THE FUTURE IS ELECTRIC

Driving E-mobility in the Charlottesville and UVA communities

Prepared for EVHybridNoire
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UVA | FRANK BATTEN SCHOOL of LEADERSHIP and PUBLIC POLICY

EVHYBRIDNOIRE
ELECTRIFYING, ENGAGING & EDUCATING DIVERSE COMMUNITIES THROUGH MOBILITY

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Disclaimer:

The author conducted this study as part of the program of professional education at the Frank Batten School of Leadership and Public Policy, University of Virginia. This paper is submitted in partial fulfillment of the course requirements for the Master of Public Policy degree. The judgments and conclusions are solely those of the author, and are not necessarily endorsed by the Batten School, by the University of Virginia, or by any other agency.

Honor Pledge:

On my honor, as a student, I have neither given nor received aid on this assignment

Executive Summary

More than 14,000 single-occupancy vehicles commute to the University of Virginia each day, however, there are currently only 355 electric vehicles (EVs) registered in the City of Charlottesville (CavPool, 2022; Virginia Electric Vehicle Registration, 2022). With vehicle emissions making up more than 28% of Charlottesville's carbon emissions, the lack of access to and usage of EVs pose a threat to emissions reductions efforts set forth by UVA and the City of Charlottesville (Charlottesville Emissions Report, 2019).

Without action, Charlottesville will fail to meet its carbon emissions reduction goals and risks putting already vulnerable groups at risk of continued exposure to harmful vehicle emissions. The environmental, economic, and health benefits of EVs are apparent, but lack visibility to the average consumer. To address the lack of access to and usage of EVs in the Charlottesville and UVA communities, I consider the following policy alternatives:

1. Creation of a public/private carshare partnership between UVA, EVHybridNoire and an electric vehicle company.
2. Advocating for the expansion of the Charlottesville EV Charger Mini-Grant.
3. Working with UVA Sustainability and on-grounds organizations to implement an informational campaign surrounding EV tax credits, subsidies, and benefits for EV drivers.

Each alternative was evaluated on three criteria: 1) cost-effectiveness; 2) equity; and 3) administrative feasibility. All are ranked on a scale of low, moderate, or high and are weighted equally. After conducting analysis of each alternative, I recommend that **policy alternative #3** – **creating an informational campaign** – be implemented. This policy alternative ranks the highest on both the cost-effectiveness and equity criteria and ranks moderately on the administrative feasibility criterion. The informational campaign presents the best path towards increasing the usage of and access to EVs in the Charlottesville and UVA communities in a cost-effective, equitable, and sustained manner.

Introduction:

The future is electric! But what does that mean?

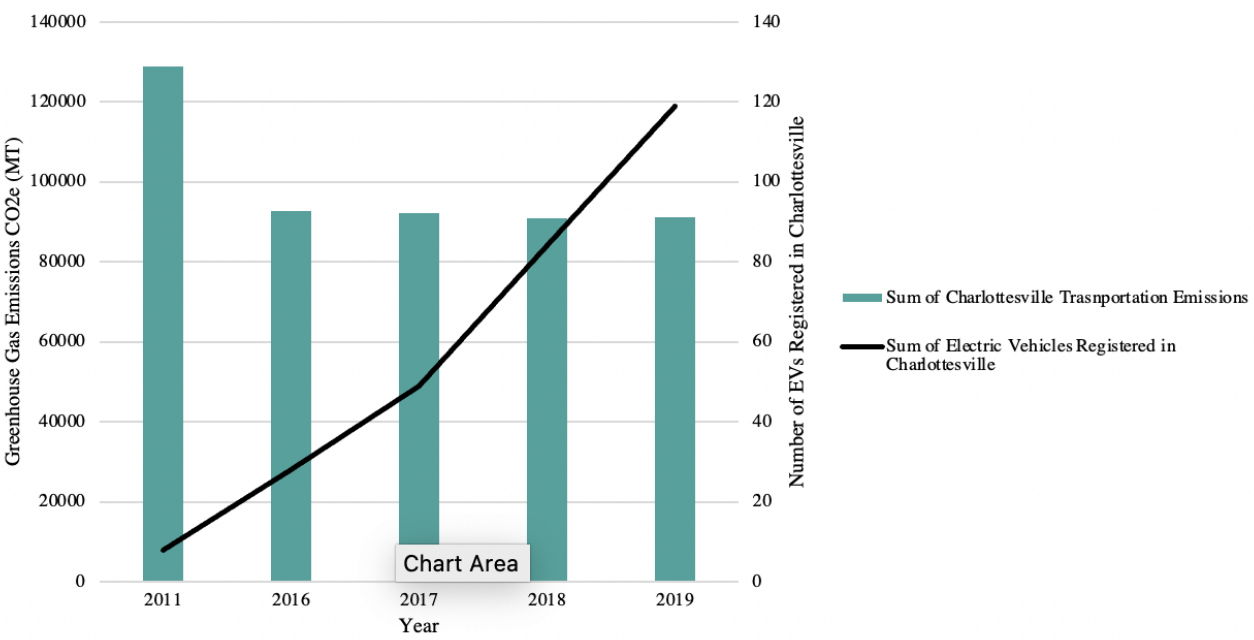
As transportation emissions continue to grow and the world trends towards a global warming of 2 degrees Celsius, changes in behavior must be made. Electric vehicles provide a proven path towards carbon neutrality. This report examines three proposed solutions aimed at increasing access to and usage of EVs for Charlottesville and UVA community members.

Acronyms:

BEV	Battery Electric Vehicle
EV	Electric Vehicle
PEV	Plug-in Electric Vehicle
UVA	University of Virginia

Problem Statement:

More than 14,000 single-occupancy vehicles commute to the University of Virginia each day, however, there are currently only 355 electric vehicles (EVs) registered in the City of Charlottesville (CavPool, 2022; Virginia Electric Vehicle Registration, 2022). With vehicle emissions making up more than 28% of Charlottesville's carbon emissions, the lack of access to and usage of EVs pose a threat to emissions reductions efforts set forth by UVA and the City of Charlottesville (Charlottesville Emissions Report, 2019).



Graph Citation: City of Charlottesville. (2020). Charlottesville emissions reports. City of Charlottesville. Retrieved March 19, 2023, from https://www.charlottesville.gov/295/Charlottesville-Emissions-Reports;Environmental Protection Agency. (2018). Virginia Electric Vehicle Update. Environmental Protection Agency. Retrieved March 19, 2023, from https://www.epa.gov/sites/default/files/2018-10/documents/2018 updatecaroline.electric.pdf

Client Overview:

EVHybridNoire is a D.C. based non-profit organization that focuses on reducing overall carbon emissions from gas-powered vehicles and increasing access to EVs and sustainable modes of transportation for individuals that are historically left out of electrification conversations. EVHybridNoire aims to shift the narrative regarding e-mobility to be more inclusive of diverse populations (EVHybridNoire, 2023). EVHybridNoire works with electric, connected, autonomous, and shared mobility partners across the country and globe and is the largest network of diverse EV drivers and enthusiasts in the U.S. (EVHybridNoire, 2023). EVHybridNoire has worked with smaller universities and colleges in the past but wishes to expand its scope to larger universities such as UVA in order to build meaningful, lasting, and durable relationships in hopes of finding replicable and sustainable methods of EV introduction to college and university campuses across the country.

Background:

The following section provides background on Charlottesville and UVA carbon emissions trends, scale and scope of EVs in Charlottesville, and equity concerns surrounding the lack of access to and usage of EVs.

Policy Environment: Charlottesville and UVA Sustainability Efforts

The City of Charlottesville has been a champion of sustainability initiatives and offers an environment suitable for and receptive to political discussion surrounding electrification and emissions reduction. In 2020, Charlottesville introduced the Climate Action Plan (CAP) for Greenhouse Gas Reductions. The program was halted due to the COVID-19 pandemic; however, the city has released preliminary content for the 2022 CAP. The content includes a section devoted to transportation, specifically, the development of a community EV charging network (Climate Action Plan Preliminary Content, 2022). The city has also purchased four electric buses which are expected to reduce emissions by 400 metric tons of carbon per year (Hirschheimer, 2022). In addition to City efforts, UVA has introduced its 2020-2030 sustainability plan. The University plans to be carbon neutral by 2030 and fossil fuel free by 2050 with an emphasis on addressing UVA's fuel mix, transportation system, and infrastructure (UVA Sustainability 2020 - 2030 Plan, 2020). With concrete emissions reduction and sustainability plans on both the University and City level, Charlottesville provides a constructive policy environment for tangible change.

