



Vermont Electric Car Webinar Questions and Answers

This Q&A covers questions received in Drive Electric Vermont Webinars and was last updated on September 20, 2023.

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A. EV Incentives

1. *What incentives are currently available for an EV purchase?*
 - a. The Drive Electric Vermont [incentives page](#) has information on all available EV incentives. The [incentive calculator tool](#) estimates the total value of all the incentive available for an individual new or used EV purchase. General information on the federal, state and electric utility incentive offerings is below:
 - i. **Federal tax credit:** Up to \$7,500 for eligible new models or \$4,000 for used EVs:
 1. *New EV purchase* - If you purchase, then you will claim this as part of your federal tax filing for the year of your purchase. The credit will offset your tax liability. If your tax liability is lower than the amount of the credit you will not get the full benefit as it is not a “refundable” tax credit and it does not carry over to future years. The amount of the credit can be found [here](#). Additional details on income eligibility requirements are [available here](#).
 2. *New EV lease* - If you lease, then the leasing company technically owns the vehicle and they are the only ones eligible to claim the credit. In many cases EV leases will pass through some or all of the tax credit as a lease incentive, although this is not required. Many EVs that are not

currently eligible for a tax credit on a consumer purchase due to North American production requirements may get the value of a tax credit passed through as part of a lease deal. More information is available at [this Drive Electric VT blog post](#).

3. *Used EV purchase* - The federal tax credit for used EVs is 30% of the cost, up to \$4,000 for EVs priced at \$25,000 or less. There are also income eligibility requirements and the vehicle must be purchased through a dealership. Additional details [available here](#).

- ii. **State of Vermont incentive:** Up to \$5,000 for an eligible new or used EV model purchased or leased by someone meeting the State's income and residency requirements.

New EVs with a base price at or below \$50,000 are eligible for a State incentive of up to \$5,000 for an all-electric vehicle or \$3,000 for a PHEV. If you are eligible and go to a "participating dealer" they should be able to pass through the State incentive at the dealership point of sale. Leases of 24 months or longer are also eligible. Details and more information [available here](#).

Many used EVs are eligible for a state-funded MileageSmart incentive of 25% of the purchase price, up to \$5,000. Income eligibility and preapproval requirements apply. This program is administered by Capstone Community Action. Learn more about signing up before a purchase at: www.MileageSmartVT.org

- iii. **Electric Utility incentives:** Nearly every electric utility in Vermont offers EV incentives for their customers. They vary by utility and are generally in the range of \$500-1,500 for an EV purchase or lease, with added incentives for lower income EV buyers. Utilities may also offer incentives for home charging equipment and off-peak charging rates. Details and more information [available here](#).

2. *Do all of the various Federal, State and Utility incentives still apply if the car is purchased out-of-state?*

- a. Except for MileageSmart incentives for used EVs, all the above-mentioned incentives should still apply for eligible purchases made outside Vermont. For the State incentive for new EVs you will need to complete a "[consumer direct](#)" application within two months of the purchase to receive an incentive payment in 6-8 weeks. Check with your utility for information on their application process.

3. *Are there income caps for electric utility rebates?*

- a. EV incentives offered by Vermont electric utilities do not have income eligibility requirements for their "standard" incentives. Many utilities offer additional "enhanced" incentive for lower and moderate income customers though. Some utilities do have

price caps on vehicle purchase eligibility. Please review your utility's website or contact them directly for more information on eligibility for their incentive programs.

4. *What if you make slightly more than the income cap?*
 - a. If you are just above the cap for the State incentive then you would not be eligible for it, although you may still be able to get a federal tax credit and/or electric utility incentive.

