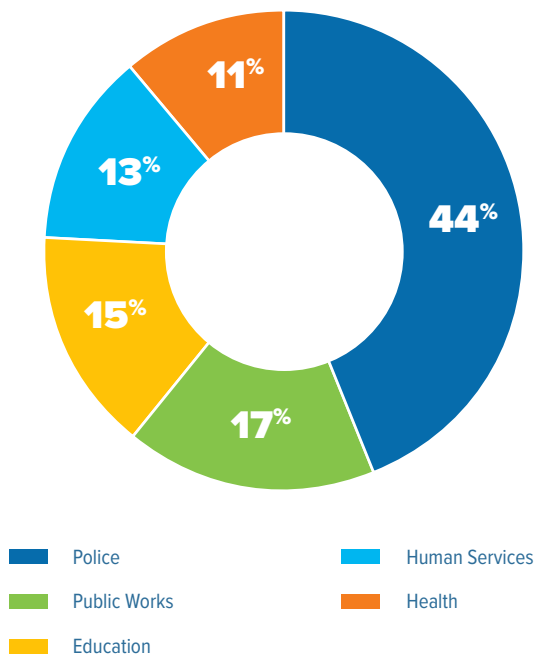
Disruptions in the global oil supply led to high spikes in the price of gasoline, which went from an average of \$3.75 per gallon across all districts in December 2021 to an average of \$5.66 per gallon by March 2022. This prompted GVI to request an updated fleet analysis to illustrate the impact of the proposed fleet electrification. This revised fleet analysis was completed on the same inventory using the new gas prices but also on the latest version of the Dashboard for Rapid Vehicle

Electrification (DRVE) Tool¹⁵, and included, as per request by GVI, several new EV replacement models that had not been considered previously.

Figures 8 and 9 show the updated average TCO per mile for St. Croix and the combined districts of St. Thomas and St. John. The net effect of the adjusted assumptions confirms improved savings for EVs in most cases, validating the key value proposition for EVs—lifetime savings can be unlocked by exploiting the historical and projected volatility of oil prices in favor of the stable, regulated, and consistently low price of electricity. As global markets continue to experience shortages and high prices, another \$0.47 per gallon increase in gasoline/diesel prices is expected to impact the USVI before the end of 2022. WAPA's continued progress on renewable energy procurement sets the stage for decreasing electricity costs across the territory.

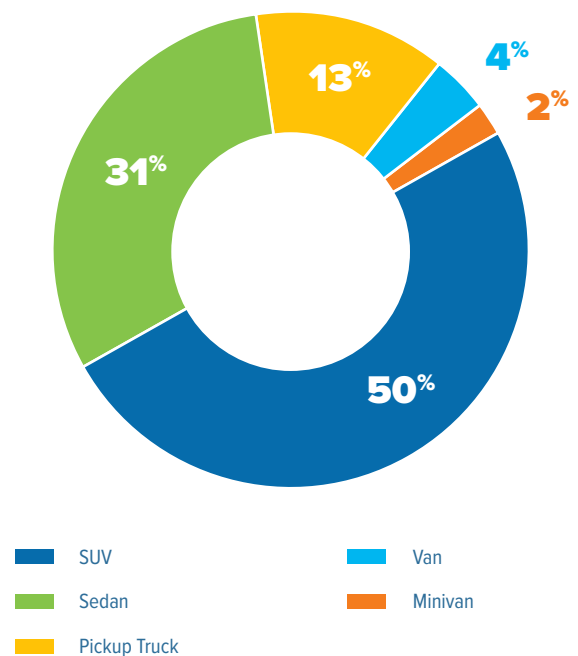
15 The Dashboard for Rapid Vehicle Electrification (DRVE) Tool was developed by the Electrification Coalition and provides quick and easy analysis for light-, medium-, and heavy-duty fleet electrification. The Microsoft Excel-based tool can evaluate a variety of procurement ownership structures, vehicle types, electric vehicle charging configurations, and many more scenarios. Accessed from <https://www.electrificationcoalition.org/resource/drve/>.