The City of Charlottesville and the University of Virginia have a unique opportunity to advance the use of EVs to help mitigate the adverse effects of carbon emissions. With a policy environment that already favors greenhouse gas abatement and climate change mitigation, Charlottesville can serve as a model for other cities and universities who wish to help mitigate the consequences of adverse climactic changes. In 2019, the U.S. Green Building Council named Virginia as one of the top 10 LEED States – states that are showing advancements in sustainable design, construction, and operation of budlings and cities (Zhang, 2019). The City of Charlottesville and the University of Virginia were named as leading contributors to the state's designation (Zhang, 2019). Charlottesville has already begun to spearhead green efforts, and with its history of leadership, the city can serve as a successful model for climate change mitigation efforts on a university, state, and federal level.

Charlottesville Carbon Emissions Trends

As of 2019, transportation was the third largest category of emissions in the city of Charlottesville, making up more than 28% of the City's total carbon emissions (City of Charlottesville, 2020). A majority of transportation emissions come from single- occupancy vehicles which are commonly used for commuting. While Charlottesville has a well-established public transportation system, with a fleet of 37 buses, a majority of residents continue to commute via single occupancy vehicles (Cat Schedules & Maps, 2018). More than 58% of workers in Charlottesville commute via gas-powered single-occupancy vehicles which are a leading source of scope 3 emissions (American Community Survey, 2020).

Charlottesville has set an ambitious goal of reducing emissions by 45% by 2030 and achieving carbon neutrality by 2050 (Climate Planning, 2022). Reducing scope 3 emissions due to single-use occupancy vehicles will play a pivotal role in meeting Charlottesville's emissions

reductions goals. Compared to the 11,435 pounds of carbon dioxide per year that single-occupancy internal combustion engine vehicles generate, EVs only generate on average 3,423 pounds of carbon dioxide per year (Emissions from Electric Vehicles, 2022). With only 355 EVs registered in the City of Charlottesville, the introduction of sustainable modes of transportation – including increased usage of EVs – will be imperative if Charlottesville wishes to continue reducing its carbon emissions (Virginia Electric Vehicle Registrations, 2022).

Barriers to Expanded Scale and Scope of Electric Vehicles in Charlottesville

While cost is a major barrier to increased electrification in the City of Charlottesville, infrastructure and culture play a large role in public acceptance of sustainable modes of transportation as well. Annual upkeep of EVs is less expensive than annual upkeep of a gas-powered vehicle, however the upfront purchasing costs of an EV are often higher than that of a gas-powered vehicle. The average annual cost of an electric vehicle is $10,360 compared to $8,691 for a gas-powered vehicle (Electric Cars vs Gas Cars Cost in Each State, 2020). The high up-front costs of EVs continue to deter potential buyers, regardless of their long-term payoffs.

Additional barriers to EV adoption for many Charlottesville residents include the lack of free charging stations in the Charlottesville community as well as cultural and social norms. In 2013 the City of Charlottesville created an EV Charger Mini-Grant Program to increase the number of public charging stations in Charlottesville (EV Charger Mini-Grant, 2022). As of 2022, the City of Charlottesville has 39 charging stations, 24 of which are free. However, most of the charging stations are located near UVA grounds leaving those on the outskirts of the city without access to free and accessible charging stations (ChargeHub, 2022). Cultural barriers have also continued to limit the electrification of Charlottesville as gas-powered single-occupancy vehicles are the primary mode of transportation for residents – with more than 14,000 cars commuting to UVA daily (Virginia Electric Vehicle Registration, 2022). A cultural and infrastructural shift concerning usage of EVs and reduced reliance on gas-powered single-occupancy vehicles will be imperative if Charlottesville is to make the transition towards increased use of sustainable transportation.

Cyclical Inequality of Access to and Usage of Electric Vehicles in Charlottesville

Charlotteville has a long history of marginalization and displacement of underrepresented groups, which has only further entrenched cyclical inequalities. Cyclical inequality of access to and usage of EVs in Charlottesville has created a culture surrounding electrification that excludes critical community voices such as individuals who have immigrated to the area, come from a lower-socioeconomic status, or are part of a historically marginalized groups such as Black or Hispanic individuals. Historically, EV owners have been predominantly male, high-income, highly educated, homeowners, who have access to charging stations at home (Hardman et al., 2021). Additionally, new EV models are predominantly marketed as luxury cars or SUVs which often retail for more than other models (Hardman et al., 2021). Some disparities in adoption of EVs can be linked to the marketing of EVs as luxury vehicles, as data shows that the adoption of Teslas as a proportion of all household vehicles is 15 times higher in the top 20% of zip codes by income than it is in the lowest 20% of zip codes by income (Atlas EV Hub, 2020). The marketing of EVs as luxury goods only exacerbates existing inequalities, as households

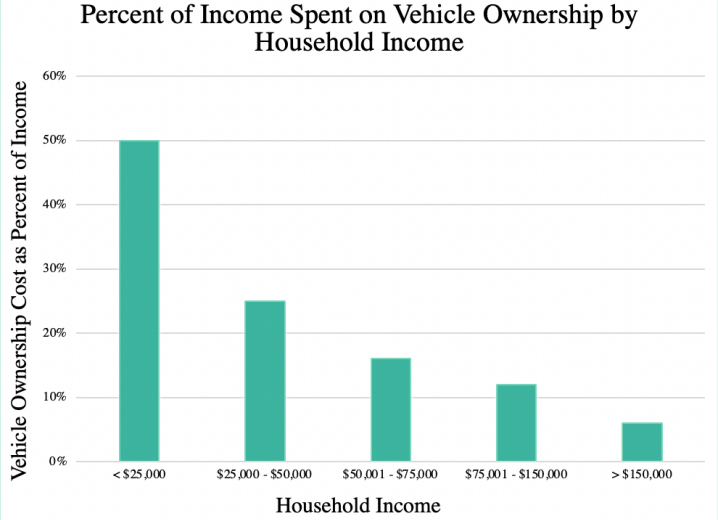
impacted by transportation emissions are more likely to reside near areas of high traffic and spend a higher proportion of household income on transportation costs (Hardman et al., 2021).

On average, U.S. households earning less than $25,000 spend 50% of their income on vehicle ownership and operation annually, whereas median-income vehicle-owning households spend only 16% of their income on the same expenses (Bauer Et. Al, 2021). The adoption of EVs could cut in half the maintenance expenses for low- and median-income households. Research has shown that maintenance costs for new 2020 gas-powered vehicles are assumed to be $0.028 per mile, compared to $0.012 for EVs – saving individuals, especially those of lower socioeconomic status, thousands of dollars per year (Bauer Et. At., 2021).

Existing barriers to EV usage in lower-income and minority neighborhoods increase air pollution and further advance cyclical inequality by driving property value down and increasing the number of pollution related health conditions in these areas. Studies have shown that low-income households are likely to benefit most from an EV, but often least likely to obtain one (Bauer et al., 2021). To address cyclical inequality within the Charlottesville community, it is imperative that disparities in access to and usage of EVs are remedied.

Consequences of a Lack of Access to and Usage of Electric Vehicles in Charlottesville

The impacts of carbon emissions will be felt globally; however, reports including the National Climate Assessment have shown that low-income communities – both urban and rural – will be disproportionately impacted by climate change relative to other higher-income communities (Fourth National Climate Assessment, 2018). The impacts of carbon emissions and lack of access to sustainable methods of transportation do not only differ by socioeconomic status but are also dispersed by race. On average, U.S. households earning less than $25,000 spend 50% of their income on gas-powered vehicle ownership and operation annually, whereas median-income vehicle-owning households spend only 16% of their income on the same expenses (Bauer et al., 2021). Charlottesville is not independent of these findings, as the median income for Black households in Charlottesville is $26,000 compared to the average median income of white households in Charlottesville which is $62,000 (Household income in Charlottesville, Virginia, 2022).