B. EV Purchasing Questions

5. *Is it better to lease or buy?*
 - a. It depends on several factors that will vary depending on your individual circumstances. Leasing is a great option as it will roll in the value of the federal tax credit and protect against rapid depreciation seen on some EV models. It may not be a good fit for high mileage drivers (over 15,000 miles/yr) as leases typically include excess mileage fees if you go over the amount allotted in the lease agreement. Leases can roll in the benefit of a federal tax credit, so some drivers will lease with the plan to purchase the vehicle at the end of the lease period. We have some additional discussion of purchase/lease issues on [this DEV blog post](#).
6. *Any suggestions on how to find an EV available to purchase right now?*
 - a. EV supply is improving, but many dealers continue to have less EV inventory due to lingering supply chain issues from COVID-19 and an industry wide shortage of microchips. Many EVs may still be available for ordering. We recommend checking with your dealer or automaker to understand the lead time for an order. You may also want to expand your search to include dealers further afield. Many automakers have inventory search tools on their websites that will allow you to expand your search area.
7. *Are dealers sending used EVs out of state? Any ways to keep more in Vermont?*
 - a. When EVs come off-lease they are technically owned by the leasing company (usually a financing entity associated with the automaker, e.g. Nissan Motor Finance). The leasing company usually gives the dealer where the vehicle is returned the option to purchase the vehicle so they can then offer it as a used model. If the dealer doesn't do that the vehicles are sent to out-of-state auto auctions. Vermont dealers do purchase from these auctions, but if they aren't seeing demand for used EVs they can be outbid by dealers from other states.

Many Vermont dealers have used EVs available and as new EV sales increase we expect to see more used options available in time. Some Vermonters have looked out-of-state to purchase used EVs and had them shipped.

This [resource from Recurrent](#) has information on some of the most affordable used EV options that are widely available .

People interested in purchasing a used EV may also want to check their eligibility for a [MileageSmart](#) incentive, offering 25% of the cost up to \$5,000 toward a used high efficiency vehicle purchase.

C. EVs in Vermont Conditions – Backroads and Winter

8. *I live on a dirt road. Is the clearance too low on most electric cars for this situation?*
 - a. Many EVs do have lower ground clearance to improve aerodynamics and increase range. However, there are growing numbers of “crossover” styled all-electric vehicles which have more clearance. The Drive Electric Vermont [vehicle comparison tool](#) provides information on all of the EV models currently available in the state and can be filtered to show models with all-wheel drive (AWD) standard or as an option. Additional AWD and higher clearance models are expected to become available in the next few years.

9. *How much less range should I expect in winter conditions?*
 - a. We generally say EVs will have about half of their official range in the coldest Vermont winter conditions, although this can vary significantly depending on the model and how it is operated. We have more detailed information on which models include heat pumps and more tips for winter driving on our [winter blog post](#)

10. *Some EVs have a heat pump, some rely on less efficient resistance heaters. Does a heat pump improve winter driving range/comfort?*
 - a. If you are running the cabin heat instead of the more efficient heated seats / steering wheel (common on many EVs, although may require outfitting with “cold weather packages”) then a heat pump will be less of a drain on the battery range. If the outside temperature is below 15-20 degrees F, then heat pumps often lose performance and backup electric resistance heating kicks on. This means the efficiency benefit of a heat pump is reduced in frigid conditions. We have more information on which models include heat pumps and more tips for winter driving on our [winter blog post](#).

D. EV Servicing

11. *Where do I get my (non-Tesla) EV serviced? Dealers, independent repair shops, others?*
 - a. Most EVs on the road today are still under automaker warranties, especially for battery and electric drivetrain issues, which typically have 8 year / 100,000 mile warranties. Warranty service is typically performed at dealerships, although you do not have to go to the same dealer you purchased the vehicle from - any EV dealership authorized to service the manufacturer’s vehicles should be able to perform warranty service.

There are some Vermont dealers who are not yet certified to service their brand’s EV models, so we recommend checking on local servicing before a purchase if this is important to you. Service visits to the dealer are generally not frequent, and you do not have to go to the dealership to get your vehicle inspected, have winter tires put on, or deal with other minor issues, which can save some trips to a dealer if there is a local shop you prefer.

