

STUDENT ORGANIZATION SUSTAINABILITY INITIATIVE PROPOSAL FORM

Part I- General Information:

Name of Student Organization	Virginia Tech Office of Sustainability
Contact/Responsible Person	Natalie Koppier
Contact Office Held/Title	2020-2021 Student Sustainability Intern Energy Team Leader
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Part II- Project Cost Information

Estimated Cost of this Proposal See III.C. below

Estimated Savings - See III.D. below

Net Cost of this Proposal =

Part III- Supporting Information

A. Please describe your sustainability initiative and attach supporting documentation.

We are requesting the installation of three ChargePoint electric vehicle (EV) charging stations on Virginia Tech's campus in the Squires parking lot. An EV charging station is a terminus situated at designated parking spots which gives EV users the capability of charging their vehicle. There are 3 main levels of charging stations, each decreasing in charging time as the levels increase. A level 1 charging station takes about 22 hours to fully charge a vehicle, a level 2 charging station takes about 2 hours, and a level 3 charging station takes about 37 minutes.



Figure 1: A ChargePoint EV charging station. [Source: <https://signalscv.com/2019/11/city-installs-additional-electric-vehicle-charging-stations/>]

Based on the Electric Vehicle Master Plan (see attached), we recommend level 2 charging stations, with two ports per station (Figure 1), be installed as part of a pilot to evaluate current need and use and determine if more charging stations are needed. Level 2 charging stations are consistent with other colleges and universities as they allow multiple vehicles to be charged per day. Priority locations include: the Squires parking lot, Drillfield Drive outside Burruss Hall, the North End Center Parking Garage, the Perry Street Parking Garage, Moss Arts Center, and the Virginia Tech Visitor and Undergraduate Admissions Center parking lot. Different benefits are provided by each location, and the selected location of a charging station could be determined based on desired outcomes from the university.

Each of these locations receives varying amounts of foot and vehicular traffic from current students, prospective students, faculty, staff, visitors (more than 50,000 people visited the university in 2019), and donors. Some of these locations serve as landmarks for the university, being widely recognized by many people across the country. Placing an EV charging station in front of a well-known building would serve as a display of the university's commitment to environmental progress.

Presentations were given on March 29 and April 5, 2019 to stakeholders within Virginia Tech and the surrounding Blacksburg community to share findings of the Electric Vehicle Master Plan and to get feedback from stakeholders with varying expertise. At these presentations, the Virginia Tech Office of Sustainability intern team met with current and retired professors, current students, and representatives from Virginia Tech Electric Service, Sustainable Blacksburg, the Virginia Tech Foundation, the Virginia Tech Office of University Planning, Virginia Tech Facilities, and Virginia Tech Transportation Services. Responses from these stakeholder presentations were generally positive regarding viability and excitement about the implementation of EV charging stations on campus.

A survey sent out by the Virginia Tech Office of Sustainability intern team to faculty, staff, and students found that 65.5% of respondents agreed that providing additional EV charging stations on campus would positively influence their decision to buy or use a plug-in electric or plug-in hybrid vehicle.

The market for EVs is projected to steadily increase over the next 30 years, with a steep incline around the year 2030. EVs will begin to make up greater portions of the Light-Duty Vehicle (LDV) market in the near future (see Figures 2 and 3), thus increasing the demand for on-campus EV chargers. LDVs are vehicles that weigh less than 10,000 pounds. Since a large SUV weighs around 6,000 pounds, LDVs make up the vast majority of the consumer vehicle market.