Bauer, G., Et. Al. (2021, February). *When might lower-income drivers benefit from electric vehicles? Quantifying the economic equity implications of electric vehicle adoption*. International

Charlottesville has a history of displacement of Black communities which has worsened access to reliable, sustainable, and affordable transportation. The lack of EV charging stations beyond the University disproportionately effects Black and low-income individuals. The forced reliance on gas-powered vehicles in Black and low-income communities only furthers the cycle of inequality of access to sustainable modes of transportation and forces members of lower-socioeconomic communities to spend more money on gas and vehicle upkeep. All vehicle owners are contributing to the climate crisis; however, the impacts of carbon emissions are felt most by individuals who have the least ability to adapt.

Existing Evidence:

The following section examines evidence on possible and proposed solutions to the lack of access to and usage of EVs on a university, city, state, and national level.

University Partnerships with Electric Vehicle Companies to Create EV Carpooling and Charging Networks

In recent years, many colleges and universities have made an effort to electrify their campuses. Partnerships with local and national EV companies and non-profit organizations have helped to expand access to and usage of EVs across the country. The University of Wisconsin-Madison and Michigan State University recently partnered with EV companies to expand their university owned fleets in an attempt to decrease carbon emissions at the universities (Ascedia, 2021; Bullion, 2022). Michigan State University was able to expand its fleet by 40 vehicles and introduce comprehensive and upgraded charging infrastructure on its campus with a goal of increasing the University's fleet by 369 vehicles over the next decade (Bullion, 2022).

Clemson University has also entered into partnerships with multiple EV car manufacturers in an attempt to develop a workforce that can build and service EVs as they grow to become a dominant mode of transportation (Clemson University, 2022). Clemson's partnership goes beyond expanding the University's fleet and attempts to make lasting cultural and educational changes at the University. The University of Alabama has introduced a similar program to Clemson's, by partnering with Mercedes-Benz U.S. International, Inc. to form a research and workforce development center (University of Alabama, 2021). The partnership at the University of Alabama has led to innovative research on crucial EV topics such as cell chemistry, with the workforce researching advanced battery materials in hopes of creating a battery that has a 300-mile range and can be fully charged within 15 minutes (Alabama Mobility and Power Center, 2022).

Many of these universities are driven to partner with EV companies due to the realization that carbon emissions from transportation make up a large – and often the largest – portion of the school's total emissions. The University of Buffalo recently committed to increasing usage of EVs and charging stations upon the realization that transportation was the University's largest source of carbon emissions (University of Buffalo, 2021). The University of Buffalo was able to partner with National Grid and ChargePoint to offer additional charging stations for EV users (University of Buffalo, 2021). At the start of 2021, the University of Buffalo had 33 charging spots, and within six months, EV driver commuting increased by 206% (Chargepoint helps University at Buffalo Advance Net-Zero Emissions Goal, 2022).

The University of California at San Diego (UCSD) has also partnered with innovators in the EV space such as Nuuve and EVgo to build one of the most diversified charging networks in the country, leading to the creation of programs such as the Intelligent EV Integration (INVENT) project which aims to demonstrate the real-world benefits of advanced Vehicle-Grid Integration applications for EVs (UC San Diego, 2022; UC San Diego Transportation, 2022). These partnerships have helped advance not only EV adoption, but also EV innovation.

Provision of Tax Credits and Subsidies to Increase Access to Electric Vehicles

Tax credits and subsidies have long been used by governments to increase prosocial behaviors. Recently, many states have introduced tax incentive program for EV drivers. Currently, in Virginia, the Virginia Department of Mines, Minerals, and Energy is authorized to administer a rebate program for the purchase of a new or used EV up to $2,500, with an additional rebate of $2,000 for individuals whose household income does not exceed 300% of current poverty guidelines (Virginia Laws and Incentives, 2022). Colorado has taken tax incentives one step further and offers tax credits ranging from $1,500 to $8,000 for different models of EV's as well as for EVs that are purchased and leased (Colorado Laws and Incentives, 2022).

While Virginia and Colorado offer some of the country's most comprehensive tax incentives for EV drivers, 47 states have some sort of EV of tax incentive (Igleheart, 2022). Tax credits are not limited to the state level, as on a national scale, the federal EV tax credit was recently renewed with the passage of the *Inflation Reduction Act* (Vincent, 2022). The new EV incentives in the *Inflation Reduction Act* provide a tax credit of up to $7,500 for a new EV and $4,000 for the purchase of a used EV.

Broadly, state and federal tax credits are successful in increasing sales of EVs. A 2018 study found that in the United States, $1000 in rebates for the purchase of an EV corresponded to an increase of 2.6% in sales of EVs, and a $10,000 incentive indicates an average increase in EV registration of 26% (Jenn, 2018). Many studies have found a positive relationship between green incentives and EV demand, including an analysis of 30 countries which found a positive and statistically significant relationship between financial incentive such as tax credits and EV adoption (Chandra, 2022; Sierzchula, 2014). Globally, the total financial incentives from 2013 to 2020 amounted to $43 billion in the top 13 EV markets and were responsible for inducing nearly 40% of total EV sales during that period (Foster, 2021).

While financial incentives increase overall adoption of EVs, they also offer support to historically marginalized and underrepresented groups. Immediate rebates on EVs have significantly larger effects for lower-income households, used vehicle buyers, and buyers with lower budgets (Roberson and Helveston, 2022). A recent study found that while a majority of plug-in EV (PEV) tax credits go to the wealthiest buyers, a more equitable distribution of tax credits to buyers with lower incomes may have been more effective at increasing overall PEV adoption (Roberson and Helveston, 2022). Additionally, surveys have found that financial incentives were not an important decision factor for purchasers of high-end PEVs but were significantly important for purchasers of lower-end PEVs (Hardman and Tal, 2016).

The above research supports the intuition that tax incentives are a proven and successful method with which to increase usage of and access to EVs for individuals of all socioeconomic, racial, ethnic, and geographic backgrounds.

Creation of Informational Campaigns Surrounding Benefits of Electric Vehicles to Increase Usage

With the rise of social media and mainstream news media, informational campaigns have become increasingly popular in educating the public on new and emerging technology and social issues. Informational campaigns have been proven to increase prosocial behavior. A review of 34 studies conducted in low-, middle-, and high-income countries found that information was necessary to motivate behavior change (Poverty Action Lab, 2021). With regards to EVs, informational and educational campaigns have played a curial role in many organizations attempts to increase access to and usage of EVs. M.J. Bradley & Associates, an environmental consulting service, has created various EV educational and outreach toolkits in an attempt to disseminate information regarding EV usage and adoption on a corporate and governmental level (EV Hub, 2021).

The Greenlining Institute, Electrification Coalition, and Forth – all non-profit organizations aimed at increasing access to EVs – have created equity and educational toolkits and hosted access conferences that share information regarding purchasing incentives, financial assistance, and community outreach (Electrification Coalition, 2021; Forth, 2022; The Greenlining Institute, 2020). An Austin-based initiatives called Plug-In Austin has begun educating the city and its surrounding areas about EVs and their benefits. Plug-In Austin has introduced interactive activities such as panels and community conversations to encourage active engagement with EVs and their benefits (Austin Energy, 2022). By streamlining access to educational recourses about EVs, organizations can and have increased community understanding of the financial, environmental, and health benefits of EVs.

The usage of informational campaigns is seen as necessary by innovators in the EV market. A survey conducted with more than 5,000 participants found that on average the mobility confidence index for battery-EVs is 55 – meaning participants had a neutral level of confidence about the future of battery-EVs (Lambert, 2019). However, 40% of individuals who had had access to an EV said they would consider purchasing or leasing one, with 78% noting that tax subsidies or credits would factor into their purchase decision (J.D. Power, 2019; Lambert 2019).

Broadly, this research suggests that an increase in education surrounding access to EVs, and possible financial incentives could drastically increase adoption of EVs. Education campaigns have and will play a crucial role in further adoption and success of EVs.