Departments/Offices by Largest Fleet Size, St. Thomas and St. John

**FIG. 5**

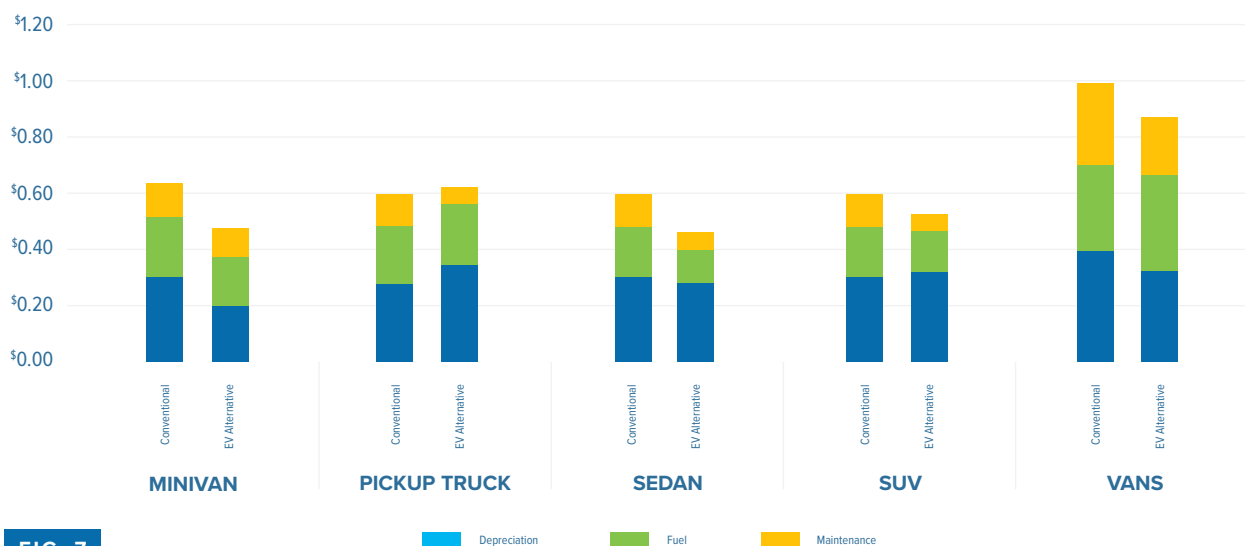
St. Thomas/St. John GVI fleet breakdown by Dept./Office

Fleet Breakdown by Vehicle Type, St. Croix

**FIG. 6**

St. Croix GVI fleet breakdown by vehicle type

Nominal Cost per Mile per Vehicle Type, All Locations

**FIG. 7**

Cost per mile for a conventional vehicle compared to an EV alternative.

FIG. 8 Average Total Cost of Ownership per Mile for Each Vehicle Type, STX

	ORIGINAL CPM	EV AVERAGE CPM
Minivan	\$0.64	\$0.48
Pickup Truck	\$0.61	\$0.67
Sedan	\$0.59	\$0.51
SUV	\$0.60	\$0.53
Van	\$0.98	\$0.97
AVERAGE	\$0.68	\$0.63

St. Croix: average total cost of ownership per mile for each vehicle type. From March 2022 DRVE Tool analysis.

FIG. 9 Average Total Cost of Ownership per Mile for Each Vehicle Type, STT–STJ

	ORIGINAL CPM	EV AVERAGE CPM
Minivan	\$0.73	\$0.48
Pickup Truck	\$0.70	\$0.67
Sedan	\$0.68	\$0.51
SUV	\$0.67	\$0.53
Van	\$1.12	\$0.97
AVERAGE	\$0.78	\$0.63

St. Thomas/St. John: average total cost of ownership per mile for each vehicle type. From March 2022 DRVE Tool analysis.