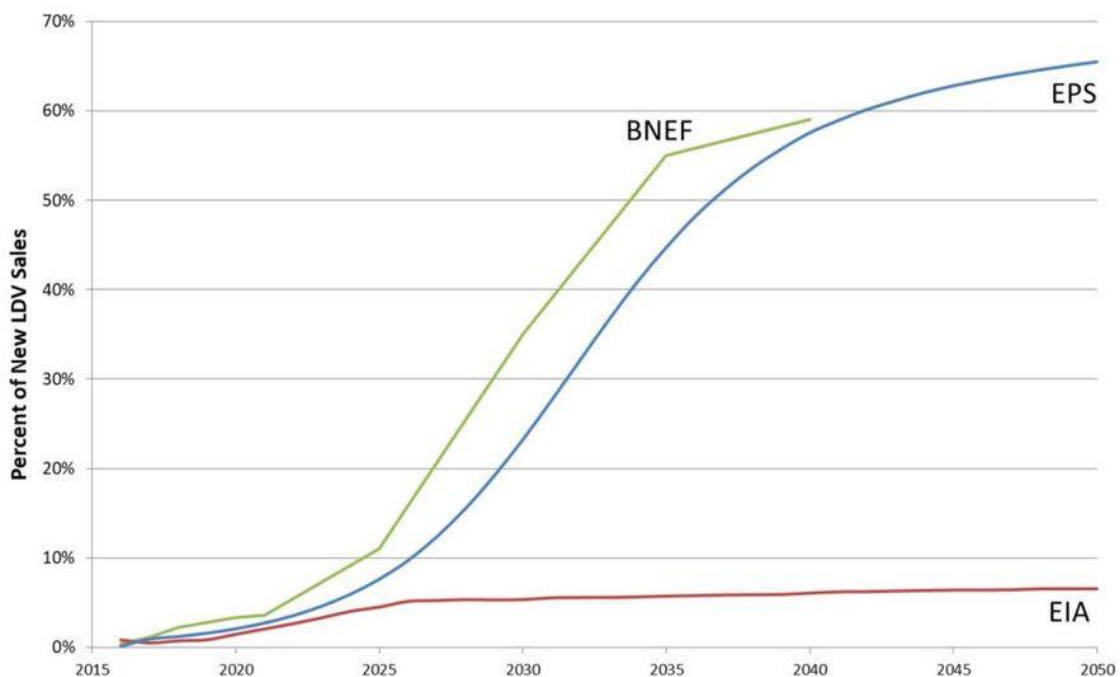


Figure 2: Projections of EV US market share from three sources: the Energy Policy Simulator (EPS), the Energy Information Administration (EIA), and Bloomberg New Energy Finance (BNEF). By 2040, EVs are predicted to make up around 60% of the entire LDV market. [Source: <https://www.forbes.com/sites/energyinnovation/2017/09/14/the-future-of-electric-vehicles-in-the-u-s-part-1-65-75-new-light-duty-vehicle-sales-by-2050/#5ff75c7be289>]

The Rise of Electric Cars

By 2022 electric vehicles will cost the same as their internal-combustion counterparts. That's the point of liftoff for sales.