Enhancing Charging Station Density to Increase Electric Vehicle Adoption

A major barrier to the broad adoption of EVs is the lack of comprehensive charging networks across the country (Anastasiadou and Gavanas, 2022). Without access to sufficient and affordable charging stations EV adoption will stall. However, literature surrounding increased density of EV charging stations has found that with an increase in the number of charging stations, there is also an increase in the adoption and usage of EVs. A 2022 study that found that

increases in the density of battery electric vehicle (BEV) charging stations increased intent to purchase a BEV by 8 percentage points in Las Angeles California (White et al., 2022).

Another study examining the key factors affecting EV adoption by consumers noted that investment in public charging infrastructure was crucial for policies encouraging EV adoption globally (Anastasiadou & Gavanas, 2022). This finding is complemented by another study concluding that increasing the interoperability of charging stations could lead to an increase in PEV sales as well as an increase in the vehicle miles traveled (VMT) by PEVs (Hardman Et Al., 2018). The University of Buffalo has exemplified these findings, as an increase in charging capabilities was associated with an EV driver commuting increase of 206% in six months (Chargepoint helps University at Buffalo Advance Net-Zero Emissions Goal, 2022).

Improving charging density does not only increase the adoption and usage of EVs but leads to increased efficiency of EVs. A 2018 study found that an initiative to build 50,000 direct current (DC) fast charging stations across the country was associated with an 8% increase in electrified mileage by 2050 (Levinson and West, 2018). Broadly, the evidence suggests that with increased EV charging station density, an increase in usage of EVs is likely to follow. By delivering comprehensive charging infrastructure nations, states, and localities can increase the adoption of EVs.

Literature Limitations

While examining solutions to lack of access to and use of EVs it was apparent that research surrounding the benefits of EVs was plentiful. Case studies ranged in publication date, but findings held steady across time. However, some literature only contained preliminary findings but held hopeful sentiments for continued success of university/EV partnerships. Overall, the literature provided a comprehensive analysis of solutions to the lack of access to and use of EVs on a global, national, city, and university level.

Evaluative Criteria:

When evaluating the following alternatives, I considered three criteria: 1) cost-effectiveness; 2) equity; and 3) administrative feasibility. All are ranked on a scale of low, moderate, or high. All criteria are equally weighted as requested by EVHybridNoire. Policy alternatives evaluated include:

1. Creating of a public/private carshare partnership between UVA, EVHybridNoire and an electric vehicle company.
2. Advocating for the expansion of the Charlottesville EV Charger Mini-Grant.
3. Working with UVA Sustainability and on-grounds organizations to implement an informational campaign surrounding EV tax credits, subsidies, and benefits for EV drivers.

Cost-Effectiveness

This criterion will measure the cost per gas-powered vehicle replaced by an EV in the Charlottesville and UVA communities. EVs can replace a gas-powered vehicle via the purchase of an EV, the renting of an EV, or the new availability of an EV for usage by community members. While an EV available for usage by community members may be utilized more

frequently than a personal EV, these circumstances are treated the same under the cost-effectiveness criterion as EVHybridNoire is currently focused on increasing usage and prevalence of EVs through all avenues.

Cost-effectiveness will be calculated by dividing the cost of the program by the number of gas-powered vehicles replaced by EVs in the Charlottesville/UVA communities – where a lower cost per vehicle signals higher cost-effectiveness.

Equity

Equity will measure the degree to which an alternative targets a policy towards historically underserved and marginalized groups. Underserved and marginalized groups include individuals of ethnic and racial backgrounds that have been historically oppressed through social, economic, and governmental institutions. In the context of EVs, historically marginalized groups have often been left-out of e-mobility conversations and thus have seen the adverse effects of gas-powered vehicles and the pollution, health effects, and environmental challenges associated with continued and persistent usage of fossil fuels. Thus, this criterion aims identify how well a policy alternative targets the marginalized groups that have not seen or experienced the benefits of EVs.

Equity will be measured by looking at demographic distributions in the areas in which each policy alternative is being introduced. Policy alternatives can receive a maximum of 2 points based on the following requirements.

1. Location of Alternative
    a. 1 point if policy is easily accessible by marginalized groups
    b. ½ point of policy is moderately accessible by marginalized groups
    c. 0 points of it is inaccessible by marginalized groups
2. Demographics (based upon aggregate data of all marginalized groups)
    a. 1 point if policy is targeted towards a community with ≥15% (on average) marginalized group membership
    b. ½ point if targeted towards community with ≥ 10% and <15% marginalized group membership
    c. 0 points if targeted towards community with < 10% marginalized group membership

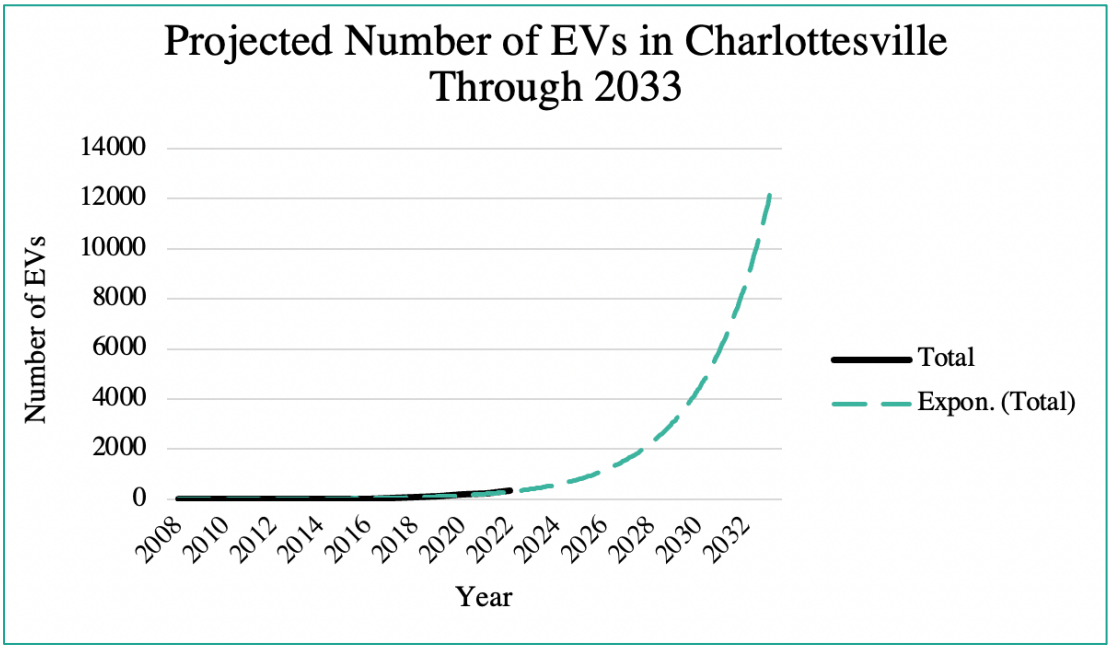
Administrative Feasibility

Administrative feasibility will measure the ease with which a policy alternative could be implemented in the Charlottesville/UVA communities given funding, personnel, space, and time constraints. Administrative feasibility will be measured by considering four factors: 1) direct monetary investment required; 2) infrastructural change required; 3) necessary logistics; and 4) timeline of rollout. A highly feasible policy would score low on all four categories listed above.

1. High Administrative Feasibility = Low scores on 3 or more measures
2. Moderate Administrative disability = Low scores on 2 measures
3. Low administrative feasibility = Low scores on 1 or no measures

Alternatives:

As of 2022, there were only 355 EVs registered in Charlottesville, VA (Virginia Electric Vehicle Registration, 2022). However, the number of EVs registered is expected to rise in the region in the coming years (Thomas Jefferson Planning District Commission, 2021). As of 2019, there were roughly 10,000 EVs registered in Virginia, this number is expected to grow to 10 million by 2050 (Thomas Jefferson Planning District Commission, 2021). If trends hold, by 2033, Virginia is expected to have nearly 1 million EVs registered with roughly 12,000 EVs in the Charlottesville community. These predictions are based upon Charlottesville EV registration data from 2012-2021. The predictions forecast 10 years into the future as to align with the 10-year time frame of each alternative. The following policy alternatives aim to advance and accelerate these predicted trends within the Charlottesville and UVA communities.



