A Guide to

Electrifying the Future:

Converting Vehicles and Preparing Automotive Students for the Road Forward

Revised 2026

An insightful guide for considering the integration of electric vehicles into education communities. This resource was developed from GreenLearning's projects, "*Re-Energy: Electrifying the Future of Transportation*" with Calgary and Mississauga high schools, amongst other partners to capture the process and learnings in converting internal combustion vehicles to electric vehicles and installing charging station infrastructure.

Land Acknowledgement

In the spirit of respect, reciprocity, and truth, we acknowledge and honour Moh'kinsstis, and the Treaty 7 region of Southern Alberta where one of the projects was conducted. This land is the traditional Treaty 7 territory of the Blackfoot Confederacy; Siksika, Kainai, Piikani, as well as the Tsuut'ina and the Îyâxe Nakoda Nations. This territory is home to the Métis Nation of Alberta, Region 3 within the historical Northwest Métis homeland.

We recognize that the land upon which the Southern Ontario project was conducted is the ancestral and treaty lands of the Miichizaagiig Anishinaabek, also known today as the Mississaugas of the Credit, the rightful caretakers and title holders of this land. This land is the traditional Treaty 13A and Treaty 23 territory of the Mississaugas of the Credit First Nation, as well as the Anishnaabek, Onkwehonwe, Haudenosaunee, Huron-Wendat, and Neutral peoples.

With gratitude, we acknowledge the land and the Indigenous people that have taken care of it since time immemorial, and continue to honour and celebrate this territory.

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An Introduction to “Electrifying the Future of Transportation”

These two projects offered high school students and educators in Calgary, Alberta and in Mississauga, Ontario, the opportunity to convert three internal combustion engine (ICE) vehicles to electric vehicles (EV), and install an electric vehicle charging station at each school. We also worked with post-secondary institutions to determine opportunities for expanding learning at this level and ways to connect high school and post-secondary learning for the needs of future careers to support the EV transition.

The intention behind these projects was to explore the connection between current automotive education in Alberta and Ontario with novel, in-demand automotive skills needed to support the growing trends in electric vehicles. With the results of these projects and by sharing our findings and experience, we intend to help other organizations keep pace with this transition toward the electrification of transportation.

The Volkswagen Beetle being transported to the 2023 World of Wheels Car Show in Calgary.

Guide Objectives

What can you expect from this document? We’ve created this guide to:

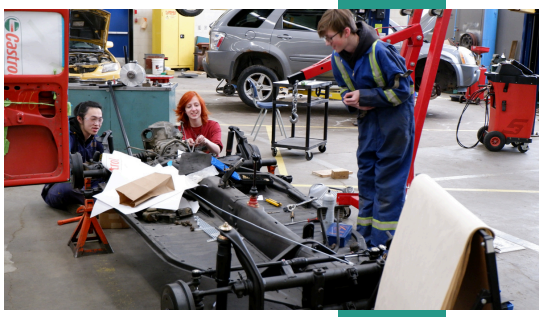
- Provide insight from two electrification projects in Calgary and Mississauga
- Outline and explain the key steps we took to:
  - Convert ICE vehicles to electric vehicles in a high school setting
  - Install EV charging stations at two public high schools
- Share our experience - what went well, what we learned from each project, and what steps we’ve identified that are needed to prepare automotive programs at high school and post-secondary levels for the electric vehicle transition
- Connect you with learning resources and tools that we’ve developed to create some of the first steps for student learning and real-world applications

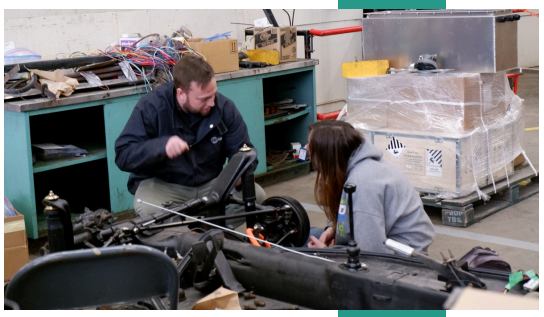
Why Electrify in Schools?

Decarbonization of transportation is a key strategy to solve our climate crisis and youth want to be at the forefront of leading this change. With governments, manufacturers and consumers on board to achieve major transformation by 2035, the electrification of transportation is a solution that is growing rapidly across Canada and around the world, leading to an extraordinary increase in demand for technicians and other skilled tradespeople and professionals.

More importantly, education systems are struggling to keep pace with providing the programming required to support this transition - often leaving youth unable to actively participate in the process. With the Canadian Government aiming for 75% of new passenger vehicles to be electric by 2035 (Canada, 2026), GreenLearning identified the need to trial these projects at two public high schools to better understand how curriculum, infrastructure, and the workforce must change in order to help make that transition possible.

GreenLearning provides free education programs about energy, climate change and green economy that engage and empower students to create positive change for our evolving world. Our GreenLearning community is committed to engaging learners in environmental activities that allow them to explore the world around them, while developing skills to positively shape the future.





GreenLearning collaborated with various stakeholders and partners to make these projects possible.

For the Alberta project, Crescent Heights High School and the Career and Technology Centre from the Calgary Board of Education, in collaboration with Chargepoint, Southern Alberta Institute of Technology (SAIT), Zeno Renewables, High Voltage Garage and the University of Calgary's Relectric Car Team, developed and piloted an innovative solution for the electrification of transportation to guide other schools across the country in preparing youth for careers in green technologies.

A hybrid webinar with Terry Orr and our Engagement Manager, Sidney Howlett, was held for the automotive students at Crescent Heights in Calgary, Alberta to get them familiar with EVs.

For the Ontario Project, The Woodlands Secondary School, and the Peel District School Board (PDSB) contributed to the electrification of an internal combustion vehicle and the installation of a charging station. In collaboration with The Clean Foundation, Plug'n Drive, FNEV, and Connected North, these groups consulted on program development pieces and contributed to project outreach. The Ontario project began after the Alberta pilot project where GreenLearning was able to apply learnings gained from previous practice and experience.

"Our students are so excited to dive into this project and get hands-on experience with electric vehicle technology. They've been looking for a donor vehicle to kickstart the conversion, and their enthusiasm is amazing to see. Watching them take the lead and work toward something that supports a greener future is inspiring."

- Vartan Meneshian,
Head of Transportation
The Woodlands S.S.

Teachers and students at both Crescent Heights High School, Bowness High School and The Woodlands Secondary School, along with the Career and Technology Centre in Calgary and the Peel District School Board in Mississauga, led the electric vehicle restoration and conversion. To support the necessary infrastructure for this transition, this project also included the installation of a charging station, assisted by fully trained and licensed technicians, the Calgary Board of Education Sustainability and Facilities team, and the Peel District School Board assistant electrical supervisor.

The 1999 Mazda Miata the Ontario team converted for this project.

"Re-Energy: Electrifying the Future of Transportation'' (ETF) projects were made possible with financial contributions by numerous funders (check out **page 29** for a full list). These projects intend to engage youth in leading the transition to a clean energy future through awareness and adoption of Zero Emission Vehicles and related infrastructure.

Why not start smaller?

There are a number of fantastic projects across the country already engaging with smaller conversions - we encourage you to check out New Myrnam School's successful golf cart conversion (click here to check out their video)!

We took on the challenge of a full ICE vehicle conversion to EV, as that's where we identified a need. Automotive classes prepare youth for future engagement with ICE vehicles, and we recognize that as the demand for EVs increases, students with experience and skills related to EVs will be better prepared for success in the automotives industry. The conversion project allowed us to explore what is really needed to begin the transformation of automotive programs at high school and post-secondary and to share these learnings with educators across Canada.

Guide Introduction

The purpose of this guide is to help other organizations, schools and groups interested in electric vehicles, conversions, and EV infrastructure bring similar opportunities to their community. We've done our best to ensure this resource shares our experience and suggestions as you evaluate starting off on an electric vehicle project of your own.

A note:
While both components of this project overlap and often involve the same team members, we recognize that other communities may only be interested in working on one of these components.

We've separated the part of this document that details our timelines and approach into two sections. First, we've detailed a guide on converting a vehicle, and then after, we explain our recommendations for installing a charging station.

This guide lays out necessary information and steps taken in these two projects for Re-Energy: Electrifying the Future of Transportation Projects: documenting the process, capturing the learnings and helping pave the way for transforming automotive programs. You'll still need the support of a qualified mechanic, technician, or installer to guide the detailed conversion or installation work; our goal is to successfully guide you through the logistics and planning to reach that stage.

We documented as much of the process as possible to help share our learnings with other educators and the broader community to communicate what went well, what we learned, what we would do differently, and how this can pave the way for transforming automotive programs in high schools or post-secondary schools across Canada. We've included an overview of the process, the challenges, lessons learned, impact on student learning, student highlights and feedback and contributions from our partners.

While this guide tends to focus on traditional educational environments like grade schools and post-secondary establishments, we're confident that it can support any group looking into starting their first vehicle conversion project. These projects also allowed students to develop a deeper awareness of the growing EV industry, and learn about the necessary infrastructure to support this change. Projects like this in any community can help pave the way in introducing and preparing youth in your community with the skills and opportunities for future careers and engagement with electric vehicles.

We hope this guide can serve as a resource for educators to begin transforming automotive programs to provide a hands-on, fun, safe, and novel learning opportunity for students in electrifying the future of transportation.

Project Overview

> The project aligns perfectly with our school's commitment to authentic, experiential learning and reflects our vision of preparing students for meaningful pathways in a rapidly evolving world.
>
> - Janice Lewis,
> *Principal at The Woodlands S.S.*

These projects required contribution and expertise from many groups!

For our initial project in Alberta, we found it beneficial to create an Advisory Committee to help support the project before setting anything in motion. This Committee was intended to help move the project forward with the guidance of experts in different fields and organizations. In our case, many of those on our Advisory Committee were identified as project partners in our funding applications to ensure the guidance and expertise needed for a successful pilot was in place early on. Our Advisory Committee consisted of Calgary Board of Education members, ChargePoint, Zeno Renewables, High Voltage Garage, University of Calgary's Relectric and SAIT.

For our Ontario project, we decided to opt-out of creating an Advisory Committee. Nonetheless, there were many partners, funders, and field experts integral to the execution and successful completion of this project.

As you consider developing your own team, we recommend establishing expectations to ensure a successful collaboration between different groups. We created a Letter of Understanding (LOU) with each partner group to articulate how the partnerships were expected to work prior to the start of the pilot. Depending on the organizations you partner with, a more detailed Memorandum of Understanding (MOU) may be needed - this may be applicable for groups like school boards that may not already have existing procedures in place for collaborating with external groups and partners on projects such as this one.

Our Project Teams

Project Lead

GreenLearning

We were responsible for the overall management of this project. GreenLearning led the collaborative team, ensuring funding and finances, scheduling, resource allocation, documentation, education, student involvement, and overall project progress over multiple years.

The Alberta Project Team

Vehicle Restoration and Conversion

Calgary Board of Education (CBE)

Students and Staff at Crescent Heights High School, Bowness High School, and the Career and Technology Centre

Staff supported student work over the course of this project. With an emphasis on the student experience and learning process, approximately 300 students were directly engaged with one of the converted vehicles while approximately 12,000 students were indirectly reached.

Crescent Heights Team

Automotive Class *- Automotives Instructor*

The automotive team all lent expertise and insights to the project, with teacher Cody Price acting as the main lead. Cody led and worked on the project vehicles, and also completed EV training early on. Cody made curriculum connections during disassembly and reassembly of the vehicles, and introduced students to wiring, forming brake lines, battery connection and logistics, the welding of battery boxes, and the installation of the drivetrain. **Advisory Committee Member.**

Automotive Class, EV Club *- Students*

All Crescent Heights High School automotive students which Cody taught interacted with the restoration and conversion of the vehicles in this project, in varying capacities. As components were removed and added, students learned about the similarities and differences between ICE vehicles and EVs. EV Club is a group of dedicated students from automotive and other classes that continued work on the VW Beetle and Ford Ranger vehicles on Mondays, after class.

Intermediate-Advanced Design Class *- Science and Robotics Teacher and Students*

Design class students created logos for the VW Beetle. After a fierce competition, the winner of the Crescent Charged Logo Competition was Waylon C., design shown.

Career and Technology Centre (CTC) Team

Automotive Class *- Auto Body Teacher and Technicians*
The automotive staff at the CTC, led by teacher Jason Budd, guided students through the bodywork and painting of the VW Beetle. The automotive teachers and technicians worked tirelessly with their students to ensure they could safely take on this challenge. In one form or another, all intermediate, advanced, and apprenticeship level students worked on the vehicle.

Automotive Class *- Students*
All automotive students at the CTC during the 2022-2023 school year were involved in the restoration work on the VW Beetle. This work addressed the extensive body work required to restore the exterior of the vehicle. The restorative work was extensive with the VW Beetle being a challenging and unique shape. They also completed the priming and painting of the vehicle.

