



## Vermont Electric Car Webinar Questions and Answers

*This Q&A covers questions received on webinars held May 20 and August 20, 2020.*

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### **A. General Questions**

1. *Do you have to be connected to the grid to own an EV?*
  - a. You do not have to be connected to the grid, but there could be challenges if you are off-grid, especially if you are reliant on solar PV in winter. Access to public charging or going with a plug-in hybrid that can run on battery and/or gasoline should be considered before making an EV purchase if you do not have electric service.
2. *How often do drivers use their maximum range in a single day?*
  - a. Many current all-electric vehicles have over 200 miles of official range, so it is fairly rare they would exceed the maximum range in a day, except on the occasional road trip. Potential EV buyers should be aware range will be reduced by up to 50% compared to official automaker range in the coldest winter conditions, especially if they are considering an EV with less than 100 miles of range. We have more information on these issues in our [winter range post](#).
3. *I could only get audio for the webinar. Was there video as well?*
  - a. Yes, there was a video with a presentation. The webinar recording includes both the audio and video materials.

### **B. Purchasing and Vehicle-specific Questions**

4. *Because the technology is always changing, 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 mileage overage charges 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 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](#).

5. *I was having trouble locating EVs to test drive and purchase, how did the contributors find their cars?*
  - a. Dealers may have less inventory right now due to COVID-19 production issues and in some cases automakers do not regularly have EV inventory to offer Vermont dealers. Unfortunately we're unlikely to be able to support EV demonstration events with rides/drives as in years past, but if there is a specific vehicle you are interested in we may be able to connect you with a local owner willing to give a test drive or loaner. Also, the [Turo person-to-person car rental service](#) has some EV options available in Vermont.
6. *Is it advisable to work with an EV dealership that is close to home? Are visits to the dealership likely to be fairly regular?*
  - a. Most EV buyers are willing to shop around to different dealers to try to get the lowest price offer possible. They will also factor in other issues, like distance from home into their final purchase decision. If you buy a new EV from a far away dealer, then any EV dealership authorized to service the manufacturer's vehicles should be able to perform warranty service. There are some Vermont dealers who do not service their brand's EV models, so it is important to check before relying on this. 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 outfit you prefer. That said, dealers authorized to service EVs receive extensive training from their automakers and are usually the best place to go for any issues involving the battery or electric motor, or dealing with warranty claims.
7. *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. Depends on several factors that will be unique to you. If the vehicle is working well and has as much range as you need 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.
8. *I need to know where and how to advertise my used 2017 LEAF for sale.*
  - a. We're not aware of any Vermont EV-specific sales channels. We know many people have used [Craigslist](#), [Autotrader](#), or [Cars.com](#). There are also some larger companies specializing in used vehicles that might buy it from you – [Carvana](#) is one example of this. If you do opt for a private sale you may want to do [some research](#) to make sure you aren't the target of a scam.

9. *One speaker said that when he travels 180 miles, he begins to be concerned about charging. But the Bolt he mentioned gets a range of 259 miles. Can't you go farther than 180 on a charge?*
- a. The current 2020 Bolt has a range of 259 miles, but earlier model years (like the one the speaker drives) had an official range of 238 miles. You can go further than 180 miles on a charge in an older Bolt in the right conditions (warmer temperatures, driving 65 mph or less, etc), but most EV drivers like to have a bit of buffer available in case unexpected issues arise. We have some tips for maximizing EV range in [this DEV blog post](#).

10. *I have heard that there is a problem with dealers sending their used EVs out of state. What have you heard about this and do you see any potential solutions?*

- 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 as of 2020 there just isn't much overall supply. Quebec and several US states are offering significant incentives on used EVs which can distort the market. 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](#).

11. *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 outside temperature are below 15-20 degrees F, then heat pumps often lose performance and backup resistance heating kicks on, so the 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](#).