Virginia Electric Vehicle Registration. Drive Electric VA. (2022). Retrieved September 15, 2022, from https://driveelectricva.org/why-drive-electric/ev-dashboard/

Alternative 1: Create a Public/Private Carshare Partnership

Alternative 1 recommends the implementation of a public/private carshare partnership between UVA, EVHybridNoire and an EV company. The partnership would be facilitated by EVHybridNoire and include a private partner organization that EVHybridNoire currently works alongside. This partner would require the capability to provide a fleet of 15 – 20 EVs, cover maintenance costs, and provide charging and parking infrastructure. An example of a potential partner could be one such as DashEV or EVMo – both companies that could provide UVA with access to EVs while helping with rollout and take-up of the program (Innova EV, 2021). UVA would be responsible for approval of the program, finding a location for the carshare program to be based, and providing students, faculty, and staff with information regarding the program.

To establish the partnership, EVHybridNoire would propose a comprehensive plan – similar to the one that follows – and use its experience from its Historically Black Colleges and

Universities (HBCU) programs to inform conversation with UVA and private partner stakeholders. EVHybridNoire should host members from the private partner's outreach department along with UVA leadership such as Executive Vice President and Chief Operations Officer Jennifer Wagner to discuss logistics, roll-out, and maintenance of the partnership.

After the partnership is established, the process of implementation begins. The EV carshare hub should be centrally located and accessible to all parts of UVA grounds – preferably on the top floor of UVA's Central Grounds Garage. The private partner would oversee the building of charging infrastructure with funding from UVA as well as local grants such as the Charlottesville EV charger mini-grant. The private partner would then be responsible for providing EVs at a discounted rate as well as making sure vehicle registration, titles, and insurance are in order. EVHybridNoire would work with UVA to establish a program manager who oversees and gathers data on the usage of the program.

Functionally, the program would work similarly to that of Zipcar. Students, faculty, and staff would be able to register using their UVA account information and after verification of a valid driver's license, individuals could sign up to rent the cars for a specified amount of time. The rental would be available at a discounted rate to affiliates of UVA, with the program being funded though student tuition, benefactor donations, private partner donations, and local state and federal grants for clean energy initiatives.

Alternative 2: Advocate for the Expansion of the Charlottesville EV Charger Mini-Grant

Alternative 2 recommends the expansion of the existing EV charger mini-grant program in Charlottesville. Currently, the mini-grant program aims to support an increase in the number of public EV charging stations in Charlottesville that are located near commercial and retail activities (City of Charlottesville, 2023). Interested parties are able to fill out an application for funding that ranges from $3,000 to $7,000 per station depending on the type of charging station being built (City of Charlottesville, 2023). The grant is currently limited to businesses building charging stations "located in areas where there are retail, restaurant, tourism and similar commercial and tourism-related activities within walking distance of the charging station" (City of Charlottesville, 2023).

The current parameters of the program disincentivize the building of charging infrastructure outside of urban areas. Through alternative 2, EVHybridNoire would advocate for the expansion of the mini-grant program to include the construction of charging stations in historically underserved and rural areas. EVHybridNoire would advocate for expansion of the program by authoring letters to the Charlottesville government, attending city meetings, and setting up times to speak with City officials. Substantively, EVHybridNoire would provide a plan for expansion of the mini-grant that incorporates federal funding and grants into the Charlottesville EV charger mini-grant program.

In 2021, President Joe Biden signed into law the *Infrastructure Investment and Jobs Act* that set aside $2.5 billion for the construction of EV charging infrastructure in rural and low-to-medium income communities (U.S. Department of Transportation, 2023). Alternative 2 would expand the Charlottesville mini-grant to include specialized help in applying for the Discretionary Grant

Program for Charging and Fulling Infrastructure as laid out in the *Infrastructure Investment and Jobs Act.* EVHybridNoire would work alongside the City of Charlottesville to rewrite the grant application to include a section for investors looking to build EV charging stations in rural and underserved areas.

The mini-grant program would then help facilitate the application process for investors looking for federal funds. Charlottesville's mini-grant program would not be responsible for providing funding for rural projects, but instead act as an intermediary between investors and federal funds, with the goal of expediting the grant process and encouraging investment in Charlottesville's rural areas.

Alternative 3: Create an Informational Campaign Surrounding EV Tax Credits, Subsidies, and Incentives

Alternative 3 recommends creating an informational campaign surrounding financial incentives and benefits available to individuals purchasing or renting used or new EVs in Charlottesville. EVHybridNoire would partner with UVA Sustainability, the Batten School, and on-grounds organizations such as Green Grounds. EVHybridNoire's policy team would compile and provide brief and digestible summaries of existing tax credits and subsidies available for used and new EVs. The UVA partner organizations would then use the information to create infographics, flyers, and informational seminars/discussions.

Functionally, the program would include various methods of information delivery from partner organizations for the 10-year duration of the program. UVA sustainability would be responsible for publishing information on its website as well as working with other UVA offices such as the Office of Parking and Transportation to promote the usage of EVs among students, faculty, and staff. The Batten school would promote the information through teaching talks. Batten could host events such as Fridays at Batten or Batten Hours, where EV experts and advocates come speak to students, faculty, and staff about the benefits of EVs and ways to affordably access them. EVHybridNoire could provide speakers for Batten events, such as Co-Founder and Director of EVHybridNoire Dr. Shelley Francis and other thought leaders in the EV space. Finally, on-grounds organizations would be responsible for engaging students in educational activities with EVHybridNoire.

Activities could include events such as 1) "drop-in" office hours with specialists able to help students learn more about financial options when purchasing or renting EVs; 2) ride-along fairs where EVHybridNoire would bring EVs to grounds, allowing students to experience riding in and charging EVs while learning about their benefits; and 3) the introduction of informational campaigns across grounds that include fliers, pamphlets, and posters that contain QR codes and links with easy access to documents containing information surrounding financial incentives for individuals looking to purchase EVs.

Findings:

The following section provides analysis of each proposed policy alternative based upon the evaluative criteria of cost-effectiveness, equity, and administrative feasibility.

Analysis of Policy Alternative 1: Carshare Program

Alternative 1 recommends the implementation of a public/private carshare partnership between UVA, EVHybridNoire, and an EV company.

Cost-Effectiveness

To calculate the cost-effectiveness of creating a public/private carshare partnership, I found direct costs associated with the program. One-time costs were discounted in year one (2024) and costs including maintenance, insurance, and electricity costs were discounted through year 10. All costs were discounted at a rate of 3%. Total discounted costs across the 10-year program came to $773,362.[1] Costs included:

Alternative 1: Carshare Program	
Cost	**Assumptions**
Labor	Labor costs for the installation of a level 2 charging station averaged $1,600. This program would require 20 charging stations, leading to $32,000 required for labor (Carvana, 2023).
Materials and Cars	On average, materials required for the construction of level 2 charging stations cost $600 per station. With 20 charging stations materials would cost $12,000 (Carvana, 2023). DashEV cars serve as a model car for carshare programs and cost $11,500 per car leading to a total cost of 230,000 for 20 cars (Dash EV Motors, 2023).
Maintenance	Maintenance estimates were based off of average maintenance costs of an electric vehicle per year. On average, maintenance per electric vehicle was $330 per year or $6,600 for all 20 cars per year (Dash EV Motors, 2023).
Titles, Registration, and Insurance	Title and registration costs were based upon Virginia costs. In Virginia, a titling fee costs $15, a fee sales and use tax of $75 is included, and the average registration fee comes out to $32.25 (Metromile, 2022). When applied to each of the 20 cars titles and registration costs reach $2,465 per year. Based on estimates, the average cost of insurance for an EV is $3,012 per year, leading to a total cost of $60,240 per year (Metromile, 2022).
Charging Costs (Electricity)	Charging costs were based upon average kilowatt hour (kWh) costs needed to charge an EV at a level 2 charging stations. The overage cost per kWh is $0.23 (Sharbono, 2023). We assume that each of the 20 cars will require 10 hours of charging per day, 365 days per year. Wen calculated annually for each of the 20 stations, the cost total cost becomes $16,790.
Total Cost	**Total cost in year 2023 = $360,095**

As written, this alternative introduces 20 EVs into the Charlottesville and UVA communities. However, based upon estimates of similar carshare programs, the introduction of one car in a carshare program can take 13 personally owned vehicles off the road (Zipcar, 2021). Based upon this estimate, the 20 car carshare program would take 260 gas-powered vehicles off the road to be replaced by the carshare EVs.