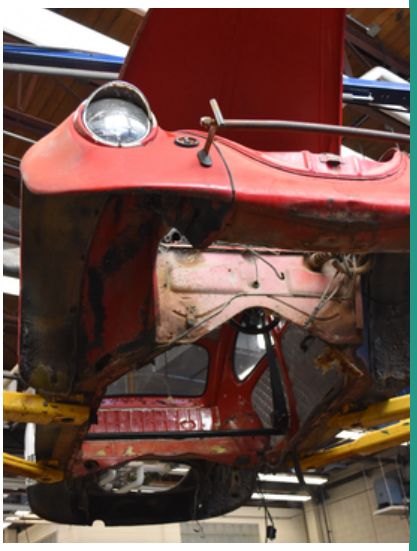
CBE Administrative Support

This complex project involved many different groups within the Calgary Board of Education (CBE), one of the largest school boards in Canada.

In School Support - the Career and Technology Studies Team Lead at Crescent Heights assisted with providing support and guidance to the automotive staff and classes. The Facilities Manager connected with the charging stations partners and provided charging station support. The Principal and Vice Principal were involved in moving administrative details along, including coordinating the Letter of Understanding (LOU) with the CBE, teacher release time, and numerous charging station aspects.

At the board level, this project involved working with the Sustainability Coordinator and those involved with the facility department on the charging station project due to its impact on the school's infrastructure. We also worked with Education Directors who coordinated approvals with Superintendents and Trustees. Safety Advisory Services was regularly involved and conducted inspections to ensure that safety requirements were met.

Charging Station



The charging station aspect of the project involved partnering with the manufacturer (ChargePoint) and the installer (Zeno Renewables). Having both charging station manufacturers and the installers involved in the project led to the best understanding as to how charging stations work and what would be best for the school for the project and for the future.

ChargePoint

As the manufacturer of the charging station, ChargePoint was able to provide key advice and insights as to how charging stations work and the best suitability for the school. They were also key in providing resources and understanding into the project. **Advisory Committee Member.**

Zeno Renewables

When schools/buildings are making infrastructure changes to the grounds there is a learning curve as to what is required. Zeno was able to advise on a number of different aspects including finding the best location for the charging station, the electrical requirements that were needed, etc. Walk throughs with school and board facility members to go through the process were integral to heightening understanding and expectations for the project. **Advisory Committee Member.**

Guidance and Content Development

This project benefited from the guidance and support of a number of other organizations experienced in one or more components of our project. These groups were readily available with advice, support and encouragement. We would recommend having similar organizations involved to share their expertise and guidance if you are considering an electrification project of your own.

Southern Alberta Institute of Technology (SAIT)

Automotive Students and Staff at SAIT

SAIT allowed us to understand post-secondary options for the automotive students with this type of project. A field trip to their facilities allowed the students to see first hand what post-secondary options included. The partnership with SAIT also allowed for the lending of needed safety equipment. The Academic Chair of Automotives provided critical thoughts and advice as the project unfolded. The capstone projects created by SAIT students better informed the project and added context to the guide (check them out here). **Advisory Committee Member.**

High Voltage Garage

High Voltage Garage was an integral part of the project to serve as a guide over the course of the project. Having completed several conversions previously, High Voltage Garage provided many tips and tricks throughout the conversion process, as well as being a sounding board for the development and delivery of EV-related educational workshops. When considering doing a similar project, we recommend having someone who has completed a conversion to be able to offer insights. **Advisory Committee Member.**

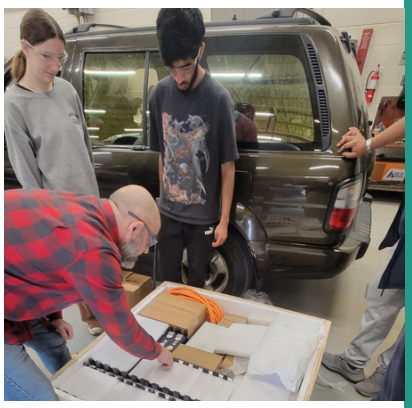
Relectric Car Team

This student-led team is currently working on converting a Volvo. Their involvement provided insight into University level post secondary opportunities and provided additional insight into the conversion. These students also designed a Motor Controller Simulator for the project. Reaching out to your local University to find similar projects like Relectric's is a great way to engage enthusiastic students and to better understand post secondary options. **Advisory Committee Member.**

The Ontario Project Team

Vehicle Conversion

For this project, the Ontario team purchased a manual vehicle that required minimal restoration work, besides some quick rust touch-ups. This allowed the project to skip the restoration component of the conversion, starting directly with the removal of the ICE components.

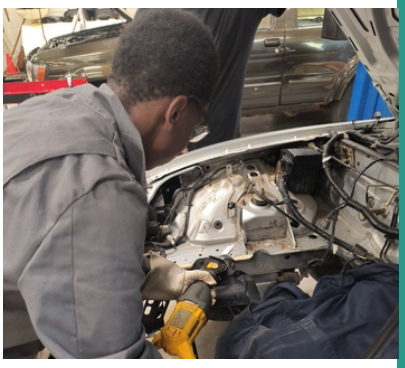


Peel District School Board (PDSB)

Staff at the School Board

Many PDSB staff supported GreenLearning and the work of students over the course of this project. Tracy Appleton, the Environmental Sustainability Coordinator at PDSB, has been the main point of contact for us throughout this entire project. She has provided support with getting the protocols for the high voltage work approved, and with many other components of the conversion process. Clayton Ellis, the Acting Instructional Coordinator Science and Technological Education for K-12, helped bridge the gap between school level and board level with getting media releases approved. The staff were directly engaged and a big part of the conversion process.

The Woodlands Team



Automotive Class *- Automotive Instructor*
The student-led automotive team carried out the conversion work for the project, with teacher Vartan Meneshian acting as the main lead/instructor. Vartan led and worked on the project vehicle and received EV training early on. Vartan introduced students to draining fluids, wiring, welding battery boxes and metal components, and the removal and installation of the drivetrain.

Automotive Class, EV Club *- Students*
The automotive students in Vartan's class at The Woodlands S.S. were directly involved in the vehicle conversion, taking on a number of responsibilities. As components were removed and added, students learned about the similarities and differences between ICE vehicles and EVs. A group of dedicated grade 9-12 students formed an EV club where they continued work on the Mazda Miata during class, lunch, and after school.

School Admin - *Principals*
The Woodlands High School administrative team were closely involved with this project. The principal's role has been to support GreenLearning, the automotive teacher, and their class with the conversion work. They have also helped to bridge any gaps with facilities staff we've worked with, and provided outreach to other PDSB schools about this project. Principal Janice Lewis has been working on designing t-shirts for the students who have been working on the conversion project. The involvement of administration has been integral for the success of this project!

Charging Station

The charging station phase of the project involved working with the PDSB facilities team, partnering with the manufacturer (Flo) and the electrician company (Holley Electric). Involving the charging station manufacturer and the electricians allowed for a thorough understanding of how charging stations operate, ideal installation locations, and ensuring the infrastructure aligned best with the schools' current and long term plans. PDSB's involvement was integral to the process of identifying a location and installing the charging station.

Peel District School Board (PDSB)

Jason Mullen, Assistant Electrical Supervisor for PDSB's Electrical Maintenance Services, led the Flo and Eaton charger installations. He hired the electrical contractor (Holley Electric), as well as contractors to install the concrete pad to mount the Flo charger on, and a contractor to paint the lines for the parking spaces. Tracy Appleton, The Environmental Sustainability Coordinator at PDSB, facilitated the purchase of the Flo level 2 charger and helped with identifying a site for the charging station. Jeff Vandenhoek, Electrical Supervisor for PDSB, assisted with charging station purchase and facilitated conversations between GreenLearning and Westburne, a wholesale electrical supply distributor. Benjamin Ratcliffe, Energy Coordinator at PDSB, attended virtual meetings and was involved with connecting the internet for the charging station and setting up payment process. Edward Cai, Manager of Energy and Sustainability at PDSB, signed the LOU and was the second point of contact for us. He also attended the June Launch event at The Woodlands S.S.

FLO

PDSB had already been working with FLO, a Canadian electric vehicle charging station designer and operator, so a FLO charging station was chosen for this project. Moving forward and working with FLO went smoothly thanks to the staff involved in the collaboration. PDSB's contact at Westburne helped facilitate the purchase of a level 2 Flo charger alongside the Environmental Sustainability Coordinator at PDSB.

Holley Electric

When installing a charging station, there are a lot of steps that need to take place involving multiple companies. Once the concrete pad was in place, Holley Electric, a Canadian electrical contracting company, delivered the level 2 Flo charging station to the high school, completed all the electrical work necessary for installation, and confirmed the charging station was ready to use. They also installed the level 2 Eaton charger that was donated from Plug'n Drive inside the auto shop class.

Guidance and Content Development

This project benefited from the guidance and support of a number of other organizations. These groups were readily available with advice, support and encouragement. We would recommend having similar organizations involved to share their expertise and guidance if you are considering an electrification project of your own.

Pilot Project Learnings

We took a lot of our own learnings, from our pilot project in Alberta, into consideration when starting the Ontario project.

For instance, with the Ontario project, we engaged with the school board right away rather than starting at the school level. We created and distributed an LOU (Letter of Understanding) that outlined everyone's expectations and roles in the project. Having the board involved from the beginning helped get the high voltage approval and media releases completed in a timely manner, which allowed the conversion project to move forward without delay. Another example is we purchased a vehicle that didn't require a complete restoration. By skipping that step, the students could begin the conversion process almost immediately. We identified more insights and advice from our pilot project in Alberta and the project in Ontario on **page 47.**

Plug'n Drive

Plug'n Drive is an EV organization that we have collaborated with in the past for input on some of our resources. They provided further support on program development and charging station resources. Mary Mallin, Events and Logistics Manager, donated an Eaton Level 2 EVSE with a Pedestal 30 A charger, which will be used as an educational tool by students at The Woodlands S.S. Mary also attended GreenLearning's *'Driving the EV Future'* in-person event to share her expertise, experience in the field, and her advice for future careers in EV.

Charging Ahead Project Learnings

We want to thank all other organizations who participated in the guidance and content development of this project. Thank you FNEV, Connected North, NRStor, and The Clean Foundation for your participation and support. For more information about their specific involvement, check out our Charging Ahead Project Learnings **here** to learn more!

Collaborator highlight for both projects: **CanEV**

We purchased EV car conversion kits for both projects from CanEV. We also purchased a battery box which they customized for each specific car. Before we chose a vehicle to convert, CanEV provided insight on the type of vehicle that would be the most viable option. They recommended a manual vehicle rather than an automatic vehicle to convert, and shared their experience with converting manual vehicles. Additionally, they were involved in the EV conversion process, having regular meetings with the lead teacher to plan the installation sequence for the battery packs.

Student Learning

A goal of this project was to engage as many students as possible, especially at both of the participating high schools. This was achieved through a number of activities. Firstly, GreenLearning hosted multiple introductory EV workshops online and in class, as well as Electrifying the Future webinars where we showcased the work being done for both EV conversion projects to other educators and industry professionals.

For the Alberta project, the Intermediate-Advanced Design Class ran a logo contest, the Electric Car Club (EV Club) was featured at the school's club rush, and weekly EV Club gatherings were open to all students for both Alberta and Ontario projects.

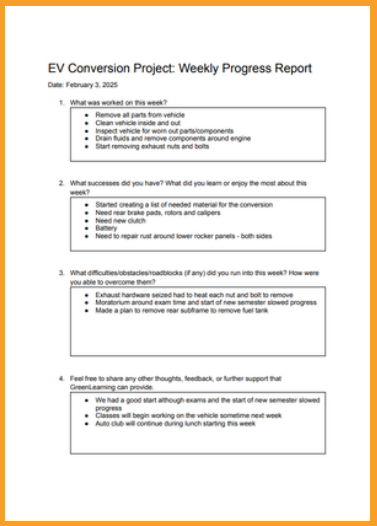
A number of off-campus visits were also offered to students - from fieldtrips to SAIT, the Driven Car Show, presenting at multiple conferences, or checking out our booth at the World of Wheels Car Show, there were numerous opportunities for learning and celebration.

Some glimpses of student learning and engagement throughout both the Alberta and Ontario projects. Celebration events, student presentations, and plenty of hands-on experiences.

Student Testimonials

Students worked hard on these conversion projects for months while providing weekly reports and progress photos along the way. To gather student knowledge and understanding, GreenLearning created weekly progress report templates for automotive teachers and their students to fill out (go to **page 29** to download a copy!). Check out an example of a completed report from our Ontario automotive teacher here.

We also conducted bi-yearly student interviews asking students what they worked on, what they learned, what benefits they see from a conversion project this big, and any advice they would give to someone thinking of participating in this type of project. Here are some of the most common answers below.