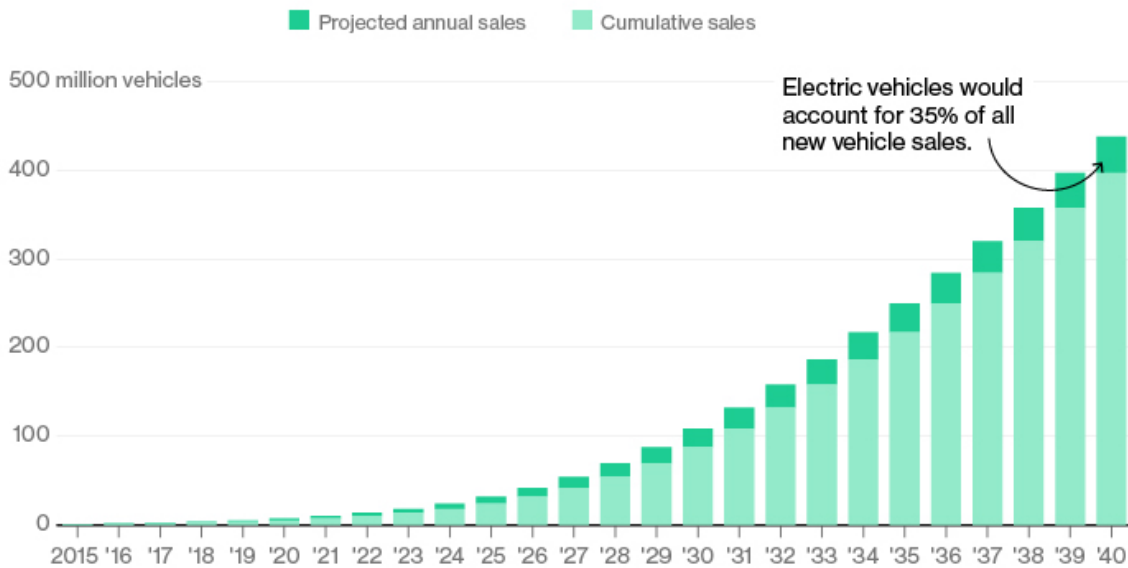


Figure 3: Projected increase in EV sales over time. [Source: <https://www.bloomberg.com/features/2016-ev-oil-crisis/>]

Figure 3 depicts a more conservative prediction of EV prevalence on the market than the Forbes prediction (see Figure 2), but it still shows a steady increase of EV use with no end in sight. It was written in 2016, and as of 2020 its prediction that EVs will be within a competitive cost range to internal combustion engine (ICE) vehicles holds true. Almost every major car manufacturer has at least one EV in their catalog. For example, Chevrolet's EV, the Bolt, is on the market beginning at \$36,620, and their roughly equivalent ICE vehicle, the Malibu, is on the market beginning at \$22,095. While the prices are over \$10,000 apart, the gap will continue to close rapidly according to Bloomberg and Forbes. With this data, it is clear that EV charging stations need to be placed on campus to keep up with demand. The rise of EVs predicted by Figures 2 and 3 indicates a need for EV charging stations on campus, and for that need to be fulfilled sooner rather than later.

Virginia Tech's student body is predicted to increase 14% by 2026, and faculty and staff employment will surely have to increase to support the additional students. This increased number of people on campus, along with the projected increase in use of EVs across the U.S., means there will be more need to support EVs as they continue to become a more popular and affordable choice in the near future.

B. How does this initiative help to achieve the goals of the Virginia Tech Climate Action Commitment Resolution and Sustainability Plan?

CAC Point 1: *Virginia Tech will be a leader in campus sustainability. Sustainability is an integral part of the fabric of the university as it pursues enhanced economic stability and affordability, diversity and inclusion, environmental stewardship expansion of knowledge, and education of future leaders.*

Universities of similar size and prestige as Virginia Tech have already incorporated EV chargers into their campuses, surpassing the efforts of Virginia Tech. For example, the University of Virginia (UVA) installed an EV charger inside of an on-campus parking garage back in 2013, according to UVAToday. Today, UVA has three

charging stations on their campus capable of charging five vehicles simultaneously. Virginia Commonwealth University (VCU) also installed four EV charging stations, with a capacity of eight EVs, inside two on-campus parking garages in 2011 according to the Richmond Times-Dispatch. Auburn University, a university similar in climate and surrounding terrain to Virginia Tech, installed 14 charging stations in 2018 according to the Auburn Plainsman. They currently have 15 charging stations on campus with the capability of charging 30 EVs simultaneously.

To maintain its goal of being a leader in Campus Sustainability, it is vital for Virginia Tech to catch up with and surpass other schools' advances in EV charging stations. In order to meet the needs of its students, faculty, and staff while also maintaining an image of not only keeping up with sustainability but rather being a leader in campus sustainability, the university should begin placing charging stations around campus as soon as possible.

CAC Point 3: *Virginia Tech will establish a target for reduction of campus GHG emissions to 80% below 1990 emission level of 188,000 tons by 2050. Interim targets from 2006 emissions of 316,000 tons will be: for 2012, 295,000 tons (on path to 2025 target); for 2025, 255,000 tons (2000 emission level); and for 2050, 38,000 tons (80% below 1990 emission level).*

By providing EV charging stations on campus, Virginia Tech would be removing one of the major roadblocks keeping students from bringing EVs to campus. Allowing for the switch for some students to the use of EVs would mean less conventional vehicles on campus and less greenhouse gas emissions from those vehicles as the university's student population - and therefore the number of personal vehicles on campus - grows. As the university continues to incorporate renewable energy sources into its power portfolio, the EV charging stations will further reduce the GHGs emitted from the Virginia Tech transportation sector. This will help the university reach its goal for reduced GHG emissions.