We are aware of a few independent repair shops who have completed EV-specific training and may be good options for out-of-warranty repairs:

- [Mann & Machine](#) in Richmond
- [County Tire](#) in Middlebury

12. *Where do I get my Tesla serviced?*

- Tesla is a direct-to-consumer automaker so they do not have local dealership franchises with service facilities. Tesla has mobile service that can come to you for many issues. However, servicing involving putting the vehicle on a lift requires a visit to a [Tesla service center](#). Vermont legislators enabled Tesla to open a service center [in legislation passed in 2021](#), and as of September 2023 work is underway to adapt the former Hannafords store off Shelburne Rd in South Burlington to a Tesla facility. Vermonters typically visit service facilities in Latham, NY; Peabody, MA; or the Montreal area. Media reports also suggest Tesla will open a facility in Bedford, NH.

Detailed information on Tesla ownership and servicing is available in the Vermont “Tesla Tips” document prepared by a local owner’s group and linked below. This also includes information on how to sign up for the Vermont Tesla owners email list.

<https://www.dropbox.com/s/6mwmej9rfj7r9w0/Vermont%20TESLA%20Tips.pdf?dl=0>

E. EV Battery Life

13. *Is there data on the frequency and cost of battery failure? Do manufacturers warranty batteries?*

- Fortunately, EV battery failures are generally rare. However, they do lose some range over time. [GEOTAB has researched](#) battery range over time and found an average range loss of about 15% after seven years of operation, although individual results may vary widely.

Manufacturers usually offer 8 year / 100,000 mile (whichever comes first) warranties on powertrains, including coverage of battery defects. However, these warranties usually do not cover “normal” range loss over time. Automakers may have separate capacity warranties – for example, Nissan’s LEAF capacity warranty will kick in if the battery health dashboard indicator drops below 9 out of 12 capacity bars (or about 75% of the original range). [Tesla currently offers a similar 70% capacity warranty](#) within their standard warranty periods.

Recurrent has some [information on the cost of EV battery replacements](#) available in their [research resources](#).

14. *Do you know what is the highest mileage EV on the road? How many miles should you expect to get out of your EV?*

- We aren’t sure what the highest mileage EV on the road is, but there are many EVs which have already passed the 500,000 mile mark. [This article](#) describes the experience of using Teslas for a high mileage shuttle service. [One estimate](#) suggests you might see about 10% range loss after 155,000 miles on a Tesla. This could vary significantly depending on the model, climate conditions, and other factors. Another analysis of

Tesla battery health is available through this [crowd-sourced Google Sheet](#).

Improvements to battery chemistry anticipated in the next few years are expected to enable “[million mile batteries](#)”. It’s important to keep in mind some earlier models of EVs may have significantly less life - especially if they lack battery thermal management systems that keep the cells cool in hot weather and/or during fast charging sessions.

15. *What is involved in battery management for maximum life? How should I charge my EV for day-to-day use?*

- a. Always check your vehicle owner’s manual for recommended charging practices to maximize battery life. Some general suggestions for increasing battery health over time [from GEOTAB’s research](#) include:
 - i. Avoid keeping your car sitting with a full or empty charge. Ideally, keep your SOC between 20-80% particularly when leaving it for longer periods, and only charge it fully for long distance trips.
 - ii. Minimize fast charging (DCFC). Some high-use duty cycles will need a faster charge, but if your vehicle sits overnight, level 1 or 2 should be sufficient for the majority of your charging needs.
 - iii. Outside temperatures are out of an operator’s control, but do what you can to avoid extreme hot temperatures, such as choosing shade when parked on hot days.

16. *Do DC fast chargers reduce EV battery life?*

- a. The jury is still out on this, but it does seem DC fast charging can be more of an issue for EVs that do not have more advanced thermal management systems to pull heat off the batteries when charging. Heat is not good for battery health. Occasional use of fast chargers should not be a problem, especially in Vermont’s climate. There is [some evidence](#) that regular use of DC fast charging (more than 3 times per month) *in hot climates* may speed degradation from a 90% state of health (SOH) over 4 years to 80% SOH. Newer battery chemistries may reduce these issues.

F. Home EV Charging

17. *What kind of chargers do EV drivers use at home?*

- a. Some EV drivers use the “level 1” charging equipment that was supplied with their vehicle to plug into a standard 120 volt outlet.