EV Conversion Project: Weekly Progress Report

Date: February 3, 2025

1. What was worked on this week?
   - Remove all parts from vehicle
   - Clean vehicle inside and out
   - Inspect vehicle for worn out parts/components
   - Drain fluids and remove components around engine
   - Start removing exhaust nuts and bolts
2. What successes did you have? What did you learn or enjoy the most about this week?
   - Started creating a list of needed material for the conversion
   - Need rear brake pads, rotors and calipers
   - Need new clutch
   - Battery
   - Need to repair rust around lower rocker panels - both sides
3. What difficulties/obstacles/roadblocks (if any) did you run into this week? How were you able to overcome them?
   - Exhaust hardware seized had to heat each nut and bolt to remove
   - Moratorium around exam time and start of new semester slowed progress
   - Made a plan to remove rear subframe to remove fuel tank
4. Feel free to share any other thoughts, feedback, or further support that GreenLearning can provide.
   - We had a good start although exams and the start of new semester slowed progress
   - Classes will begin working on the vehicle sometime next week
   - Auto club will continue during lunch starting this week

Click above to see an example of a Weekly Progress Report!

What Have You Learned About EVs While Doing This Project?

- You learn a lot about the different components that go into an EV: cables, wires, batteries, transmission, and it can take a lot of time and patience to convert
- How much has to be taken out of ICE vehicles to convert it to EV

What Benefits Do You Think an EV Conversion Project Can Have in High Schools?

- You learn valuable skills and knowledge on how to work with EVs
- Teaches you patience and how to work with expensive and fragile car components

Any Words of Advice for Future Student Groups Working on a Conversion?

- Have a lot of patience and listen to the teacher, they know what they're doing
- Know about the different parts, study, do the work needed, and have fun!

"This GreenLearning project has really helped me grow. The opportunity to work with a gas car and make it electric is very cool and we love working on the car during our lunch breaks."

- John and Sahil,
The Woodlands Students

"The project brings a lot of people, new people, closer together. Some of us wouldn't be as close if we weren't all working on it together."

- Dexter,
The Woodlands Student

"If this is the direction that lots of cars are going to go, then having that background knowledge is so useful and helpful for us for the future."

- Becca,
Crescent Heights Student

Electrifying the Future Webinars

In the midst of these projects, GreenLearning put together multiple virtual webinars and learning resources, including this guide. We developed and delivered ETF-focused webinars for teachers and students across Canada to learn the basics behind EVs, differentiate between EV myths and facts, and discover how to do their own conversion right from the classroom using an interactive simulator (see **page 48** for a direct link to the simulator).

A screenshot from one of our virtual ETF webinars hosted by our Environmental Education Coordinator, Maria Khan.

We developed and delivered two webinars; one focused on learning the basics of electric vehicles with an interactive EV myths and facts component, and the second was a Re-Energized Webinar that concentrated on renewable energy and covered components of electric vehicles. After these webinars, students completed surveys about what they learned. From these surveys, 100% of students indicated they learned something new about EVs and 60% of students said they would join an EV club over a wood-working or design club. For more numbers of student engagement, check out our Charging Ahead Project Learnings document**.**

From the 40+ webinars conducted, below are the most common poll results of the pros and cons of electric vehicles.

Pros of Electric Vehicles	Cons of Electric Vehicles
Better for the Environment	Mining of Lithium, Cobalt, etc.
Less Gas Emissions into the Atmosphere	Longer Charging Times
More Torque	Shorter Range
Quiet	Struggle in Colder Climates
Recyclable Batteries	No “Cool” Noises
Cheaper to Charge	Limited Infrastructure

*The pros and cons that students identified aligned with overall public perceptions of EVs. We shared information in our sessions to help students deal with some of their concerns, especially showcasing examples of sustainable mining practices such as **Vulcan Energy Resources** in Australia, who specialize in the production of lithium with a net-zero carbon footprint through their **‘Zero Carbon Lithium’ project**. Check out more about this project here!*

Community Engagement

GreenLearning had many opportunities to attend and host some exciting outreach events showcasing our conversion vehicles, highlighting our electrification projects, and discussing all things EV!

Calgary World of Wheels

The 1975 Volkswagen Beetle was showcased at the 56th annual Calgary World of Wheels in April of 2023, where there were 41,249 attendees! We had a booth showcasing the Beetle to the general public, and informing them about the project. Students from both Crescent Heights and the Career and Technology Centre who have worked directly on the vehicle stopped by to share their excitement and experience.

Driven Car Show

We also had the opportunity to showcase our 2009 Ford Ranger at the Driven Calgary Aftermarket Car Show in May of 2025. Accompanied by the teacher leading the conversion project and the students involved, they were able to chat to the general public about their experience with the EV conversion project.

Driving the EV Future

In Mississauga, we hosted a '*Driving the EV Future*' networking event with students, EV and charging infrastructure experts, and educational partners in November of 2025. This panel discussion involved industry professionals who helped students gain valuable insight into best practices for installation and maintenance, while exploring opportunities in the clean transportation field and inspiring future pathways for students. Students at The Woodlands S.S. also had the opportunity to showcase their Miata EV conversion project to the guests in attendance.

The panel speakers in attendance were Jason Mullen, Assistant Electrical Supervisor of PDSB, Karla Barron, Program Manager, Energy & Environment at NAIT, and Mary Mallin, Manager of Events and Logistics at Plug'n Drive.

Celebration Events

Alberta Kick-Off Event

GreenLearning and all of our project collaborators came together in April of 2022 at Crescent Heights High School to celebrate the project. 50 people attended the project presentation, with other partners who joined via Zoom. After the formal presentation portion of the event wrapped, attendees got to have a look at ZENO's Tesla, and High Voltage Garage's converted Ford Ranger and ask questions.

Alberta Wrap-Up Event

GreenLearning, along with Calgary Board of Education staff, high-school students and project partners, hosted a celebration event in June of 2023 for the EV conversion and infrastructure project, designed to recognize and celebrate the efforts of everyone involved in the project during the school year.

Ontario Celebration

We celebrated the Electrifying the Future project in June of 2025 with students in Mr. Meneshian's Transportation SHSM class. With pizza, snacks, and a custom cake, students celebrated the launch of the conversion and all they've accomplished throughout the year.

We were thrilled to have staff from PDSB join us for the event, where they had the chance to hear directly from students about their work on the Miata. The students were excited to share their progress, highlighting how hands-on experiences like this are helping them build real-world skills. Students and staff continued the work in the 2025/2026 school year!

> For many students, the highlight was showcasing the nearly completed EV, proudly explaining the systems they had transformed and the new skills they had gained.
>
> - Janice Lewis,
> *Principal at The Woodlands S.S.*

Curriculum Connections

Student learning was a primary goal when working on this project. It's important that students are not only learning valuable life skills, but are also gaining educational knowledge connected to the province's curriculum. This can also help incentivize teachers and school admin to participate in bigger EV conversion projects like this one.

ONTARIO CURRICULUM CONNECTIONS

Subject	Learning Objectives
TTJ2O - Grade 10 Transportation Technology and the Skilled Trades	**A1**. Initiating and Planning • A1.2 apply an understanding of fundamental technological concepts, design considerations, and science, technology, engineering, and mathematics (STEM) concepts as appropriate in developing projects involving the creation of products and/or services **B2**. Impacts of Technology • B2.2 assess local and global impacts of various technological innovations on the environment and the economy, including the labour market **A2**. Designing and Performing • A2.2 identify factors that could impact the development of their projects and apply appropriate strategies to increase the probability of a positive outcome
TTJ3C - Grade 11 Transportation Technology	**A2.** Understanding Electrical and Electronic Circuits and Components **A3**. Understanding Major Systems and Components **B3**. Service and Repair of Steering/Control, Suspension, Brake, and Body Systems **B4**. Challenges and Repair Problems **D1**. Health and Safety
TTJ4C - Grade 12 Transportation Technology	**A1**. Understanding Engine Management Systems **A2**. Understanding Power Transfer Devices **B2**. Service and Reair of Drivetrain Components **A3**. Troubleshooting the Powertrain **C2**. Technology and Society

Connected Courses & Outcomes For Alberta

• MEC2090: Electrical Components	2. Describe the function and operation of a vehicle's electrical systems and components 2.6 Identify and describe the ratings that are given to electrical components: e.g., resistance, Voltage, amperage and power rating 3. Identify electrical faults, by using standard diagnostic and testing procedures 3.2 Calibrate correctly, connect accurately and read the appropriate test equipment to determine: 3.2.3 Current Draw 3.2.4 Component resistance
• MEC3050: Engine Replacement	1. Use Engine lifting equipment and related tools safely 1.1 Demonstrate knowledge of types of lifting tools/equipment available for engines 1.2 Demonstrate knowledge of where to attach devices 3. Apply mechanical skills to remove and replace engine accessories 3.1 Identify the most appropriate method and remove and replace the following: 3.1.1 Wires 3.1.2 Cables
• MEC3080: Alternative Energy Systems	2. Describe the use of different fuels and engine designs in modern vehicles 2.3 Examine and report on the present initiatives to build electric-powered cars and batteries of sufficient capacity to power them
• MEC3090: Computer Systems	2. Identify the principles that apply to all computer management systems 2.5 Identify the principles and functions of computer control systems 3. Locate the components of selected computer management systems and describe their function 3.1 Locate and identify the parts of selected computer management systems 4. Demonstrate how computer management systems operate 4.1 Describe the function of the parts of a selected computer management system

Curricular connections courtesy of Vartan Meneshian and Cody Price

Ready to Spark a Change?

There were many aspects to these projects with the two major components being:

- Converting a vehicle from gas-powered to electric (p. 24 - 39) , and
- Ensuring that there was appropriate infrastructure - a charging station - to support the converted vehicle (p. 40 - 45).

The following two sections of this guide share our experience, learnings, and suggestions.

Vehicle Conversion

The following section of this guide is intended to provide key steps to prepare for and work through the conversion of a vehicle from an internal combustion engine vehicle (ICE) to an electric vehicle (EV). A key checklist, suggestions, and additional information can be found in each stage of the process.

- **Preparatory Steps:** This stage includes the tasks that should be done prior to the conversion of your vehicle.
- **Conversion Process:** This stage covers any considerations you may have during the actual conversion of the vehicle.
- **Post-Conversion Considerations:** This stage offers guidance on how to manage your new vehicle in a shared, educational setting.

Any tips or tricks for future groups collaborating to convert a vehicle?

"Think the whole process through from start to finish. Know what the end goal of the vehicle is - understanding if it's going to be a community thing, is it going to be a school vehicle, is it going to be sold later, is it a project that will go from school to school? Then picking a vehicle that fits those needs."

- Cody Price,
Automotives Teacher at Crescent Heights

Preparatory Steps

Key Checklist

- [ ] Identify team roles, responsibilities, and expectations
- [ ] Outline project outcomes
- [ ] Make a budget: Your time and money
- [ ] Explore grants, funding, and reporting
- [ ] Understanding internal processes: Identify permissions
- [ ] Safety precautions and training

Identify Team Roles, Responsibilities, and Expectations

This process takes time and collaboration! We recommend outlining expectations with all those involved; from who is responsible for decisions like paint colour and battery location, to purchasing authority, ownership details and project timelines. With various organizations or departments collaborating and juggling other responsibilities and tasks, it can be difficult to maintain momentum if team members are unsure of their responsibilities or decision-making power. Consider setting aside some time before the conversion to outline all of the key decisions related to purchasing and designing the vehicle, and identify the person who will have the final say in those decisions.

A tool such as a responsibility assignment matrix (such as a RASCI Chart) may be useful to establish expectations and keep roles and communications streamlined. Working through a RASCI Chart together creates a resource that indicates who is Responsible, Accountable, Supporting, Consulting, and Informing about steps and decisions throughout the project.

This is an example of what a few lines on a RASCI Chart for your project could look like:

Task	**Responsible** (gets the task done)	**Accountable** (has final say)	**Supporting** (helps "Responsible" complete task)	**Consulted** (asked for input on task)	**Informed** (updated about task)
Bringing the vehicle to a car show	• Project Manager (PM)	• PM's Leadership Team • Vehicle Owner	• PM's Colleagues	• Advisory Committee • Automotive Teacher	• Advisory Committee
Choosing vehicle paint colour	• Automotive Teacher	• School Administrator	• Project Manager • Automotive Class	• Advisory Committee	• PM's Colleagues

When working with a school board, we suggest doing a formal agreement, or "Letter of Understanding" (LOU). In the LOU, we clearly outlined the roles and responsibilities of our organization, the school board, the individual high school, and the automotives teacher involved in the conversion project.