CAC Point 11: *Virginia Tech will improve transportation energy efficiency on campus through parking, fleet, and alternative transportation policies and practices. the university will continue to implement programs that encourage the use of alternative transportation methods and will continue to implement programs and services that promote eco-responsible fleet management.*

Installing EV chargers in parking lots on campus encourages the use of EVs by students, faculty, staff, and visitors. Additionally, incorporating EVs into Virginia Tech's fleet over time will "promote eco-responsible fleet management," but will also require installing EV chargers around campus to power them. This Green RFP is not proposing any charging stations for use by Virginia Tech fleet vehicles, but the attached Electric Vehicle Master Plan outlines the benefits of doing so, and this may be proposed in a future Green RFP.

CAC Point 13: *Virginia Tech will monitor energy use and GHG emissions as well as changing internal and external conditions, prepare an annual 'report card' showing progress towards target, and periodically re-evaluate targets, making adjustments to targets as appropriate based on changing internal and external conditions and evolving technologies.*

It is important to note that EVs are only as clean as their power source. To incorporate EVs into Virginia Tech's plan to reduce GHG emissions, it would most likely be necessary to pursue renewable energy sources on campus. Chargers themselves can be powered by renewable energy sources such as solar power but would also need to be plugged into the electrical grid at Virginia Tech.

C. What is the cost of your proposal? Please describe in adequate detail the basis for your cost estimate.

The costs detailed in the table below are for three EV charging stations in the Squires parking lot adjacent to the Bottom of the Stairs.

Item	Unit Cost	Quantity	Total
ChargePoint CT4000 EV charging station	\$8,419	3	\$25,257
Blackstone: Excavate, form and pour (3) 2'x2'x6" concrete pads (includes trenching)	\$4,200	1	\$4,200
Shively Electric: Install new 200 amp 120v/208v 3R MB panel on strut rack. Install 3 40 amp circuits using #8 THHN	\$9,920	1	\$9,920
VTEs: Supply power, frame and meter base at existing transformer	\$5,232	1	\$5,232
UBO: Permit and inspection	\$250	1	\$250
Subtotal			\$44,859
Contingency (12%)			\$5,389

Total			\$50,248
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Should the university choose to install fewer charging stations, some cost advantages would be lost. The table below details the cost per charging station if one, two, or three charging stations are installed.

Number of Charging Stations Installed	Total Cost	Cost per Charging Station
3	\$50,248	\$16,750
2	\$38,718	\$19,359
1	\$25,235	\$25,235

Additionally, there is a \$658/year cost (per charging station) for a network service plan that allows for monitoring, scheduled charging, pricing, software updates and support. Transportation Services intends to structure the pricing so the charging stations are cost neutral for the university. A summary of this information, as well as detailed quotes, are attached to this proposal.

D. Will your proposal produce cost savings for the University? If so, how much? Please describe in adequate detail the basis for your savings estimate.

The installation of EV charging stations would help bolster the university's reputation as a leader in campus sustainability, improving the school's image. This improved image may lead to more and new support from donors and supporters of the university as they see the campus continue to progress towards a more sustainable state. Improving the university's sustainability image could also lead to more students applying to and attending Virginia Tech. Additionally, by adding EV charging stations and improving its overall sustainability rating, Virginia Tech could end up receiving awards and recognition nationwide that would indirectly either produce savings for the university or bring in more students, donors, and interested parties.

E. Is this funding request for a One-Time need or an Ongoing need (please check one)?

One-time

Ongoing

F. Is funding available for this request from another source? If yes, describe the funding (source, amount, etc.)

No – Most of the opportunities for free EV charging stations involve non-networked chargers. This is a non-starter for the university as it does not allow for cost recovery, and the university is not in a position to give away electricity for free.

**STUDENT ORGANIZATION SUSTAINABILITY INITIATIVE PROPOSAL FORM
(Continued)**

Part IV- Requestors/Reviewers

Prepared By Natalie Koppier	Date 11/20/2020
Reviewed By Nick Quint, Transportation Network Manager	Date 3/30/2021
Reviewed By Denny Cochrane, Director of Sustainability	Date 3/30/2021