



# Vermont Electric Car Webinar Questions and Answers

*This Q&A covers questions received on recent 2022 Drive Electric Vermont Webinars.*

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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, including an incentive calculator tool that can help estimate the total value of all the incentive available to you for a particular vehicle 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, the value of the credit can be found [here](#).
    1. 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.
    2. 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.

- ii. **State of Vermont incentive:** \$0 - \$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 \$40,000 are eligible for a State incentive of up to \$4,000 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 20% 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](http://www.MileageSmartVT.org)

- iii. **Electric Utility incentives:** Every electric utility in the state except Hyde Park Electric 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. Yes, all of the incentives should still apply, but you will need to be pre-approved for a [“consumer direct” State incentive](#) (assuming you are eligible) since you would not be going through a Vermont dealer. Following your purchase, you will an incentive application and supporting documents (proof of purchase, VT registration, VT driver’s license and W-9) to claim the incentive.

3. *Which utilities offer special rates for off-peak EV charging?*

- a. Burlington Electric Department and Green Mountain Power offer EV-specific rates that can reduce charging costs by 30-50% compared to standard rates. Accessing these rates requires EV owners to have connected charging equipment from an approved manufacturer. Many other utilities also offer whole-house time-of-use rates that could be worth considering. The [Drive Electric Vermont utility incentive resources](#) provide more information on what utilities are offering.

4. *Why are there different incentives for different utilities?*

- a. The Federal and State incentives are the same, but for the electric utility incentives each utility is responsible for developing their own plan for meeting the State Renewable Energy Standard requirements for offsetting customer fossil fuel use - often referred to as their “Tier 3” plans. A utility’s customer base, generation mix and other factors are

considered as they develop their compliance plans, which are reviewed in an annual VT PUC process. The 2022 plans are available at [this PUC eDocket](#).

5. *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. Many utilities do have price caps on vehicle purchases. Please review your utility’s website or contact them directly for more information on eligibility for their incentive programs.
6. *What if you make slightly more than the household 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

7. *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. Some owners who know they may not be able to claim the full value of the federal tax credit on a vehicle eligible for a credit 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](#).
8. *Any suggestions on how to find an EV available to purchase right now?*
  - a. Dealers have less EV inventory due to lingering supply chain issues automakers are experiencing due to COVID-19 and an industry wide shortage of microchips used in vehicles. For this reason it may not be an ideal time to purchase a vehicle if you don’t need to. While dealer inventory is limited, 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.
9. *I have a 1-year old LEAF, on a 2-year lease. Would you suggest purchasing at the end of the lease, or getting a new vehicle?*
  - a. This depends on several factors that will be unique to you. If the vehicle is working well and has adequate range for your needs then it may be worth buying it out at the end of the lease. We would recommend checking the residual value (the price you will pay to buy it) in your lease documents and then comparing it with the current market value for your vehicle from [Kelly Blue Book](#) or a similar source. If the residual is higher than the value you may be better off looking for another used EV, or considering a lease/purchase of another new model. Lease buy-outs are generally ineligible for federal, state or utility EV incentive programs.

10. *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, but there isn't much overall supply. 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.

We have more information and resources related to used EV purchase on this [DEV Blog post](#). People interested in purchasing a used EV may also want to check their eligibility for a [MileageSmart](#) incentive, offering 20% of the cost up to \$5,000 toward a used high efficiency vehicle purchase.

### C. EVs in Vermont Conditions – Backroads and Winter

11. *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.

12. *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](#)

13. *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

### 14. 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

### 15. Where do I get my Tesla serviced?

- a. 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](#), but as of April 2022 they have not taken advantage of this. Vermonters typically visit service facilities in Latham, NY; Peabody, MA; or Montreal. Recent media reports suggest Tesla is also planning to 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 owners 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

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

- a. Fortunately, EV battery failures are generally rare to-date. 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](#).

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

- a. 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.

18. *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.

19. *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 (usually liquid) 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. EV Battery Materials and Lifecycle Environmental Considerations

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

- a. 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.

### 21. 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 more cost-effective recycling programs. Many of the links in the

## G. Home EV Charging

### 22. *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, Webasto, EnelX, Wallbox, and ClipperCreek 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.

### 23. *Are homeowners with EV charging installed allowing neighbors or the public to come and charge a vehicle? How would an individual be compensated for that?*

- a. Many homeowners have shared their home charging through [PlugShare](#), although you may need to change the PlugShare filter settings to include "Residential Locations" to see them. These locations typically require advance notice to the homeowner before charging there and might involve a donation to cover the cost of electricity.

There are also a number of [EV Match](#) locations in Vermont which are intended to be shared and may have pricing applied through an EV Match account that is connected to your credit card.

Additional peer-to-peer EV charging services are in development in other parts of the USA and may find their way to Vermont in the coming years.

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

- a. 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. [DCC has options for this](#) that a few utilities in Vermont are piloting. 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](#).

*25. Any news of future DC fast charging (DCFC) across New Hampshire and Maine?*

- a. Yes! [Vermont](#), [New Hampshire](#) and [Maine](#) are all investing funds from the VW diesel settlement on increasing DC Fast Charging. Maine is furthest along with several locations up and running, but NH and VT are also working on more charging. Additional funds are becoming available through the federal Infrastructure Investment and Jobs Act (IIJA) passed late last year. The webinar presentation slides include additional information on planning for more EV charging.

Tesla already has an extensive Supercharger network with several more locations planned in New England. Only Tesla drivers can use these, but Tesla does offer a [CHAdEMO DCFC adapter](#) so Teslas can use non-Tesla DCFC.

*26. 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 may 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.

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

- a. Generally speaking there is adequate capacity for thousands more EVs in Vermont, especially if they are charging during 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.

## H. Public EV Charging

*28. 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.

The vast majority of publicly available 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](#).

*29. 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.

*30. 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, but don't see it happening any time soon. Tesla seems committed to their plug format and will continue offering adapters to use other plug types. The SAE Combined Charging System (CCS) fast charge plug is used by most US, European and Korean automakers and seems to have a long-term market advantage. The CHAdeMO fast charge plug used by Nissan and Mitsubishi has a large base of existing compatible vehicles, but Nissan recently announced their intention to switch to the SAE CCS plug with the [launch of their Ariya all-electric model](#) expected to be available in the next year.

Many of the older DC fast chargers in Vermont are CHAdeMO only since they were installed before the SAE CCS standard was finalized or affordable CCS equipment was available. Several received funding support from Nissan. As the State of Vermont invests in building out more fast charging they are requiring State-funded locations to offer both CHAdeMO and SAE CCS plugs to maximize compatibility, but it will take time for the new locations to get up and running.

*31. Is there a way to tell which public charging stations may be using green energy?*

- a. Not easily. There are a few charging stations co-located with solar photovoltaic (PV) generation, but generally it will depend on the utility supplying power to the location. Burlington Electric Department, Washington Electric Co-op and Swanton Electric provide

100% renewable electricity while Green Mountain Power has [announced plans to go completely renewable by 2030](#). Other utilities are sourcing more renewable energy too.