Some of the roles and responsibilities we included were:

GreenLearning	School Board	High School	Teacher
Conduct site visits for tracking progress updates	Approve the procedure for obtaining media releases	Host a community event to showcase the project vehicle	Complete high voltage training required to safely complete the conversion
Provide financial coverage & manage the project budget	Approve the protocols to complete the high voltage work	Ensure school board safety guidelines are being followed	Support GreenLearning staff in collecting data
Document the conversion process	Share ETF-related materials with the school board	Participate in virtual workshops	Assist in planning a community event
Create a communications plan	Determine a long-term plan for the vehicle after the conversion	Allow GreenLearning staff to visit the school as necessary to see progress	Commit to completing the project if moved to another school

We recommend creating an LOU as it helps divide up the larger tasks needed for the duration and success of a project this size. In addition to the LOU, you should have your own version of a responsibilities chart for other organizations and stakeholders who will be involved throughout the project.

Additionally, establish expected response times and key communication lines to ensure continuity and momentum. A diverse team encompassing multiple organizations may have varying seasonal demands and commitments. With communication expectations in place, this allows a grace period for people working at full capacity, as well as an opportunity for teammates to recognize when a follow-up prompt is appropriate.

Depending on the timeline of your project, it's possible that there may be organizational changes or disruptions. We recommend that you determine who will be responsible for taking on responsibilities during periods of absence or staffing changes.

Outline Project Outcomes

Before diving in, it's helpful to determine what your key project and learning outcomes are.

Is it to have a road-ready EV you can drive to shows? Are you looking to support student skill development, tied to the curriculum? Are you wanting a school vehicle for a specific purpose?

These questions can help you evaluate what types of funding you may seek out, and will influence your timeline and approach to the project.

Alberta Students, Crescent Heights staff, and CBE staff celebrating the project at the wrap-up event in June of 2023.

Once the main project outcomes are identified, consider what the smaller milestones may be - for the conversion, our steps included purchasing the vehicle and the conversion kits, then completing the restoration (body work and paint, this is optional), receiving permission for high voltage tasks, installing the drivetrain, and then wiring the vehicle together. For the charging station, the steps included choosing a location for the charger, purchasing the charging station, then completing the installation (pouring a concrete pad and completing required electrical work), putting signage up, and connecting internet for set-up and usage. Our final landmark was to celebrate the conclusion of the conversion with all of the students and staff that had contributed to the project with a wrap-up event.

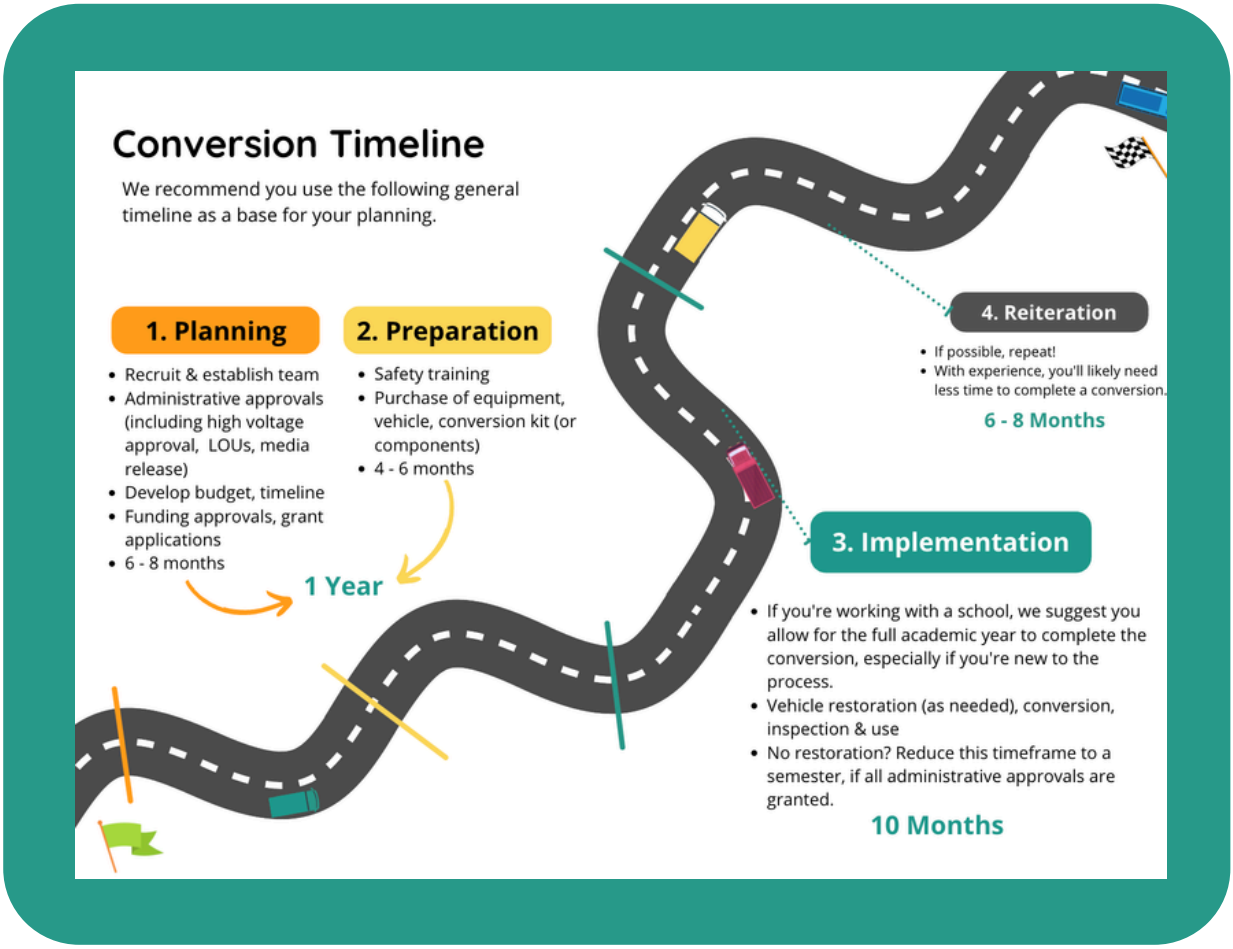
If the purpose of your conversion project is to focus on developing and practicing EV automotive skills, we suggest working with a vehicle that needs very little work to become road-ready. While a challenging and engaging vehicle, our vintage Volkswagen (VW) Beetle required extensive repair and preparation before we could even begin the conversion. For this reason, we sought out a more modern Ford Ranger for the second conversion and a Mazda Miata for our third conversion; they were both vehicles that were ready for conversion as soon as disassembly was complete. We explain our rationale for choosing these three very different vehicles later in the guide - however, we encourage you to consider what type of vehicle may help (or hinder!) you to reach your project goals.

Finally, while establishing project outcomes, consider the final destination of your conversion project. The conversion process itself may provide you with all of the learning outcomes you seek, but planning for future use and ownership of the vehicle allows for a smooth transition from the conversion to a finished vehicle. An idea could be to establish a rotation where the vehicles can be used by different automotive classes within the school board for exploration by other automotive students and enthusiasts.

Or instead, use the vehicle for transportation to key sporting and band events - carrying equipment and serving as a mascot for school pride. Perhaps feasible for different groups, you could even consider whether the successful auction of an inspected, converted vehicle could contribute funds to continue the conversion cycle of vehicles into the next year. For the Ontario project, they plan to use the vehicle as a show piece for the school board as part of their vehicle fleet, in addition to an educational tool. There's many educational opportunities this project can give before, during, and after full completion!

Make a Budget: Your Time and Money

Between scheduling time and establishing your budget, allow for some wiggle room when planning! Here's a general timeline to give you a picture of how much time to set aside at each stage of the project.



The pilot project in Alberta began during the COVID-19 pandemic, and the repercussions of this global event led to delays in supply chains for key capital pieces like the EV conversion kits and charging stations. The schedules of the students working on this project also influenced when work could be done on the vehicle. In an educational setting, it's especially important to consider the academic calendar and key events like exam breaks, semester changes, and holidays, especially if classes and clubs will be highly involved in the vehicle conversion.

The project in Ontario ran more smoothly thanks to our learnings from the Alberta project, but it's always important to give yourself more time to complete the actual conversion rather than less time, especially if restoration is nvolved.

We chose to share the pilot project at a few large-scale events to garner interest and share the project with the public (*as outlined on page 20*). The dates of these events dictated when certain tasks needed to be completed and influenced our schedule. Having a budget line in the budget for attending events is advised if this is a priority in your planning. To find out more about the specific events we attended and the role we played in sharing our project details, check out our Charging Ahead Project Learnings **here.**

Our Volkswagen Beetle at the Calgary World of Wheels in 2023.

Finally, consider safety, training, and miscellaneous expenses when creating your budget and timeline. Through collaboration, some of the safety materials required for a conversion were lent to the Crescent Heights class from SAIT, reducing the cost of supplies. For the Ontario project, we ended up purchasing the safety tools required. We've included a list of the safety materials we purchased later in the guide (**p.31-32)**. Additional training for educators or community leaders will need to be scheduled into your plans to ensure a safe conversion. Check out our *'Safety Training'* section on page 30 for more details.

"It's worth doing these pilot projects, even though they seem challenging and slow. It is worth trying these things out. I encourage any group to keep on. If they can provide a good rationale for the reason why they want to engage in a particular project then go for it! Make sure that you're engaging all the right people. Don't be shy about asking questions, or asking leaders in the organization! Say "I wanna do this, who should I talk to?"

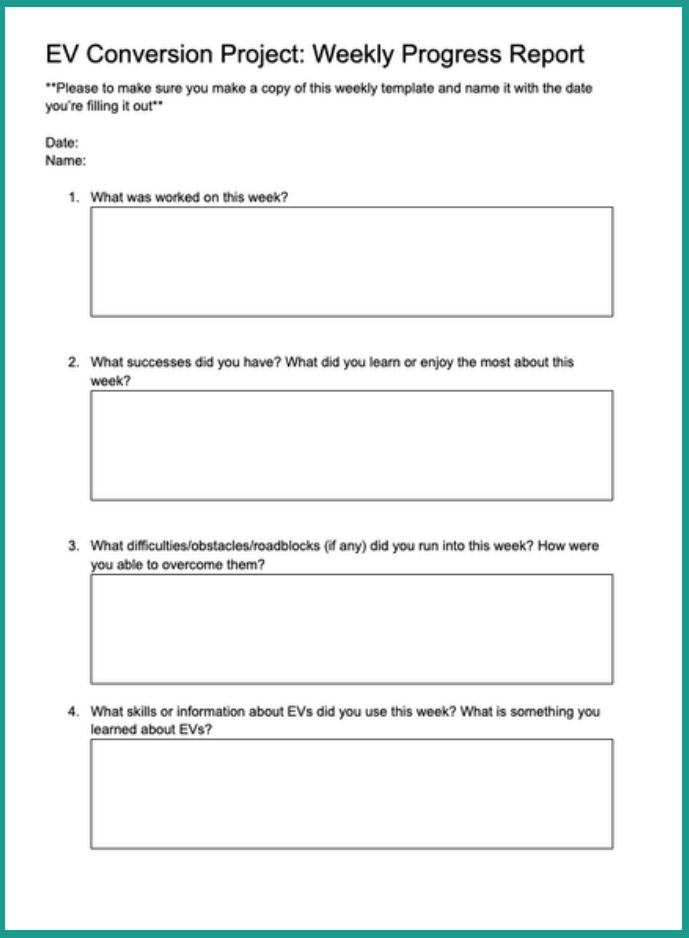
- Olena Olafson,
CBE Sustainability Coordinator

Explore Grants, Funding, and Reporting

Without the financial support of various grants; RBC Tech for Nature, NRCan, the Calgary Foundation, Chawkers Family Foundation, Edmonton Community Foundation, Natural Resources Canada, the Trottier Family Foundation, and Suncor Energy Foundation, these projects would have remained on the drawing board. Once you understand your budget, the next step is to secure your funding.

You can look into many different areas for funding. Consider exploring current government initiatives (we were successful with NRCan's ZEVAI initiative), community or other foundations and other corporate funders.

Both of these projects were complex, with many opportunities to document activity, collect data, and report on progress. As mentioned previously, we used a weekly report to collect information through written updates and photo progress, and developed surveys for students to complete before and after their time working on the project. We also did student interviews where we asked various students questions about their involvement in the project. Consider the documentation and reporting requirements of the grants you may receive, and make a proactive plan to ensure the information you need in your reports is collected regularly, or well in advance. Our projects saw many changes over the months, and it was important for us to continue documenting everything to provide our funders with an accurate understanding of the projects' progress.



EV Conversion Project: Weekly Progress Report

Please to make sure you make a copy of this weekly template and name it with the date you're filling it out

Date:
Name:

1. What was worked on this week?
2. What successes did you have? What did you learn or enjoy the most about this week?
3. What difficulties/obstacles/roadblocks (if any) did you run into this week? How were you able to overcome them?
4. What skills or information about EVs did you use this week? What is something you learned about EVs?

Click here to download a copy of our Weekly Progress Report for your own use!

These grants may influence your documentation, as well as your timeline and budget. Some grants may have constraints or allowances that require you to adjust your plans. We encourage you to allow for some contingency room on your timeline and budget, to proactively prepare for unforeseen challenges. The documentation process may also mean that there are additional administration duties that you need to plan for, outside of the conversion itself.