12. *For the Tesla, is there a charge for the use of their wifi, updates, maps, etc?*

- a. Standard connectivity is included for free and generally requires the car be connected to a wifi hotspot (or home wifi) for more advanced features beyond navigation. The premium connectivity package is \$9.99/month and includes more capabilities through an in-vehicle cellular data connection. Many Teslas include a free 1 year trial of the premium connectivity package with a Tesla purchase. More details are available on the [Tesla website](#).

## C. Incentives and Electric Utility Programs

13. *Are utilities still moving forward with advanced rate design or has COVID-19 slowed that down?*
- Burlington Electric Department has offered an EV-specific rate for a while now. Green Mountain Power recently received approval to offer off-peak rates for EV charging through a [VT Public Utility Commission \(PUC\) process](#). They are currently working on the roll-out plan for the new rate offerings. Many other utilities also offer whole-house time-of-use rates that could be worth considering. The Vermont Public Service Department (DPS) is also continuing to work on advanced rate design issues.
14. *Are our utilities increasing their electrical capacity as increasing numbers of people go with all-electric cars?*
- 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.
15. *Why are there different incentives for different utilities?*
- 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 2020 plans are available at [this PUC eDocket](#).
16. *Are there income caps for the Burlington electric rebates?*
- The Burlington Electric Department (BED) EV incentive does not have an income cap for the regular \$1,200 incentive, although the vehicle MSRP must be \$50,000 or less. BED (and many other utilities) do offer additional incentive for low and moderate income customers. More details are available on the [BED EV rebate website](#).
17. *What if you make slightly more than the household income cap?*
- 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.
18. *Do all of the various Federal, State and Utility incentives still apply if the car is purchased out-of-state?*
- Yes, all of the incentives should still apply, but you will need to be pre-approved for a State incentive (assuming you are eligible) since you would not be going through a [participating dealer](#) in Vermont that can pass the incentive through at the point-of-sale.

Following your purchase, you will have to complete some additional paperwork to claim the incentive. Some utilities also offer incentives through participating dealerships or financing entities and so purchasing out-of-state or from a non-participating dealer may similarly require a bit of extra effort to claim their incentive.

19. *Does any company besides Nissan offer additional incentives, such as the additional \$4,000 discount mentioned for the Leaf?*

- a. As of August 2020 we are not aware of other automakers offering customer discount programs similar to Nissan's, but we will update the [Drive Electric Vermont automaker incentives resource](#) if we learn of more offers in the future.

20. *When is the best time to buy a car?*

- a. Many automakers offer significant discounts and customer rebates on a month-to-month basis, so if you feel good about a deal you may not want to wait too long to take advantage of it. There are times of year when discounts tend to be higher (e.g. end of the month, end of the quarter, end of the vehicle model year), but discounts can vary significantly from one dealer (or auto manufacturer) to the next. Edmunds.com provides some additional information on [timing your purchase in this article](#).

## D. EV Charging and Battery Life Questions

21. *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 2020 LEAF 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.

22. *Do you know what is the highest mileage EV on the road? Looking to see expected lifetime on a battery. [also a similar question: How many miles should you expect to get out of your EV?]*

- a. Not sure what the highest mileage EV on the road is, but there are many EVs which have already passed the 500,000 mile mark (although not always on the original batteries). [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](#)". Important to keep in mind that

some earlier models of EVs may have significantly less life - especially if they lack active battery cooling systems.

23. *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.

24. *Do DC fast chargers reduce 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) cooling 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.

25. *What kind of chargers do you have at home?*

- a. ChargePoint, Flo, Webasto, EnelX, and ClipperCreek are some of the more common level 2 chargers for home use. 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.

26. *My house has 100 amp 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.