[1] Calculations in Appendix A

The cost-effectiveness of this program is **low** with a cost of $2,974 ($773,362/260) per gas-powered vehicle replaced by an EV in the Charlottesville and UVA communities.

Equity

The public/private carshare program directly targets the UVA community. The program would be housed in UVA's central grounds garage. While central to the University, the garage is more than 1.6 miles from the nearest prominently and historically Black neighborhood and more than 3.5 miles from the nearest prominently and historically Hispanic neighborhood (Best Neighborhood, *Race, diversity, and ethnicity in Charlottesville*, VA, 2023). These neighborhoods are also some of the lowest income areas in Charlottesville (Best Neighborhood, *The highest and lowest income areas in Charlottesville*, VA, 2023). While public transportation is available from these neighborhoods to UVA's central grounds garage, the commute can take upwards of 30 minutes. Additionally, this service would only be available to UVA affiliates, limiting the number of community members able to participate in the program. After taking these factors under consideration, this alternative receives ½ point towards the equity location criterion.

When examining the demographics targeted by this alternative, I studied UVA student, faculty, and staff racial demographics. Only 13.4% of UVA students, 6.6% of faculty, and 13.8% of staff identify as Black or Hispanic (University of Virginia, 2020). When averaged, 11.3% of UVA affiliates are of a marginalized background. Since this alternative exceeds the 10% threshold required by the equity demographics criterion, it receives ½ point.

With a final score of 1 point, this alternative ranks **moderately** on the equity criterion.

Administrative Feasibility

Based upon projected costs from the cost-effectiveness criterion, the direct monetary investment required to implement a carshare program is high. Additionally, the infrastructural change associated with the program is high, as construction of 20 charging stations will change the make-up and layout of UVA's central grounds garage. Necessary logistics are high, as projected steps for implementation of carshare programs alone can take months as insurance, titles/registration, training, and infrastructure adaptation is required (DiNello, 2022). The program's rollout time is also high, as construction permits can take up to a year to be issued (Sheaffer Construction, 2022). Additionally, construction of charging stations can take months and the final program may need to be tested by a small number of individuals before it is made freely accessible.

Since this alternative ranks highly on all measures of administrative feasibility, it has **low** associated administrative feasibility.

Analysis of Policy Alternative 2: Expansion of Charlottesville's EV Charger Mini-Grant

Alternative 2 recommends the expansion of the existing Charlottesville EV charger mini-grant program.

Cost-Effectiveness

To calculate the cost effectiveness of expanding the Charlottesville EV Charger Mini-Grant program, I found direct costs associated with the program. All costs were discounted at a rate of 3% for the 10-year duration of the program. Total discounted costs across the 10-year program came to $618,420.[2] Costs included:

Alternative 2: Mini-Grant Expansion	
Cost	**Assumptions**
Labor (grant consultant):	Labor costs for a federal grant consultant were based upon the average salary for this position in Virginia which was estimated to be $58,060 per year (ZipRecruiter, 2023).
Educational Training	Educational training costs were based upon cost estimates of on-line/virtual federal grant training modules/services. The average cost of these trainings was roughly $300 per person (assuming two employees will participate) (Fechter, 2023).
Travel	Travel costs were based upon average mpg for vehicles and train tickets from Washington D.C. for two EVHybridNoire employees. The averaged costs were found to be $130 for two individuals completing 4 trips per year (Wanderu, 2023).
Building Costs (materials and labor):	On average, materials required for the construction of level 2 charging stations cost $600 per station. With 21 charging stations materials would cost $12,600 (Carvana, 2023). Labor costs for the installation of a level 2 charging station averaged $1,600. This program would require 21 charging stations, leading to $33,600 required for labor (Carvana, 2023).
Total Cost	**Total costs in 2023 = $104,989**

To calculate the number of gas-powered vehicles replaced by EVs this alternative introduces into the community, I referenced a 2022 study that found that increases in the density of battery electric vehicle (BEV) charging stations increased intent to purchase a BEV by 8 percentage points (White et al., 2022). Based on the study's findings, the 8-percentage point increase was associated with a 15% increase in intent to purchase a BEV.

Since the mini-grant's inception in 2013, Charlottesville has seen an increase of 21 charging stations over a 10-year period with 14 installed in the past 3 years (Thomas Jefferson Planning District Commission , 2021). Based upon the past 10-years of exponential EV charging station growth as well as statewide predicted trends, we can assume that expansion of the grant program will accelerate this growth over the next 10 years, leading to the doubling of Charlottesville's current EV charging infrastructure and density.

The doubling of Charlottesville's charging density would result in a total of 42 EV charging stations available in the community. We can assume that this number of charging stations can sustain predicted EV trends until exponential growth is reached. Once exponential growth begins

[2] Calculations in Appendix B

it is likely that Charlottesville's charging infrastructure would have minimal impact on the purchase of new EVs and we will likely see diminishing marginal returns on investment with respect to charging stations increasing EV adoption. The EV projections through 2033 show exponential growth beginning in 2026, with roughly 1,500 EVs in the Charlottesville community at that time. Assuming that the 15% increase in intent to purchase holds as well as projected linear trends, this alternative would replace 225 (1,500*.15) gas-powered vehicles with EVs in the Charlottesville and UVA communities over the 10-year duration of the program.

The cost-effectiveness of this program is **low** with a cost of $2,749 ($618,420/225) per gas-powered vehicle replaced by an electric vehicle in the Charlottesville and UVA communities.

Equity

Expansion of the EV Charger Mini Grant directly targets rural areas surrounding Charlottesville. Charging stations would be placed along alternative fuel corridors that have already been designated by the federal and state governments (U.S. Department of Transportation, 2023). I-64 has been designated as an alternative fuel corridor (Virginia Clean Cities, 2016). Since this is the nearest alternative fuel corridor to Charlottesville and its surrounding areas, most applications for federal rural grants will be for charging stations along I-64. I-64 runs through the center of Albemarle County, around the outskirts of Charlottesville. While I-64 covers a long stretch of the county, it does not run through predominantly Black or Hispanic areas. A majority of marginalized groups live in the southeastern part of the county, more than a 30-minute drive to I-64 with limited public transportation options available (Virginia Department of Transportation, 2023). Due to the lack of accessibility to I-64, the primary location of expanded charging stations, this alternative receives a 0 on the location equity criterion.

Since this alternative expands access to charging stations beyond the immediate Charlotteville and UVA communities, I considered Albemarle County's demographics. 9.3% of Albemarle County's residents are Black and 5.6% are Hispanic (Statistical Atlas, 2023). In total, 15% of Albemarle residents belong to a marginalized racial/ethnic group (Statistical Atlas, 2023). Since this alternative exceeds the 15% threshold required by the equity demographics criterion, it receives 1 point.

With a final score of 1 point, this alternative ranks **moderately** on the equity criterion.

Administrative Feasibility

Based upon projected costs from the cost-effectiveness criterion, the direct monetary investment required to expand the Charlottesville EV Charger Mini-Grant program is high. Additionally, the infrastructural change associated with the program is high, as construction of multiple charging stations will change the make-up and layout of the greater Charlottesville area. Necessary logistics are moderate, as there are five projected steps for implementation of EV charging stations (DiNello, 2022). Additionally, Charlottesville would need to hire a grant consultant, conduct trainings, and revamp the existing website. Finally, the program's rollout time is also moderate, as once a grant consultant is hired, the program can start immediately.

Since this alternative ranks low on two measures of administrative feasibility, it has **moderate** associated administrative feasibility.

Analysis of Policy Alternative 3: Informational Campaign

Alternative 3 recommends creating an informational campaign surrounding financial incentives and benefits available to individuals purchasing or renting used or new EVs in Charlottesville.