We found that documenting every step was one of the most important components for the success of these projects!

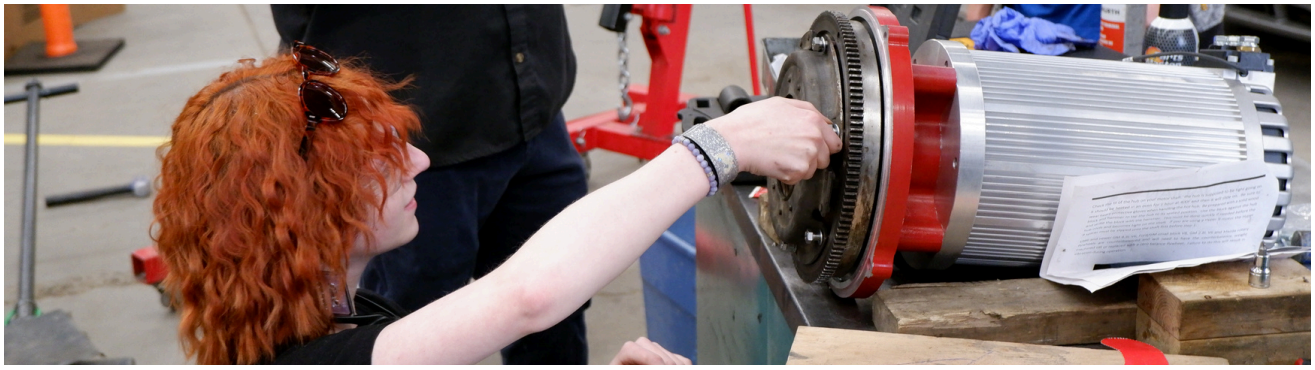
Understanding Internal Processes: Identify Permissions

Due to the innovative nature of our projects, there were many new processes and updated procedures that needed to be in place to ensure student and staff safety, especially to allow the completion of high voltage tasks. This provided an opportunity for the school board to understand how they may need to adapt in the future as Canada's transportation sector shifts towards electrification.

There were a few key items we felt were a priority: as mentioned previously, the first step was creating an agreement, or "Letter of Understanding" (LOU) with the school board prior to collecting data from students, or sharing Media Release Forms to allow for documentation of student work. Second, a Safety Work Practice was developed in response to an Administrative Regulation (AR) that was in place to ensure safety for our Alberta project. With the Safe Working Procedure, an appropriate alternative or approach to high voltage work was agreed upon between the school board and conversion team. The Safety Advisory Services also visited the school with the local fire department to ensure all precautions were being taken and appropriate measures were in place to ensure a safe project.

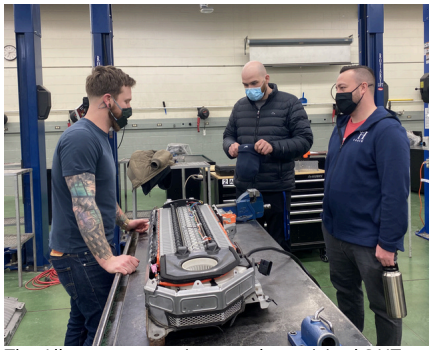
We worked with the PDSB risk management team to review the project and the safety steps being taken. They agreed that the school could undertake this project. Different school boards have different regulations and policies in place, this would be good to check out before starting a project of your own! It's important to ensure that your plan meets any safety requirements needed by your school board or organization.

This is something we encourage you to consider looking into immediately if also working on your conversion in an educational setting, as many boards have not had the opportunity to understand what a project like this may entail. It can be an exciting opportunity to pioneer something but keep in mind that internal processes may take time to be established and approved.



Safety Precautions and Training

It's important that those involved in the conversion are trained and prepared well in advance of starting your conversion. The lead Automotive Teachers for both projects, Cody Price and Vartan Meneshian, attended an Electric Vehicle Technology and Service training course at BCIT to ensure they were adequately prepared and trained. This hybrid course was a week of virtual learning, followed by a week of in-person training for high-voltage EVs. Vartan also attended an additional 1-day in-person training session at the Ontario Council for Technology Education (OCTE) prior to his training at BCIT. We recommend checking out NRCan's Zero-emission list of teacher training opportunities here!



The Alberta automotives teachers visited SAIT Auto Shop to learn about the safety equipment needed for an EV conversion.

This is a relatively new field so you will need to explore if there are any training opportunities near you and if so, what is the cost and timing needed for this type of training. More training opportunities are becoming available as electric vehicles are becoming more prevalent. Cody and Vartan were both the first teacher in their board to receive high voltage training needed for this project, which has since then informed the CBE's Safe Work Practice for high voltage work on electric vehicles to include additional safety measures for students, teachers, and visitors.

As both of these conversions were taking place in public high schools, we also needed to be aware of the additional safety measures the Calgary Board of Education and the Peel District School Board had in place to ensure that students and staff remained safe. Primarily, the two safety measures central to our preparations were to take proactive fire safety measures with the lithium ion batteries, and ensure that training, precautions, and permission was granted for Cody and Vartan to complete the high voltage tasks on the electric vehicles.

Currently, the voltage of an EV battery can range from 40 V to 900 V. This means that most EV batteries have the potential to allow a dangerous electrical current flow through you, or a conductive item. This current could be seriously harmful, even fatal! This is why it's really important for anyone involved in the high voltage conversion tasks to be fully trained and safely prepared for the tasks.

The Alberta Automotives teachers visited SAIT's auto body shop to learn about the safety equipment used for the EV conversion.

Finally, there were a number of tools we purchased (or borrowed!) that were required for high voltage work. This list was provided by the BCIT training. A comprehensive list is below - these are the items we used for the vehicle conversions, in addition to the standard automotive shop fare.

Safety Tools:

Precision MilliOhm Meter		*To verify that a motor is in good shape, a milliOhm meter can verify that the windings aren't failing. This is something that would be useful if you were considering using a pre-used motor.*
Insulated Rescue Hook		*Trained individual connecting or disconnecting high voltage systems? This tool is a backup safety measure that allows someone else in close proximity to pull the person working on the high voltage system away if they were to get electrocuted (as they would be unable to let go).*
Orange safety pylons, stanchion and chains		*Mark off your high voltage workspace with high visibility safety markers. In addition to being bright, did you know that orange safety indicators typically represent high voltage?*

Digital torque wrench or Mechanical torque wrench		*Ensures that connections between batteries in a high voltage system are done securely (preventing an increase in resistance due to a loose connection), and the terminals aren't damaged by over torquing.*
Insulated sockets and ratchets		*Rubber insulated tools (rated to 1000 V) prevent accidentally shorting out your system!*
Hydraulic crimper (yellow) **Cutters** (black)		*The crimper is designed to provide an accurate, tight crimp to the high voltage cable.* *The cutter is well suited to cut the thick copper wire (below) used for the high voltage components.*
High Voltage Wire		*Wire should be ORANGE if carrying 40V or more.*
Digital Insulation Multimeter (CAT3)		*Two main tasks:* • *Ensures high voltage battery has indeed been disconnected before it's worked on (often by doing a "live-dead-live test" with a 12 V auxiliary car battery before and then after testing the high voltage system).* • *Can confirm by measuring the amperage that there are no "electrical leaks" in the HV system (ie. battery cables that were crimped or insulation damaged)* *A safe working voltage is less than 30 V.*
Insulated Rubber Gloves (Class O)		*Class 0 insulated rubber gloves, or lineman's gloves, are required whenever working near high-voltage parts on an electric or hybrid electric vehicle.* *These need to be reinspected every 6 months.*
Combustible Metal Fire Extinguisher (Class D)		*Fire mitigation safety tool- a heavy-duty fire extinguisher better suited for this conversion project.*

Conversion Process

"[it's a] great new learning opportunity, [with] EVs becoming more common [these are] valuable skills to be able to carry out [our] own repairs."

- Emma
The Woodlands S.S. Student

Key Checklist

- [ ] Purchase vehicle
- [ ] Purchase conversion kit
- [ ] Prepare vehicle
  - [ ] Restoration (if applicable)
  - [ ] Drain fluids, remove & dispose of all ICE components (gas tank, engine). May need to remove transmission (for ease of access to adaptor plate, motor).
- [ ] Preparing for conversion
  - [ ] Kit may not have battery box (may need to fabricate and weld battery box)
  - [ ] Determine how power steering/brakes will work
- [ ] Convert vehicle
  - [ ] Mount motor and controller and install other electric vehicle components
  - [ ] Wire vehicle
  - [ ] High voltage tasks

Purchase Vehicle

When choosing your vehicle, consider the outcomes you established with your team. We chose to convert a Volkswagen Beetle, a Ford Ranger, and a Mazda Miata, all for various reasons.

Initially, our first vehicle we chose to convert was a 1975 Volkswagen Beetle. This type of vehicle had successfully been converted before and we believed the compact size would work best for our pilot conversion. We then chose a 2009 Ford Ranger to convert. This vehicle was chosen as a learning tool and for future use of the school, as it would be used to transport equipment or as a school spirit item. Next, we chose to purchase a 1999 Mazda Miata MX-5. This vehicle was compact, required very little restoration work, and was also a vehicle of choice for the students who worked on the conversion.


1975 Volkswagen Beetle


2009 Ford Ranger


1999 Mazda Miata

Here's some more insight on the vehicles we chose for our EV conversion projects below.

1975 Volkswagen Beetle - $7,500

- Affordable, great learning opportunity, "cool" factor when considering aesthetics, have been successfully converted before. This vehicle wasn't working previously - added bonus of bringing the car back to "life" and bringing in elements of a circular economy.
- More challenging to remove body from frame, this specific vehicle required a lot of bodywork and restoration due to condition and age

2009 Ford Ranger - $9,500

- Body on frame, manual brakes and steering, better suited for learning tool and future use (can lift the body off much more easily), and could be driven/towed as a school spirit item (transporting equipment to games, etc).
- Power steering and brakes are more complex to convert than manual, so a manual vehicle was chosen.

1999 Mazda Miata MX-5 - $7,000

- A more compact vehicle with a manual transmission was decided upon as the best option for the school
- Some rust spots, but otherwise little restoration work was required, as was the goal when purchasing a vehicle for this project
- Affordable, easy to convert with manual power steering and brakes, the smaller size of the frame can make it difficult to fit electric vehicle components like the battery boxes.

When considering your project, we recommend you consider only converting one vehicle at a time to save space in the shop, and for ease of post-conversion management. It's also ideal to have manual brakes and steering (not power brakes or steering) to simplify the conversion. Also consider the size and condition of the vehicle before purchasing as this will affect the timeline for the project. We found these vehicles for sale through used car shops, auto repair shops, and on Kijiji. For a unique or more affordable approach, you could also look into converting golf carts, ATVs, a zamboni, or a forklift!

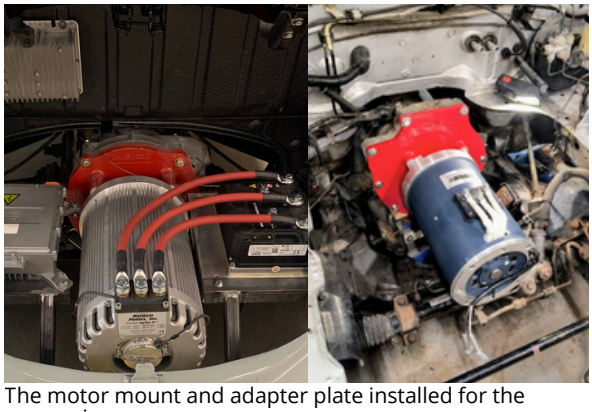
Purchase Conversion Kit

There are two types of electric conversion kits available: custom kits, which are tailored to specific vehicle models, and universal kits that can be installed in a variety of vehicles. Universal kits contain all the essential drive-system components but rely on the builder to create custom parts like battery racks or boxes. Custom kits include the entire drive system and battery racks and boxes, customized to suit a particular model.

We used the same type of universal kit for all three of our vehicle conversions, directly purchased from CanEV. For your reference, each "Educational Builder's Kit" was approximately $35,000.00 at time of each purchase, and included:

- Drive System (Hyper 9 LV Drive System or AC-50 Drive System)
- Contactor Box
- Battery System (including 3.2V or 228Ah lithium ion batteries)
- Additional Options (custom battery boxes, CAN BUS Kit, Heater Element, Power Brake/Steering Elements)

In addition, we needed to purchase an adaptor plate, specific to each vehicle and the type of conversion kit purchased. Some kits have an adaptor plate included.



The motor mount and adapter plate installed for the conversion.

There is a wide range of kits available - along with a wide price range! The kit we used for our conversion vehicles included many parts, and was expensive. However, we found this a more efficient way to get the pieces we needed, and we knew the kit pieces were chosen to work well together. Instead of sourcing and troubleshooting each individual component, we could focus on executing the conversion and have more success in completion.