If you want a faster charge then 240 volt “level 2” charger is recommended.

ChargePoint, Flo, Emporia, Webasto, EnelX, Wallbox, and Enphase are some of the more common level 2 chargers for home use. Tesla drivers may also use the Tesla wall connector. Many utilities offer charging equipment incentives in addition to their vehicle incentives, so we recommend checking their website to see if they have specific requirements for their programs before purchasing. We have a utility incentive overview with links to resources [on the DEV website](#). You may also want to refer to this

listing of [ENERGY STAR certified EV chargers](#) to ensure you get one that is as efficient and safe as possible.

18. How much does it cost to install home charging?

- a. The cost can vary widely depending on the type of charging (level 1 or 2), existing service capacity, and location of your electric panel relative to where you would like to install the charging equipment. We recommend having an electrician assess your situation to determine what the best approach is. Any licensed electrician should be able to install charging. Efficiency Vermont has a [listing of charging installers](#) if you don't already have a preferred contractor. Generally we see installation costs ranging from \$500-\$1,000 for "typical" installations.

Some automakers may have programs to help EV buyers install charging. Check with your dealer or the automaker's website for information on these offerings.

19. My house has 100 amp electric service. Will I need to upgrade this to install a level 2 charger?

- b. Maybe. We generally recommend having an electrician assess your situation to determine what the best approach is. There are some technology options that may allow you to install a level 2 EV charging circuit separate from your existing service panel to avoid the need to upgrade. This [Reddit resource](#) has details on some options for this. For anyone considering an EV and having electrical work done at their home, we recommend putting in the wiring as part of a larger job when possible – it is usually much more affordable that way. Efficiency Vermont has a listing of contractors who've expressed interest in supporting EV charging installations [here](#).

20. Will new housing developments install chargers as part of their construction?

- a. Yes! The best time to install EV charging is when a structure is getting built. It is much more cost effective. The [Vermont Building Energy Code](#) does have requirements for installing EV charging in new multi-unit dwellings and commercial developments. The "stretch code" requirements can be required by Vermont municipalities and go a bit further, including at least offering level 1 charging capability for single family homes. Act 250 permitting frequently requires the stretch code EV charging minimums. These requirements are expected to increase in the future. In the meantime, any property owner building a new structure or updating parking facilities may want to consider options for at least including conduit and electrical capacity for future EV charging installations.

21. Are our utilities increasing their electrical capacity as increasing numbers of people go with all-electric cars?

- a. Generally speaking Vermont has a strong and reliable grid with many more EVs, especially when charging occurs in off-peak periods. Utilities are offering incentives for charging equipment that makes it easier to shift charging away from peak periods, which will help them sell more energy through their existing infrastructure investments, which should help put downward pressure on electric rates over time. VELCO and

electric distribution utilities regularly update long range plans which factor in transportation electrification to ensure our utilities will be able to manage even large increases in EV use in the future. Please connect with your utility directly for more information on their plans and programs.

G. Public EV Charging

22. Do you ever find a given fast charger is not available, or there's a wait? Can you reserve a charging spot in advance?

- a. Several DC fast chargers in Vermont have experienced outages in recent times. It is typically not much of a problem with Tesla Superchargers since there are usually 8 or more charging stations at each location - if one is not working others are usually available. On some high travel days (like around Thanksgiving travel holidays) there have been lines at Superchargers, but this has been more of an issue in west coast states with more Tesla owners. Tesla vehicle displays can show the status of each Supercharger location and how many slots are available - if a location appears busy drivers can consider other options.

For non-Tesla all-electric vehicle drivers it is good to check with [PlugShare](#) before relying on a DC fast charger for a trip. Many non-Tesla DCFC only have one charging station per location, so if there are issues flagged on PlugShare you will want to find another charger along your route or have a plan B in mind.

Most public EV charging locations are first-come, first-served without an option to reserve in advance.

We have additional resources related to charging on our [Public Charging Map](#).