Cost-Effectiveness

To calculate the cost effectiveness of introducing an informational campaign surrounding tax credits and subsidies for EV drivers I found direct costs associated with the program. All costs were discounted at a rate of 3% for the duration of the 10-year program. Total costs came to $32,962.[3] Costs included:

Alternative 3: Informational Campaign	
Cost	**Assumptions**
Labor	Labor for office hour associates based upon hourly salaries of financial advisors. This came to $29 an hour for two associates for two hours a week for 30 weeks of the semester, totaling $3480 per year (Salary.com, 2023).
Materials	Materials required for Batten Hour and organizational campaigns on grounds. Materials totaled $1,135 based upon costs of printing informational materials and food for individuals attending Batten Hours (UVA Library, 2023).
Travel and Accommodation	Travel and accommodation for EVHybridNoire employees hosting ride along events in Charlottesville. This data was based upon average hotel costs for two people in Charlottesville as well as transportation from DC. This totaled $981 (Momondo, 2023).
Total Cost	**Total costs in year 2023 = $5,596**

To calculate the number of gas-powered vehicles replaced by EVs this alternative introduces into the community I referenced a 2018 study that found that $1000 in rebates for the purchase of an EV corresponds to an increase of 2.6% in sales of EVs, and a $10,000 incentive indicated an average increase in EV registration of 26% (Jenn, 2018). An additional study found that people who receive information about EVs appear more likely to buy an EV than those who do not receive information (Broadbent et al., 2019). Based on these key assumptions I was able to assume that the 2.6% sales increase will hold in Charlottesville. This finding is scalable up to $10,000 in rebates with an associated increase in EV sales of 26%. Policy alternative 3 would provide data on EV incentives up to $7,500 which, based on the 2018 study, would be associated with a 19.5% increase in EV sales.

Currently, there are 355 EVs registered in Charlottesville. We expect the program to have a positive impact on the introduction of EVs over the 10-year time-period as individuals exposed to information may opt to purchase an EV after graduation from UVA or throughout their time in Charlottesville. If projected trends hold, we can assume that the informational campaign would increase the number of EVs above the projected status quo – 12,000 EVs. Based upon the assumption that the informational campaign would be associated with a 19.5% increase in EV sales, we expect that this alternative would replace 2,340 (12,000*0.195) gas-powered vehicles with EVs in the Charlottesville and UVA communities as a result of the 10-year program.

[3] Calculations in Appendix C

The cost-effectiveness of this program is **high**, with a cost of $14 ($32,962/2,340) per gas-powered vehicle replaced by an EV in the Charlottesville and UVA communities.

Equity

The informational campaign targets the UVA and Charlottesville communities. The program would be based upon a University/EVHybridNoire partnership, but events and information would encourage community participation. The partnership would encourage community events and hold informational sessions in community centers as well as disseminate information to community leaders and members. Annually, roughly 50 events would be held, with 30 office hour events, 4 Batten Hour events, and roughly 15 to 20 on-grounds events ranging from ride-along days to club informational sessions, to tabling events on the lawn and in community centers.

Over the 10-year timeline, the campaign will be expanded to community centers as Charlottesville and UVA build lasting relationships with EVHybridNoire and its partner organizations. Since information is easily accessible to all Charlottesville and UVA community members there are minimal locational barriers. UVA sponsored informational and interactive campaigns, such as the "For All of Us" campaign that focused on masking during COVID-19, have been successful in the greater Charlottesville Community (University Communications, n.d.). Thus, this alternative receives 1 point for the location equity criterion.

While examining the demographics targeted by this alternative, I studied UVA student, faulty, and staff racial and socioeconomic demographics and general Charlottesville demographics. When averaged, 11.3% of UVA affiliates are of a marginalized racial/ethnic background (University of Virginia, 2020). In the broader Charlottesville area, 23.7% of community members are of Black or Hispanic backgrounds (U.S. Census Bureau, 2022). When averaged, the campaign targets communities with 17.5% marginalized group membership. This is above the 15% threshold required by the equity demographics criterion, thus receiving 1 point.

With a final score of 2, this alternative ranks **highly** on the equity criterion.

Administrative Feasibility

Based upon projected costs from the cost-effectiveness criterion, the direct monetary investment required to implement an informational campaign is low. Additionally, the infrastructural change associated with the program low, as there is no infrastructural change necessary to implement this program. Necessary logistics are moderate, as coordination across EVHybridNoire, UVA, the partner schools, and on grounds organizations would need to be established and sustained throughout the partnership. Finally, the program's rollout time is moderate, EVHybridNoire will have to spend time creating partnership plans and proposing its initiatives to UVA sustainability. Additionally, EVHybridNoire will have to compile information to be disseminated by partner organizations. While the program itself can be implemented quickly, the initial steps required to organize the UVA/EVHybridNoire partnership may be timely due to administrative logistics.

Since this alternative ranks low on two measures of administrative feasibility, it has **moderate** associated administrative feasibility.

Outcomes Matrix:

	Alternative 1: Carshare Program	Alternative 2: EV Charger Mini-Grant	Alternative 3: Information Campaign
Cost-Effectiveness	Low ($2,974)	Low ($2,749)	High ($14)
Equity	Moderate (1)	Moderate (1)	High (2)
Administrative Feasibility	Low	Moderate	Moderate

Recommendation:

Based upon performance on all three evaluative criteria – cost-effectiveness, equity, and administrative feasibility – I recommend that **policy alternative 3**, work with UVA Sustainability and on-grounds organizations to implement an **informational campaign** surrounding EV tax credits and subsidies for drivers, be implemented. Policy alternative 3 ranks the highest on two of the criteria – cost-effectiveness and equity. Policy alternatives 2 and 3 both have moderate associated administrative feasibility, however, alternative 3 requires no infrastructural change and will likely be more easily accepted by partner organizations, UVA, and the City of Charlottesville. The lack of infrastructural change is associated with the high cost-effectiveness of policy alternative 3. Given budgetary constraints, this alternative presents an effective and non-costly path towards increasing the usage of and access to EVs in the Charlottesville and UVA communities.

It is important to note that this alternative is a 10-year program, and effects will likely be incremental from the onset of the program. However, given financial, time and infrastructural constraints of both EVHybridNoire and the UVA and Charlottesville communities, this alternative provides the most cost effective and equitable path towards increasing the usage of and access to EVs in Charlottesville.

Implementation:

Overview

While policy alternative 3 – work with UVA Sustainability and on-grounds organizations to implement an informational campaign surrounding EV tax credits and subsidies for drivers – has moderate associated administrative feasibility, there will likely be challenges in the implementation of the program. EVHybridNoire may face partnership and engagement challenges as the implementation of the informational campaign progresses. The success of an informational campaign depends on the willingness and ability of partner organizations to work alongside EVHybridNoire as well as the willingness of UVA and Charlottesville community members to engage with the informational material. However, by highlighting these potential implementational problems in advance, EVHybridNoire can take steps to mitigate these implementational issues as outlined below and create a lasting and impactful informational campaign.

Stakeholders

EVHybridNoire

EVHybridNoire will serve as both an implementation manager and an implementation fixer throughout the informational campaign. EVHybridNoire will be responsible for initiating the partnership with UVA Sustainability, on-grounds organizations, and the Batten school. EVHybridNoire will also be responsible for providing speakers and experts on the topic of EV tax rebates and subsidies as well as providing the different entities with information surrounding tax rebates and subsidies available for individuals who purchase and rent EVs. EVHybridNoire already has this information on hand through sources such as its "Advancing Transportation Electrification in Diverse Communities" toolkit but could explore partnerships with UVA research institutions such as psychology and leadership labs in order to explore the best methods of research and information delivery (Ezike, 2021). EVHybridNoire will provide personnel responsible for hosting "office and advising hours" for students, faculty, staff, and community members looking to learn more about the benefits of EVs.

UVA Sustainability

UVA Sustainability will serve as the primary UVA and Charlottesville community implementation manager and fixer, as they will oversee the student organizations, volunteers, and on-the-ground logistics of the informational campaign. UVA Sustainability will be responsible for piloting the implementation of this informational campaign on grounds. UVA Sustainability will need to publish the information provided by EVHybridNoire on its website under the "Programs & Services" and "Take Action" pages (UVA Sustainability, 2023). UVA Sustainability will be responsible for coordinating efforts and events with both EVHybridNoire as well as on-grounds organizations. Finally, UVA Sustainability will serve as the central hub for information and questions for all participating organizations, schools, students, and community members.