However, keep in mind that there are other options available. A basic EV can be powered by a 36 - 48 volt DC battery, currently at a price range of about $5000. The additional parts needed for your conversion may vary greatly in price, and those prices can fluctuate rapidly with supply and demand. We suggest you establish a clear budget prior to ordering your pieces, and keep it updated while placing orders to remain aware of any changes to your expenses.

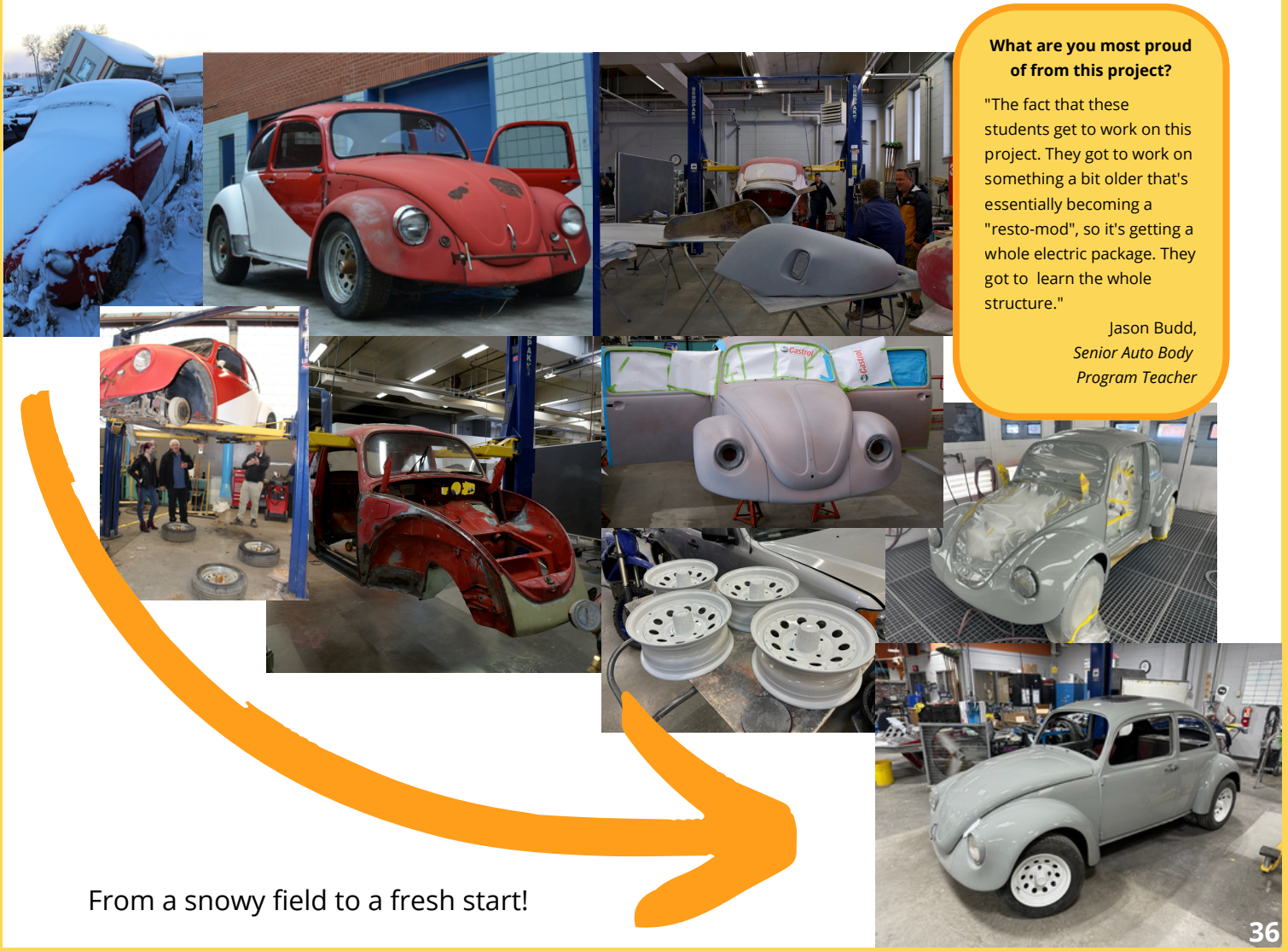
EV conversion parts being delivered to Crescent Heights High School and The Woodlands S.S. during the conversion process.

Prepare vehicle - Restoration (if applicable)

Each vehicle will have its own needs; at this point in your project, we suggest you ensure the vehicle you purchase is now restored and/or drivable. For many, that means this step is complete! This was the case with our Ford Ranger - we were confident it drove, and no bodywork or paint was needed. This was also mostly the case for our Mazda Miata - some light rust touch-ups and it was ready for the next step.

However, if you're interested in a challenge or purchased an antique, you may have your hands full with some restoration work! This was the case with the VW Beetle. The Beetle, after years of sitting in a farmer's field, was in dire need of some body work and a fresh paint job to restore and protect the body of the vehicle. Before we could move forward with the conversion, this restoration work was needed. While an additional step, this was a rewarding choice. The decision to restore a vehicle meant that it was rescued from a junkyard fate and recycled into a zero-emission vehicle.

The majority of the restoration work on the VW Beetle was completed at the Career and Technology Centre (CTC). First, students worked to restore the fenders, base and hood of the vehicle. This was an extensive task, as the condition of the vehicle was very poor. Once the body work was complete, the vehicle was primed, and then later coated with a single stage paint. The old, and unique shape of this vehicle made for challenging work and a great opportunity to redirect a vehicle from the fate of a landfill back into drivable condition.



What are you most proud of from this project?

"The fact that these students get to work on this project. They got to work on something a bit older that's essentially becoming a "resto-mod", so it's getting a whole electric package. They got to learn the whole structure."

Jason Budd,
Senior Auto Body Program Teacher

From a snowy field to a fresh start!

Prepare vehicle - ICE Components

In preparation for the vehicle conversion, you'll need to drain the following fluids from the vehicle: engine oil, coolant, power steering fluid, fuel, washer fluid, brake fluid, clutch fluid, differential fluid, and transmission fluid. You will also need to remove all ICE and associated components (gas tank, engine, etc.). Depending on your vehicle, you may also need to remove the transmission. We found it much easier to mount the adaptor plate and motor to the transmission after removing it from the vehicle. Before starting this step in the conversion, check out our ***EV Conversion Simulator*** with your students to go through each step virtually and navigate the general process of converting an ICE vehicle into an EV.

Finally, consider what the disposal of your internal combustion engine and components could look like. If the vehicle you're working on has a working engine, you may be able to sell it for funds to contribute to your EV conversion, and provide the necessary parts for someone to repair their ICE vehicle. Taking the vehicle apart creates a great learning opportunity for learners to have an up-close understanding of how an internal combustion vehicle works.

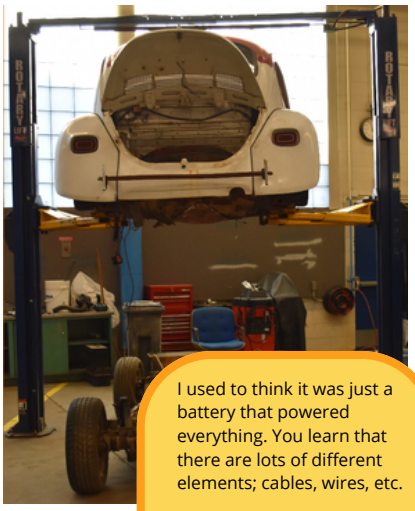
Preparing for conversion- Battery Box and Power Steering/Brakes

Now that your vehicle has been "emptied" of the ICE components, this is a great opportunity to take a closer look at how everything will fit together. With the VW Beetle, the old floor of the vehicle wasn't sturdy enough to safely anchor the weight of the two custom battery boxes. Instead, a few additional supports were fabricated and welded to the battery boxes to ensure safe mounting. With the Mazda Miata, the space was too small to fit the battery boxes. The space had to be shaved down slightly and a few pieces of metal were welded to make extra space. The Ford Ranger did not run into this issue, which is why we recommend considering the size of the vehicle for your conversion project beforehand. Additionally, it's possible that your conversion kit may not include battery boxes, so you might need to fabricate your own battery boxes!

Students at both high schools taking measurements, welding, and working on the battery boxes in preparation for installation.

Most vehicles made in the last few decades will have power steering and power brakes. You can avoid purchasing a vehicle with power steering and brakes by purchasing an older vehicle to help simplify your conversion. All of the vehicles we chose had manual brakes and steering.

If you're taking on the more challenging option of working with power steering and brakes, you'll need to determine how you want this to work - typically these systems rely on the ICE components of the vehicle. The Ford Ranger had vacuum assisted power brakes, so a vacuum pump was installed. The Ranger used a belt-driven hydraulic power steering pump; one conversion option is to install an electric motor to turn this belt. An "electric over hydraulic" power steering pump was chosen.



I used to think it was just a battery that powered everything. You learn that there are lots of different elements; cables, wires, etc.

- Emma
The Woodlands S.S. Student

Convert Vehicle

While converting your vehicle, there will be many hands-on opportunities to share with your learners how ICE vehicles and EVs compare and contrast. We recommend proactively planning to ensure that you know which steps you think your learners would benefit from and which topics you'd like to highlight. In our experience, conversions and timelines can rapidly become complex and demanding, so it's helpful to identify learning opportunities early to plan for and support regular participation and engagement from learners.

Each vehicle will vary; the following list provides an overview of the general conversion steps taken by the automotive teacher and their classes:

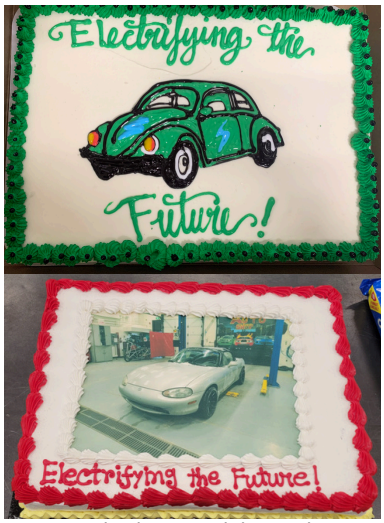
1. Prepare the chassis (possible restoration, check driveline components, brakes and suspension in a safety check, clean/paint)
2. Mount the motor and adapter plate onto the transmission (and/or driveline)
3. Install electric vehicle components
   - Mount the battery boxes
   - Install the motor controller
   - Replace the brakes and hydraulic power steering (if applicable)
4. Install a convenient charging port to your vehicle
5. Wire EV components (converter high voltage DC to low voltage DC, vehicle (auxiliary wiring) - we also purchased a State of Charge (SOC) display for the VW Beetle to monitor the battery's remaining charge
6. High voltage tasks (for our conversions, this step was relatively small compared to the rest of the restoration and conversion)

Learning can easily extend outside of the garage! With the help and support of the automotives teachers for this project, UCalgary's Relectric Car Team, SAIT, and other volunteers, we've created various resources to increase education and awareness of electric vehicles (EVs), charging infrastructure, and related career opportunities among high school students and educators across Canada. Check out our 'Resources' section on **page 48 + 49** to find out more!

Post-Conversion Considerations

Key Checklist

- [ ] Inspection and registration of vehicle
- [ ] Showcase opportunities
- [ ] Plans for future use



Decorated cakes to celebrate the students' and teachers' hard work!

Inspection and Registration of Vehicle

If you intend to drive the converted vehicle, keep in mind that you have made some big modifications! Consider the rules and regulations of your area. If the vehicle was unregistered and unlicensed when you purchased it, you will likely need to pass an inspection before hitting the road. Depending on how the chain of ownership has occurred within your team, you may also want to confirm who (or which organization) currently owns the vehicle before pursuing the appropriate paperwork. Your vehicle will need to be registered with an organization, like the school board, to fully operate or drive. This includes in public areas or on school grounds!

Showcase Opportunities

With all the hard work you've invested into your project, you may be interested in showcasing your vehicle in an automotive show, community event or sustainability fair! You may also be interested in hosting a celebration event of your own, where you can showcase your vehicle to various partners or organizations that were involved.

For example, GreenLearning was invited to attend and showcase the VW Beetle conversion project at SAIT's Transportation and Manufacturing Industry Night. This was a fantastic opportunity to speak with post-secondary students, SAIT employees, industry professionals, and the general public on the growing interest and importance of EVs.

The excitement about the project from these events was so inspirational, and reached a large audience. We felt it was well worth the money and time to participate in these events. To find out more about the specific events we attended in Alberta and Ontario, check out our Charging Ahead Project Learnings!

Plans for Future Use

At this point, your conversion is complete, lessons learned, and tools put away. Consider what will come next for your converted vehicle. If your project outcome was centered on student skills and development, do you have the opportunity to auction off the vehicle to repeat the process for a new cohort? Is there potential to share the vehicle with other schools or learning communities for them to learn from your work? Can you use the vehicle as a display model for future classes? The sky is the limit!