APPENDIX 5

STAKEHOLDER ENGAGEMENT PROCESS

Providing a forum for gathering insight is essential to developing the deeper understanding needed for project success. Between February and April of 2022, four groups were engaged to provide input, which has been incorporated into the Roadmap's recommended actions.

Strategic engagement groups

Public Fleets

Transitioning public fleets to EVs increases resiliency, reduces costs of public services, and provides a strong foundation for further deployment of community-facing EV charging infrastructure. The following organizations were invited to participate in facilitated discussions:

- Bureau of Motor Vehicles
- Department of Education

- Department of Finance
- Department of Health
- Department of Human Services
- Department of Justice
- Department of Labor
- Department of Licensing and Consumer Affairs
- Department of Public Works
- Virgin Islands Energy Office
- Virgin Islands Police Department
- Virgin Islands Territorial Emergency Management Agency

Topics of discussion included the project's background and purpose, results of the DRVE analysis, charging

strategies, and widespread EV inclusion objectives such as technician training. In addition to procurement approaches, special attention was paid to questions regarding battery disposal and operations continuity during power outages.

Utility – WAPA and Public Services Commission

Utilities and their regulatory bodies are essential partners in the transition to EVs. During the project, staff and leadership from WAPA and the Public Services Commission were engaged to discuss opportunities within infrastructure planning, grid resiliency, and strategies to support and encourage EV adoption.

Auto Dealers and Rental Car Companies

As they are located within an island territory, USVI-based auto dealers and rental car companies play an integral role in the availability of vehicles for residents and visitors. Topics for consideration extended beyond the rental and purchasing opportunities to include education and outreach strategies for sales staff and technicians and consumer-focused activities. Additional

topics included workforce development, vehicle, and infrastructure challenges, as well as policies and programs for incentives.

Community Groups

Acceptance of electrified transportation is essential at the community level for the full benefits of EVs to be realized. For this to occur, various concerns need to be addressed as this technology requires behavior modification, specifically surrounding charging. Engagement with community stakeholders and representatives focused on education, identifying and addressing concerns, challenges with vehicles and charging infrastructure, and incentives and programs to ensure equitable access.

Outcomes of the transportation focus group

The Roadmap process took the opportunity to engage stakeholders on the important questions that undoubtedly arise during electrification. Below is a sample of outcomes from these brainstorming sessions.

How can we make the transportation sector more equitable?

Financial
incentives
for EVs

Provide public
education on
the cost-saving
advantages
of owning an EV

Multimodal
mobility

Public charging
stations with
attractive
charging rates

Car-sharing with
free options

Making public
transportation more
accessible, reliable,
electric, and better
mapped

Public infrastructure
investments

Improved road
maintenance

In what ways might charging infrastructure that considers the impact on the grid increase EV usage in the USVI?

New EVs can supply electricity to homes during a power outage

Involve public utility for charging

Projection of charging need

Understand USVI charging patterns (peak vs. off-peak hours)

Inventory of vehicle distribution, routes, and trips

Reasonable growth estimate for EVs

Solar-powered EV charging infrastructure

Controls on EV charging to minimize grid impact and utilize renewable energy

How can the government set an example for the community in the transportation sector?

Policies to incentivize EV ownership

Policies to assign cost of GHG to conventional gas-vehicle owners

Tax vehicle emissions and use tax revenue to fund EV infrastructure

Municipally owned charging stations with use incentives

Setting ZEV goals

Government vehicles to have requirements for fuel efficiency or to be electric

Convert the government fleet to electric and pay WAPA for electricity instead of outside gov't for gas/diesel



This roadmap was developed with support from the Electrification Coalition.

About the Author: The Electrification Coalition is a nonpartisan, nonprofit organization that promotes policies and actions to facilitate the widespread adoption of plug-in electric vehicles (EVs) on a mass scale in order to overcome the economic, public health and national security challenges that stem from America's dependence on oil. For more information, visit

ELECTRIFICATIONCOALITION.ORG