On-Grounds Organizations

On-Grounds Organizations will serve as the primary implementation doers for the informational campaign, as they will be on-grounds agents providing the information to students, faculty, staff, and community members. These organizations will be responsible for holding tabling events on-grounds and within the community, working with EVHybridNoire to publicize information

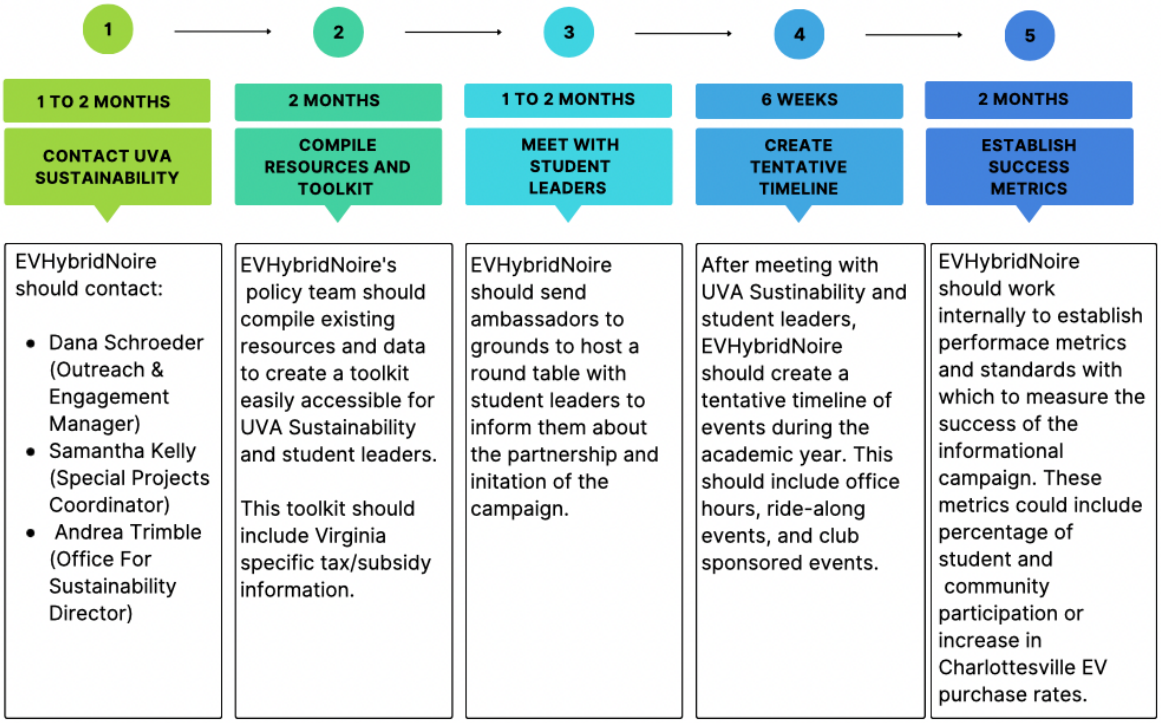
surrounding ride-along and other interactive events, and serving as ambassadors to students and community members with questions regarding the benefits, financial incentives, and environmental impacts of investing in EV.

The Frank Batten School of Public Policy and Leadership

The Batten School will serve as another implementation doer during the informational campaign. The Batten School will be responsible for working with EVHybridNoire to host thought leaders and experts in the EV space and facilitate seminars and discussions surrounding the benefits of investing in EVs on the personal, local, state, and national levels. The Batten School will work alongside EVHybridNoire to make sure students are being exposed to information about EVs and their benefits in an informal and constructive environment.

Next Steps

EVHybridNoire should focus on the below five steps when moving towards implementation of the informational campaign. These steps are ordered chronologically and are all necessary before the informational campaign can be rolled out to the UVA and Charlottesville communities (Velasquez-Hague, 2022; PSA Worldwide, 2022; Stafix, 2020).



Potential Challenges and Hurdles

The success of the informational campaign depends heavily upon the willingness of both the UVA partners to work with EVHybridNoire as well as the willingness of UVA and Charlottesville community members to engage with the campaign and its associated events. Under a worst-case scenario, UVA entities do not agree to partner with EVHybridNoire, and initiation of the informational campaign fails. While it is highly unlikely that all UVA entities

would reject a partnership with EVHybridNoire, there may be administrative barriers to potential collaboration that could delay or dissuade organizations from partnering with EVHybridNoire. To prepare for this worst-case implementation scenario, EVHybridNoire should identify local Charlottesville non-profits, non-governmental organizations, or EV manufactures/sellers that align with their interests and could serve as partners for a community based informational campaign. There are a plethora of these organizations in the UVA/Charlottesville communities including Virginia Clean Cities, the City of Charlottesville's sustainability initiatives such as the "A Green City" program, and Generation180 – a nonprofit that has already hosted informational campaigns and events surrounding EV usage in the Charlottesville community (Holmes, 2021).

The second worst-case scenario is that students and community members do not engage with the informational campaign. While UVA has had a history of success with many of its informational campaigns including the "For All of Us" campaign and the "Green Dot, Red Dot" campaign, EVHybridNoire cannot force engagement in a campaign (UVA Women's Center, 2017; University Communications, n.d.). Thus, EVHybridNoire should work over the course of the 10-year program to engage the community by starting with a small number of individuals or groups such as UVA's student run Green Grounds or EcoNetwork clubs. From here, EVHybridNoire can expand its reach as the program progresses. If engagement is low at the inception of the program, EVHybridNoire should work to make incremental progress, build name recognition, and find allies amongst community leaders.

Replication

The implementation and success of an informational campaign is heavily dependent upon buy-in from the target communities. EVHybridNoire should focus on creating lasting relationships with the UVA and Charlottesville communities to ensure a smooth and impactful roll-out of the informational campaign. Managing the various stakeholders, steps, and events associated with the information campaign may prove to be an administrative burden, however, the division of labor between EVHybridNoire, UVA Sustainability, on-grounds organizations, and the Batten School allows for multi-pronged oversight of the program and will prove useful in identifying inefficiencies throughout the life of the program. By creating meaningful relationships, managing important stakeholders, and detailing the successes and failures of the program, EVHybridNoire can develop an informational campaign action plan that can be taken and replicated at colleges and universities across the country.

Conclusion:

The lack of access to and usage of EVs in the Charlottesville and UVA communities has not only impeded the city's ability to reduce its carbon emissions, but the lack of EVs has also contributed to continued pollution and adverse health effects felt in low-income and minority neighborhoods. In order to advance its carbon emissions reduction goals and improve the overall environmental and physical health of its citizens, the City of Charlottesville and UVA communities must work to implement an informational campaign surrounding the incentives and benefits associated with the purchase, renting, and usage of EVs.

With the implementation of an informational campaign, the City of Charlottesville and UVA can accelerate the adoption of EVs in the community and serve as a model for other university and college towns as well as localities, cities, and states across the country.

Appendix:

Appendix A:

Alternative #1: Carshare Program Discounted Costs (3%) PV/(1+r)^n											
2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
$360,095.0	$349,606.8	$78,829.3	$72,140.0	$64,095.4	$55,289.3	$46,303.9	$37,649.3	$29,720.7	$22,778.5	$16,949.3	$773,362.5

Appendix B:

Alternative #2: Expansion of Charger Mini-Grant Discounted Costs (3%) PV/(1+r)^n											
2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
$104,989.0	$101,931.3	$96,080.0	$87,926.8	$78,121.8	$67,388.6	$56,436.9	$45,888.3	$36,224.7	$27,763.2	$20,658.4	$618,420.0

Appendix C:

Alternative #3: Informational Campaign Discounted Costs (3%) PV/(1+r)^n											
2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	Total
$5,596.0	$5,433.0	$5,121.1	$4,686.6	$4,163.9	$3,591.9	$3,008.1	$2,445.9	$1,930.8	$1,479.8	$1,101.1	$32,962.2

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