Charging Station

This section of the guide provides key steps for the selection and installation of an electric vehicle charging station(s) in your community. A key checklist, suggestions, and additional information can be found in each stage of the process.

- **Preparatory Steps:** This stage includes the tasks that should be done prior to the purchase and installation of your vehicle charging station.
- **Installation Process:** This stage covers any considerations you may have during the installation of your charging station.
- **Post-Installation Considerations:** This stage offers guidance on how to manage your new resource in a shared, educational setting for long-term use.

A note: *We are not the first (and likely not the last) group to compile a guide about installing a charging station. If you are looking for a comprehensive guide to installing a charging station, we've found the Municipal Climate Change Action Centre's EV Charging Install and Operations Guide to be a very valuable resource.*

However, we did want to share our experience pioneering the installation of a charging station at two public high schools. The context of introducing this new infrastructure within the Calgary Board of Education and the Peel District School Board meant that each decision would set a precedent for future projects.

Preparatory Steps

Key Checklist

As with the Vehicle Conversion Preparatory Steps (p.24), we recommend that you:

- [ ] Identify team roles, responsibilities, and expectations
- [ ] Outline project outcomes
- [ ] Make a budget: Your time and money
- [ ] Explore grants, funding, and reporting
- [ ] Understand internal processes: Identify permissions

Additionally:

- [ ] Choose a charging station(s)
- [ ] Identify charging station location(s)

Choose a Charging Station

Identify which charging station is best suited for your community. Who will have access to it? What will they use it for- a quick boost, or a longer charge? Are there charging stations already installed at other schools or in the community? Should you purchase the same kind or a different type?

Currently, there are three commonly used types of charging stations available; Level 1, Level 2, and Level 3. Take a look at the chart below to see which charging station may be best suited for you and your community.

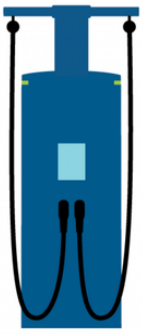
	What can it do?	Who is this suitable for?
 **Level 1**	• Uses household plug to charge (120 V) • Slower charging rate • Portable	• Personal use, especially for overnight charging of smaller batteries like those used in plug-in electric vehicles (PHEVs) • Emergency charge (portable)
 **Level 2**	• Uses 240 V plug • Can charge an EV in 5-10 hours	• Personal or public use • Public buildings, businesses, schools; locations where vehicles typically park for at least a few hours or overnight.
 **Level 3** (aka Direct Current Fast Chargers, or DCFC)	• Can charge an EV's battery to 80% in as little as 30 minutes; fastest charging rate available for EVs • Power output typically 50 kW (but can be MUCH higher depending on the charging station)	• Designated charging stations, for users requiring a rapid charging (like a gas station, for EVs)

Table information gathered from MCCAC Charging Guide, 2023
Icons courtesy of ChargePoint

We chose a Level 2 charging station to be installed at both high schools, which seemed best suited for use for the converted vehicles, and eventually, student and staff use. For the Alberta project, a CT4000 Dual Port charger was purchased from ChargePoint. For the Ontario project, a Level 2 Eaton EVSE (electric vehicle supply equipment) charger was donated from Plug'n Drive, and a Level 2 Flo CoRe+ PowerSharing Dual Port charger was purchased from Flo. When choosing the charging station, we recommend considering the type of brand you want to use and work with for your project. A Level 3 charging station may be of consideration if your school or school board is looking into investing in electric school buses.

The ChargePoint and Flo charging stations can be managed digitally, allowing waitlists to be created, data to be tracked, and the station to be activated or inactivated during key times. The Eaton charging station does not require wifi or other remote monitoring features, thus deciding it would be best used as an educational tool within the automotive shop at PDSB.

As these charging stations are installed on public school grounds, it has been important to have many conversations with the CBE and with the PDSB to ensure student privacy, security, and safety is respected. The decisions made about the use of these charging stations will set a precedent for many other schools in these divisions, and requires deliberation by the decision-makers. These charging stations can be decided to be used by the school only, the public, or just the converted vehicles depending on what works best for your project.

Identify Charging Station Location

With permissions granted, your finances and budget in place, the last preparation step is to choose where your charging station will fit best. We found that working collaboratively with the project team to share our thoughts and ideas and decide upon a location was the most effective. Utilizing the expertise of the school principal, the facilities manager, the lead teacher for the conversion, the charging station installer, and the students, gave us valuable insight on the best location.

Our Project Manager met with the Crescent Heights High School's Facilities Manager and Zeno (the charging station provider and installer) in Alberta. Our Education Coordinator met with The Woodlands Secondary School's Acting Principal and the Automotive Instructor in Ontario, and had a **site plan** created, reviewed by PDSB's Facilities Department and Electrical Supervisor.

Some of the key questions they discussed while narrowing down locations were:

- **What kind of electrical supply does your community have?** *If the available grid capacity doesn't meet the needs of your charging station, the next step is to get in contact with your energy provider.*
- **How much electricity will the charging station use?** *This will depend on your users: when, how many, and how often?*
- **How much space do you have?** *Is there an opportunity to add more stations in the future, as needed?*
- **How close are you to your electrical panel, or power source?** *The further away, the more conduit and labour will be needed to install the station, increasing the cost of installation.*
- **How accessible is this location?** *Think about how people will find, get to it, and use this station. Are there barriers in place?*
- **Are there security measures in place?** *Consider video surveillance, lighting, and possible security measures like fencing-in the station to prevent vandalism.*
- **Are you able to communicate easily with station users?** *Consider how you will communicate who can use the charger, when, and for how long. Will there be signage, an app, or something else?*

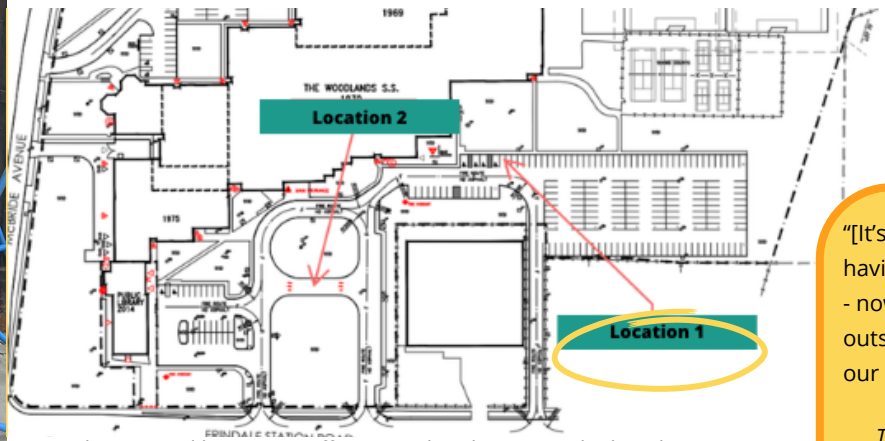
Alberta Charging Station Location

We decided to install the charging station in the student parking lot. The student lot is a high traffic area, well lit, and already under video surveillance. Additionally, it is close to electrical panels in a tech classroom located just inside the school. Electrical panels are the easiest points of access, and this classroom has high ceilings which makes installation easier. The school's back up generator is located right beside where the charging station is installed so it was cost effective for running conduit underground. It may be worth exploring whether there are any similar projects scheduled for your community that you can connect to your charging station project.

An aerial overview of Crescent Heights High School to determine to best place to install a charging station.

Ontario Charging Station Locations

When deciding on a location for the Flo charging station, there were 2 possible sites being considered. Ultimately, it was decided to move forward with location #1, as it was within camera visibility, and the other location would require more electrical work to connect to the building's main electrical panel. Additionally, the other location had limited accessibility with parking and allowing the public to access the chargers.



A site plan created by PDSB staff was used to determine the best location to install a charging station at The Woodlands High School.

"[It's] pretty cool having two chargers - now we have one outside and one in our class."

- Anthony
The Woodlands S.S. Student

Plug'n Drive generously donated a Level 2 Eaton charging station to The Woodlands Secondary School for this project. This specific charging station does not require wifi or other remote monitoring features and it was best suited to be used as an educational tool within the automotive shop at PDSB or to charge the Mazda Miata once converted. The location it was installed in is directly by the garage door at the back of the class, making it easily accessible for the Mazda to charge, or for student learning.

Installation Process

If all goes smoothly, it's possible for a Level 2 charging station to be installed in about two weeks. This can really depend on the local context - stock, labour, and scheduling need to line up!

For our pilot project, our timeline changed frequently, as stock shortages and scheduling conflicts occurred. However, once the station arrived and an installation schedule was confirmed, the process was quite straightforward. This helped us leverage what we learned and apply it to our project in Ontario. By the time the charging station was delivered to the head office, multiple conversations were conducted discussing the timeline and within a month, the charging station was installed.

The beginning of the installation process depends on whether the electrical conduit is already laid (consult with the school's facilities manager). If not, the next step would be to plan a directional bore, a minimally invasive drilling method that installs underground conduit and cables. With the inclusion of this step, the installation process will likely be more time-consuming and costly.

If the conduit is already laid, the next steps would be scheduling a time with the school board to pour a concrete pad, installing protective posts (optional), painting lines for parking (if not already done), scheduling a time with the installer and the facilities manager to deliver the station and complete the electrical work to put the receptacle in place, and then confirming that the charging station is safe and ready to use. Some behind-the-scenes training for the administrators managing the charging station's activity may be needed, as the station can be managed digitally.

A Level 2 ChargePoint charger installed at Crescent Heights High School.

A Level 2 Flo charger installed at The Woodlands High School.

We worked with Zeno Renewables, a local solar solutions and sustainable energy company in Alberta, and Holley Electric, a Canadian family owned and operated electrical contracting business, in Ontario. Both companies were willing to take on the installation of the charging station. The process involved:

1. ***Consultation (complementary)***
2. ***Assessment of site***
3. ***Installation***
4. ***Certifications and Inspection***

Post-Installation Considerations

Depending on your location, you may consider adding signage or additional security measures to ensure welcoming, efficient, and safe use of the charging station. This could look like a sign communicating active hours, permitted users, noting video surveillance, or instructions for general use. It may be reasonable to consider installing a fence and lockable gate around the charging station to discourage vandalism if it's a concern in your community. This is also a great opportunity to create some passive learning material, if it suits your environment. Signage explaining what a charging station is, how it works, or where the electricity in your community comes from can help educate your community.

Signage for the charging station installed at The Woodlands High School.

Typical maintenance for a charging station depends on its environment - charging stations are generally made to last if used respectfully, and are designed for a longevity of around 10 years. As technology advances, updates to the charging station could include new software, but the physical charging station is unlikely to undergo many upgrades or changes. If anything, it's possible that connector changes could occur if the industry makes a change, but for many organizations, field upgrades or retrofit kits would be readily available.

The visibility of charging stations is important for people that may be "on the fence" about whether or not charging stations bring a benefit to their community. Learning that infrastructure for EVs is readily available in their community shows people that an electrified option is available to them. It also confirms an interest and dedication to sustainability and the environment in their community.

There are plenty of considerations to be made regarding the use of the charging station. Many charging stations include software to help manage usage. You will need to determine if it will be available for charging 24/7 or during school or business hours. Will users pay and if so, how much?

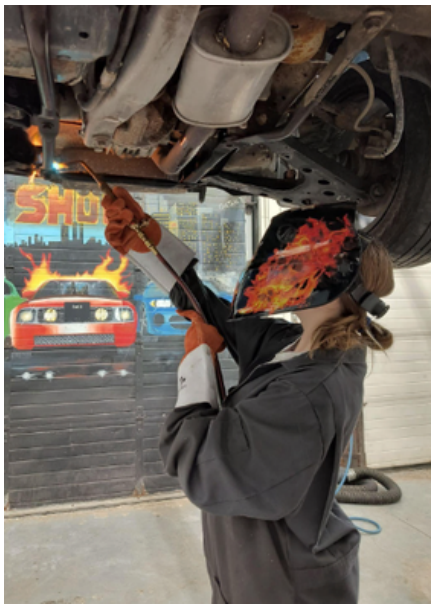
For the Ontario project, it was decided that community members can use the charging station as well as the students and staff. Rates will be the same for all community members who use the charging station, as a base amount is set by Flo. A portion of the revenue from the charging station will go back to Flo, while the other portion will go back to the school to cover the cost of the electricity.

What impact do you hope this project has?

"I hope that it allows the CBE to seriously consider implementation of the technology (charge stations), and spurs the discussion of "what role do we play?". On the learning side, also considering "how are we preparing students for this inevitable future?"

- Olena Olafson,
CBE Sustainability Coordinator

Conclusion



These projects provided numerous learning opportunities for a wide variety of students and also helped them explore post-secondary and career options through partner connections.