23. How much do the different types of chargers cost to install?

- a. We have information on installation and equipment costs on the [DEV EV charging installation guide](#). Generally, a public level 2 charger will run from \$1,000-\$10,000 per charging port, depending on the installation specifics and whether it is networked equipment that can process payments. DC fast charging is much more expensive – a typical 50kW unit might cost \$50,000-\$100,000+ for equipment and installation. These costs may be offset by electric utility incentive programs.

24. Will there be a universal EV charging plug at some point in the future? Right now there are three different plug types and not all fast chargers fit every EV.

- a. We would love to see a single plug for all levels of charging across different automakers, and there is some progress on this front. We discussed in the webinar [many automakers are adopting the NACS plug](#) (formerly known as the Tesla plug) for vehicles starting in 2025. In the meantime, adapters are planned that will allow most non-Tesla vehicles to access Tesla Superchargers. Tesla vehicles already have adapters available to use non-Tesla level 2 and DC Fast Charging equipment.

H. EV Accessibility

25. Are EVs accessible for mobility impaired individuals?

- a. Based on our limited research, many EVs are compatible with hand controls, but there may be some models or combinations of models and hand control equipment that will not work. The [compatibility lists](#) of one hand control manufacturer include several popular EV models, including the Chevrolet Bolt, Tesla, Nissan Leaf, etc.

One [resource](#) noted a potential benefit of EVs for mobility impaired individuals is skipping the gas station fueling experience by charging at home.

We'd recommend the potential driver check with their adaptive equipment supplier to confirm their equipment will work with a particular EV model.

The State of Vermont incentive program for new EVs has Vehicle MSRP price cap exemptions available for individuals with disabilities that require special registration plates or placards as defined in [23 V.S.A §304a](#). This can allow for State incentives on vehicle models that aren't typically eligible. Please contact the program administrators for details at vermontPEV@energycenter.org or 1-888-807-0446.

I. EV Battery Materials and Lifecycle Environmental Considerations

26. What are the impacts of EV battery production? Can EV batteries be recycled?

- b. Comprehensive lifecycle assessments of EV production impacts and emissions compared to gasoline vehicles indicate EVs can provide 60-70% lower lifecycle greenhouse gas emissions compared to conventional vehicles:
 - i. Efficiency Vermont – [Are EVs better for the environment than gas-powered vehicles?](#)
 - ii. International Council on Clean Transportation - [A global comparison of the life-cycle greenhouse gas emissions of combustion engine and electric passenger cars](#)
 - iii. Rocky Mountain Institute – [Six solutions to battery mineral challenges](#)
 - iv. Yale School of the Environment - [YSE Study Finds Electric Vehicles Provide Lower Carbon Emissions Through Additional Channels](#)

There are impacts to sourcing of raw materials for EV batteries and components. These impacts can be mitigated through reducing the need for certain minerals, like cobalt, which have significant human rights issues associated with extraction and developing policies to responsibly source materials. For example, [Tesla's Impact Report](#) provides information on how they have reduced the use of cobalt in their EV batteries and developed programs to responsibly source raw materials for their production (see the Supply Chain discussion starting on p 44):

The links below offer additional information on these issues, including the opportunities to reuse and recycle EV batteries once they've reached the end of their useful life in a

vehicle – those actions could significantly reduce the need for mining and other activities in the future:

- i. Fresh Energy - [What's up with electric vehicles and batteries?](#)
- ii. Volts - [Minerals and the clean-energy transition: the basics](#)

The best thing people can do to reduce the impact of transportation on the environment is to drive less by walking, bicycling, carpooling, using public transportation, living in areas that require less driving and undertaking other actions to reduce vehicle travel. The [Vermont Climate Action Plan](#) calls out these strategies as important elements in meeting our climate goals.

27. What happens with used EV batteries at their end of life?

- a. Many EV batteries may still be used in stationary energy storage applications once they reach the end of their lives in the vehicle. Automakers and industry partners are still developing these capabilities, with several pilot programs already underway.

If an EV battery doesn't find a second life (or reaches the end of it) then recycling facilities can recover much of the raw materials. Currently it can be difficult to separate the materials for reuse at an affordable cost, but battery recycling companies are working with automakers and governments to develop recycling programs.