27. *Did you have to add solar panels for car charging or did you plan your array to ensure enough kWh to handle 2 EVs?*
- a. Many EV drivers also have solar photovoltaic (PV) panels installed to cover their home and/or vehicle energy needs. If you know you're going to be charging one or more EVs then you can factor in their energy requirements to the PV system design by estimating the energy they will require by using one of calculator tools on or linked from the [Drive Electric Vermont cost of ownership page](#). If your electric use outstrips your PV system then you may be able to buy "shares" in a community solar system or work with your utility on green power purchasing programs. Adding more panels is also an option if you have space available.
28. *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 have both issued RFPs for companies to bid on building out more charging. Green Mountain Power has also [announced a program](#) to help support "make ready" to reduce DCFC installation costs. Also, VW's [Electrify America](#) subsidiary is developing more DCFC in New England, including [a location in Lebanon, NH](#) near I-89 exit 18. It is likely there will be some delays to this build-out due to COVID-19, but hopefully there will be much more robust charging network developing in the next two years. And of course Tesla already has an extensive Supercharger network with several more locations planned in New England (although only Tesla drivers can use these, but Tesla does offer a [CHAdemo DCFC adapter](#) so Teslas can use non-Tesla DCFC).
29. *Could Vermont allow EVs to use their batteries for energy storage for the grid to help store energy from wind or electric?*
- a. Yes, potentially. Electric utilities are starting to explore possibilities for this, but there may be complications with getting these devices through electrical safety certifications as well as ensuring additional cycling of EV batteries for bidirectional energy storage will not void automaker warranties. [This article](#) has more details on some of the current technologies in development. Best estimate right now is that we may start to see Vermont pilots with these types of devices in the next two years or so.
30. *As a plug-in hybrid owner I only use public charging when leaving the car for 2 hours. My favorite place is the town hall in Johnson where it charges while I ride on the Lamoille Valley Rail Trail. However, as a member of a local energy committee I am not very enthusiastic on getting charging installed in my town which is not a destination for many drivers. Any thoughts on this?*
- a. Since most people are charging their EVs at home there may not be a need to get charging installed in every community in the state. However, if there are nearby workplaces or multi-unit dwellings (MUDs - apartments, condos) then access to level 2 charging may be more important. Many utilities are offering incentives for public, workplace, and/or MUD level 2 charging that can help offset the cost. The State of Vermont has also offered grants in the past using VW settlement funds. If additional

State funds become available there may be future opportunities. DC fast charging is generally recommended to go along highly traveled corridors or in urban areas, so may not be needed in Vermont communities away from interstates or other major highways.

*31. Looking toward new housing developments installing chargers as part of their projects.*

- 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 in the process of getting more stringent (effective Sept 2020) and future updates may go further. 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.

*32. How much do the different types of chargers cost?*

- 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.

*33. 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 2021.

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.

*34. Do you ever find a given fast charger is not available, or there's a wait?*

- a. There have been maintenance issues with several DC fast chargers in Vermont over the past few years. 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.

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

*35. What does it cost to charge with a Tesla Supercharger?*

- a. It depends on the vehicle and whether the state allows Tesla to charge by the kWh (which Tesla prefers) or if they need charge by the minute. Some vehicles include free supercharging. For the Model 3 and Model Y it is usually around \$6-7 for a session, which generally is still less expensive than comparable travel on gasoline. Tesla has additional supercharging information on [their website](#).

*36. To what degree is resale value reduced as batteries age, and what are some of the replacement costs of electric car batteries?*

- a. Resale value is somewhat affected by battery condition, but so far has been more impacted by increased range with larger batteries as newer EV models are released (e.g. a 2012 LEAF had an [official range of 73 miles](#) new, while a 2020 LEAF Plus offers [226 miles of range](#)). Automakers often offer 8 year, 100,000 mile warranties on EV batteries for defects and workmanship issues, but usually have shorter periods for “capacity warranties” under the expectation that batteries will have some degradation over time. It is likely that as more EV batteries require servicing there will be options to service/replace individual cells in battery packs instead of replacing the whole unit, which should extend the life of a battery pack.

If a battery does need replacement and it is not covered by warranty then costs can vary significantly depending on the automaker and size of the pack. As an example, LEAF replacement packs reportedly cost between \$5,500-\$7,500.

*37. 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.