As a testament to the interest in the project, student involvement was continuous over the academic year. EV Clubs, classroom presentations and webinars, and logo design class engagement all indicated student interest beyond the automotive classes. Being able to engage with numerous classrooms, as well as additional high schools in the board, created excitement about the project amongst students and created life-long learning. These projects allowed students to become their own advocates, able to readily speak about the project at conference presentations and to the media.

A full EV conversion project is valuable in providing direct experience in understanding the differences between ICE and EVs. However, we recognize that it can be costly and there are many training and safety considerations. There are a variety of intermediate alternatives or supporting options that can help. Some of these will take time and resources to further develop. There are also a few observations that we note, recognizing that this is an industry full of potential for development.

Considerations

- A full conversion provides in-depth learning about both ICE vehicles and EVs. It is costly and takes time; we recognize that it may not be possible for every high school to complete a full conversion. Instead, a school board could consider doing just one conversion, and the converted vehicle could be showcased in the community and shared among schools in the school board as a learning tool.
- As a first step for those new to conversions, consider exploring smaller scale transitions such as converting golf carts from gas to electric or electric ones to using solar power. Zamboni's or forklifts could be another approachable vehicle.
- Utilize EV mechanics, owners of EVs or others that have completed conversions as a learning resource.
- Use some of the learning resources identified in this guide to support student learning.
- Dual-credit opportunities or apprenticeship programs through partnerships with post-secondary schools may be an option, as many institutions are beginning to offer them. This could alleviate some of the up front costs and help bridge the financial gap.
- School boards will need to create or review safety policies in relation to students and teachers working with high voltage EVs and also create charging station policies as more EVs are on the road including electric school buses.
- Automotive curriculum will eventually need to keep pace with the EV transition, as will teacher training and equipment.

The future of electrification is bright! It may have some bumps in the road but with all the engagement and encouragement from partners and supporters, coupled with the excitement from the students we are confident we will reach that destination together.

What We Learned

Over the past three years, we have gained a lot of insight and knowledge on what we would do again, what we would change, and what we would do differently in the future. This section highlights some of the things we learned. We highly recommend checking out the full list below before you consider doing your own electrification project!

- Working with a school board immediately helped get high voltage approval and media releases quicker. We also administered an LOU right away that outlined everyone's expectations and responsibilities for the project.
- If you are wanting the conversion process to go smoothly, we recommend purchasing a car that requires little-to-no restoration work. This will be a bigger step to complete before the actual conversion work begins. However, the restoration component is a great learning opportunity for students if you have the time to include it!
- Things beyond your control, such as supply chain issues or teacher strikes, may arise. This will delay your project timeline, so it's important to plan for unexpected issues like this when you're planning your conversion project.
- During our Alberta pilot project, our automotive teacher moved high schools. This required us to plan how to move the cars from one high school to the other, while they weren't fully converted or drivable. For the next project we did in Ontario, we included a section in the LOU that stated the teacher will continue with the project if they move schools during the time allotted, to keep things clear.
- Before purchasing a vehicle to convert, you may want to consider the size of the vehicle. The Beetle and Miata were both on the smaller size, which was the biggest obstacle for students trying to fit the battery boxes securely into the car. They had to shave some of the metal down and add additional mounts to attach it securely. The Ford Ranger didn't require the same additions.
- Another thing to think about when purchasing a vehicle is how it will balance the weight distribution of the battery boxes. If it's a smaller vehicle, you don't want the batteries all in the back or the front of the vehicle. Is there enough room on both ends?

Additional Resources

Learning Resources

From educator feedback, workshop participants, and industry experts, we developed a number of resources. These resources are ideal for people learning about EVs or charging stations, and may help with your project in a student or learner capacity.

EV Conversion Simulator

In collaboration with our ETF automotive instructors for both projects, Funktion Designs, and other volunteers, we've developed an EV conversion simulator. This simulator was designed to give you an introduction to the process of converting a gas-powered vehicle into an electric vehicle, and the differences between the two.

LINKED HERE

ETF Charging Ahead Educator Video

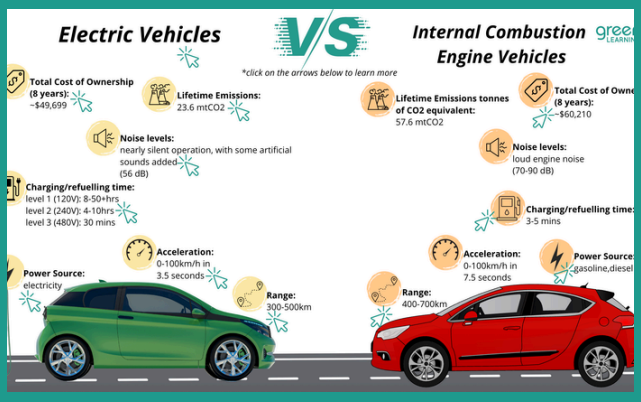
GreenLearning's Charging Ahead Workshop for Educators webinar gives an in-depth look at our Electrifying the Future Pilot Project in Alberta, where educators can hear directly from the automotive teachers in charge of the EV conversion project and get a behind-the-scenes look.

LINKED HERE

ETF Charging Infrastructure Video

Get a behind-the-scenes look at the Ontario ETF project. In this video, you see how the EV charging infrastructure at a school supports student learning, the transition to clean transportation, and the emerging career pathways for students.

LINKED HERE



Motor Controller Simulator

In collaboration with UCalgary's Relectric Car Team and Funktion Design, we've built a motor controller simulator. This introductory-level simulator allows learners to explore how the various components of an EV are wired together, and the role they play in making the EV move.

LINKED HERE

EV vs ICE Vehicle Interactive Infographic

Check out this interactive graphic on the differences between electric vehicles (EV's) and internal combustion engine vehicles (ICE).

LINKED HERE

Additional Resources Continued

Check out our ETF landing page for other resources here!
See how GreenLearning's ETF program can kickstart your EV Career here!
Take a minute to explore an electric vehicle: Electric Vehicles: Tesla 3 Video Tour

Other Electric Vehicle Resources

We found the following resources beneficial for the community leaders in our project.

BCIT Course - linked here, you can find the training that the automotive teachers attended to prepare for high voltage tasks.

This EV workshop can provide insight into how EVs work. This is especially helpful for those looking for in-depth explanations behind different stages of their conversions.

The Municipal Climate Change Action Centre has a great resource on how driving an EV might save you some money. Electric Vehicle Savings Calculator linked here.

Plug and Drive lists multiple benefits to electric vehicles, including government incentives here.

The Electric Vehicle Affordability Program (EVAP) in Canada offers incentives for purchasing EVs, find out more here.

Charging Station Resources

If you're on the lookout for resources that can help you better understand charging stations, or communicate how they can impact a community, consider the following:

Municipal Climate Change Action Centre Resources:
- EV Charging Install and Operations Guide Link

Charging Guides:
- Chargehub's Charging Guide
- Zeno's Home Charging Guide

Charging Station Apps:
- ChargeHub
- PlugShare

Career Potential:
- Chargepoint Electrification Blog Post
- Pembina Institute Blog Post

Opportunities for EV Learning

The future of EV is so bright! This project has connected us with other like-minded organizations that focus on providing students with exposure to emerging career pathways in electric vehicle technology, and teachers with opportunities for proper EV training and practice. Check out the organizations listed below to find new and exciting opportunities for EV learning in your classroom.

The Switch Lab is an educational program that lets students build real, road-ready electric vehicles right in their classroom through a project-based learning experience. They guide students through assembling major EV components like the chassis, motor, battery, wiring, and safety systems, helping them gain practical skills in electrification, mechanics, and sustainable technology. They offer reusable EV conversion kits, adaptable curriculum materials, and instructor training workshops to support hands-on learning in STEM, auto tech, and career-technical courses. This could be a great alternative to completing a full-scale vehicle conversion!

Edison Motors is a Canadian electric truck manufacturing company that also specializes in various trucks, tractor units, and EV conversion kits. They host a competition called **'The High School EV Challenge',** aiming to spark interest in EV technology among Canadian youth. This challenge happens every year with schools in BC, AB, and SK. Click here to find out more information!

The University of Waterloo also has an EV challenge for high school students to design, build, and drive their own electric race cars in an endurance competition every year. To find out more information, click here!

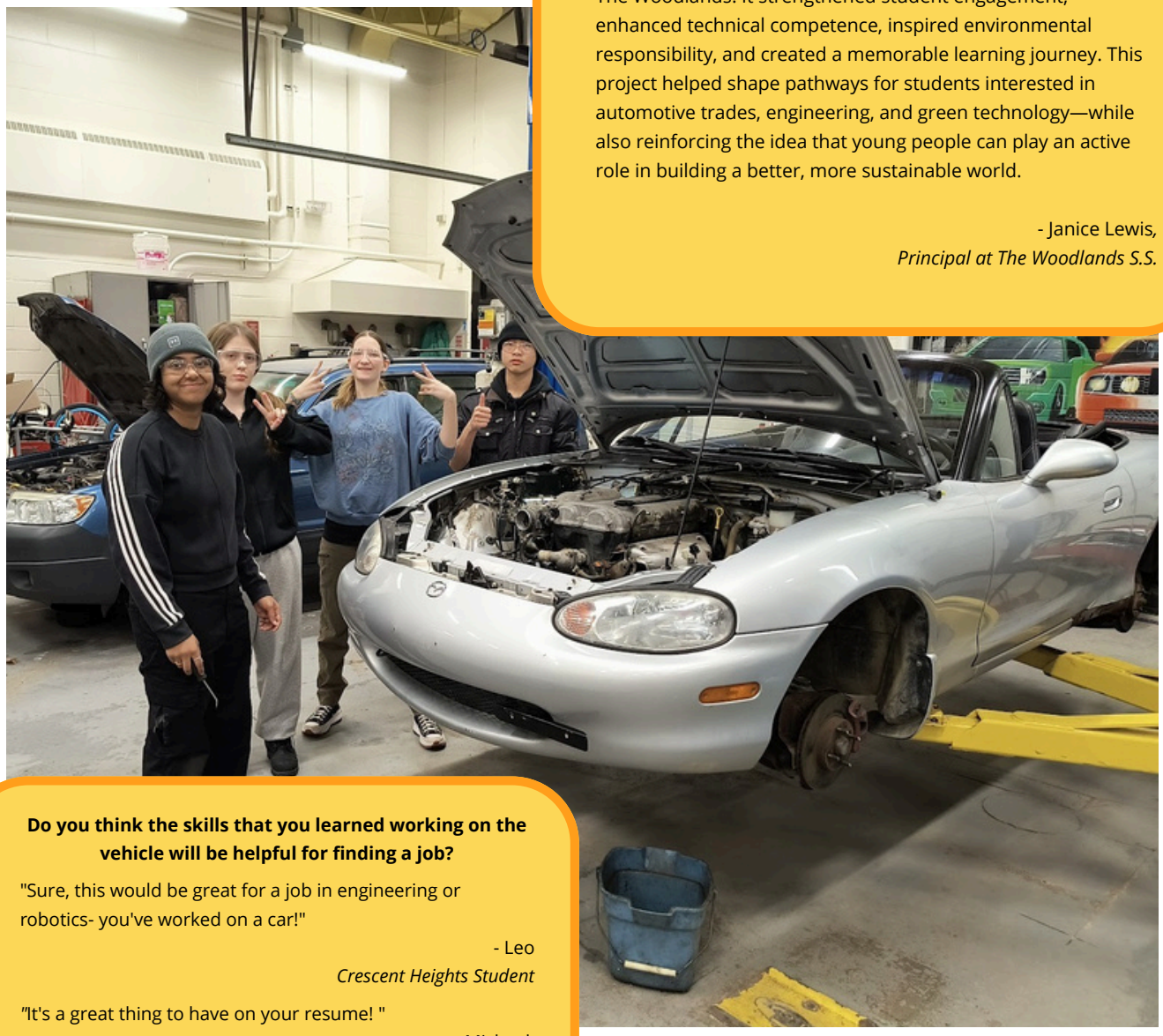
NAIT and SAIT are both piloting EV technician courses this year (2026). These courses focus on training educators in the automotive field who want to learn high-voltage safety training for electric vehicles. Click here to find out more about the EV training courses offered by NAIT and SAIT.

Final Thoughts

We'd love to see what you accomplish. If you take on a conversion project, please feel free to reach out and keep us informed about your progress. We can be reached at programs@greenlearning.ca or tagged @greenlearning.

The Green Learning EV Project was an exceptional success at The Woodlands. It strengthened student engagement, enhanced technical competence, inspired environmental responsibility, and created a memorable learning journey. This project helped shape pathways for students interested in automotive trades, engineering, and green technology—while also reinforcing the idea that young people can play an active role in building a better, more sustainable world.

- Janice Lewis,
Principal at The Woodlands S.S.



Do you think the skills that you learned working on the vehicle will be helpful for finding a job?

"Sure, this would be great for a job in engineering or robotics- you've worked on a car!"

- Leo
Crescent Heights Student

"It's a great thing to have on your resume! "

- Mishaal,
Crescent Heights Student