10 Things To Consider Before You Start An EV Conversion

Reading this from Rebbi may save you money and heartache down the road. If you are considering an EV conversion, chances are you have spent some time under the hood of a car. Whatever information you need to know about an EV conversion is out there somewhere on the internet. There are EV conversion forums you can go to for help. Helpful companies: Rebbl, EVTV, EVWest, EV4U, and Classics Gone Green.

1. Do It Yourself Or Hire A Professional?

Doing the work yourself will give you a special sense of satisfaction when you are done. Assuming you ever get done, that is. Some say 90% of automotive restorations and conversions never get completed. They wind up collecting dust in the back of the garage without ever feeling the pavement under their tires.

Asking a pro to do the work will save you time and get your new electric buggy on the road sooner so you can start enjoying it. But it will also add $10,000 or more to the final cost of your project. The old rule of "Buyer Beware" still applies. Be sure to check into the background and qualifications of the professional you are thinking of entrusting the work to. Talk to people who have done business with him previously. Did he finish on time and within budget? Once a project gets started, it's easy for costs to spiral out of control to cover unexpected developments. If you get into a dispute, the laws in your state may prevent you from getting your car back until you pay your bill in full, so make sure you are doing business with someone you trust.

2. What Type Of Vehicle Do You Plan To Convert?

For most people, the vehicle they plan to convert is the one that is already sitting in the garage. It could be that '69 Mustang your grandmother left you or the '94 Miata that died because you didn't change the timing belt when you should have.

When it comes to EVs, the most important consideration of all is weight. Big, heavy cars need bigger, more powerful motors to make them go. Bigger motors need bigger batteries and more sophisticated control systems. In this case, bigger means more expensive. Converting a 6000 lb. suicide door Lincoln Continental is going to cost a lot more than doing an 1800 lb Volkswagen Beetle. Also, the Lincoln will need extra electrical power for the air conditioning, power steering, power windows and electric seats that came standard with the car from the factory. Better check your wallet before you dive into that project.

3. Sporty, Luxury Or Economy Car?

Do you want your EV to rival the new Tesla P85D in acceleration? 0-60 in 3.2 seconds is mighty sweet. But the Tesla needs about 700 horsepower to make that happen. Does you budget allow for that kind of performance?

What about top speed? Are you content to cruise the back roads at speeds up to 60 mph or do you want to burn up the autobahn at 155 mph? Once again, higher performance comes with higher costs. Are you looking to build a drag strip or autocross championship winning machine? It's gonna cost you. The oldest expression in auto racing goes like this: "Speed costs money. How fast do you want to spend?"

4. Do You Want Regenerative Braking?

Regenerative braking can add 15% - 20% to your EV's range if you do mostly city driving. But on the highway it is much less important.

If you want your EV to feature regenerative braking, you will need an AC or brushless DC motor. Either will cost you about 30% more than a typical DC motor with brushes. If you don't know the difference, you will probably be fine without the extra cost that regenerative braking entails. Being able to recapture some of the kinetic energy from your car when you slow down sounds like a great idea and it is. But it also requires sophisticated battery and motor control systems that will add to the cost of your project. The time to decide whether you need it is before you begin. Regenerative braking is not something you can easily add after the project is completed.

5. What About Range?

Range and speed are closely connected. The further you want to go before you EV needs to be recharged, the more batteries you will need. Batteries are usually the most expensive component of an electric car, so adding more raises your costs considerably. How will you use your EV when it is done? Do you plan to recreate the entire trip from Chicago to LA via old Route 66? That's more than 2000 miles all the way, just like

the song says. Or will you be content to potter around town, visit a few car shows, or just go for a Sunday drive? It's important to know the answers to all these questions before you begin. Adding more batteries once the project is finished is usually a lot more expensive than making provisions for them at the beginning.

6. Has Anyone Done This Conversion Before?

Conversions of old Volkswagen Beetles are pretty common. Conversions of a World War II era 2.5 ton Army truck are not. If you will be using a donor car that is a popular conversion choice, chances are that special parts, motor brackets, wiring harnesses and the like are already available and will save you both money and time compared to fabricating them from scratch. Why not take advantage of someone else's mistakes and buy components that are already proven to work in the real world? Ordering off the shelf will cost considerably less money than hiring an engineer and a fabrication shop to build you a custom made doohickey or thingamajig.

Another consideration is dealing with your local Registry of Motor Vehicles. If you bring them something truly unique that no one has ever seen before, they might balk at giving it a passing grade when it comes to getting it inspected. Your shiny new conversion isn't going to do you much good if you can't drive it on the public streets. If you can show those gimlet eyed safety inspectors that a conversion like yours has been done before and blessed by officials in your state or elsewhere, that might tip the balance in favor of you getting the registration process completed successfully.

7. Are There Any Bargains Out There You Can Take Advantage Of?

Making batteries for electric cars is a new business for a lot of manufacturers. Some of them don't make it and wind up in bankruptcy. Israeli start-up company Better Place went bankrupt in 2013 and its inventory got sold off for pennies on the dollar. Occasionally you might come across a battery from a Nissan LEAF or Chevy Volt that was in a collision and ended up in a recycling yard. Of course, any battery from a damaged car or a bankrupt company will have no warranty, but if the price is right, it just might get your EV conversion process off to a good start and save you money that can be put to good use finishng the job in a timely fashion.

8. Can You Upgrade An Older EV?

Outside the US, companies like Fiat, Peugeot, Citroen and Renault offered electric versions of the Panda, Kangoo, 106, and Berlingo starting in 1990. These cars are sometimes available on E-bay for very little money. If you can find one and import it to the US, you can easily upgrade the lead acid or nickel cadmium battery they came with by swapping it for a lithium ion battery instead. Remember you will have to replace the charging system as well but after that you will have a car that has less weight and more power than it had when new.

9. What Kind Of Battery Management System Will You Need?

A battery management system (BMS) manages a rechargeable battery and protects it from operating outside its safe operating area, monitors its state of charge, controls its environment, and balances the charging and discharging of individual cells within the battery. In a balanced battery, the cell with the largest capacity can be filled without overcharging a weaker cell and it can be emptied without over-discharging any other cell. Battery balancing is done by transferring energy from or to individual cells, until the state of charge of the cell with the lowest capacity is equal to the battery's total state of charge. If you will be using a lithium ion battery in your conversion, you will need a "smart" BMS, which can cost several thousand dollars more than a basic BMS. Remember that if you have a "smart" BMS, you will need a "smart" charger as well.

10. What About Charging?

How quickly will you need to recharge your EV when the conversion is done? If you have a small 17 kWh battery, a basic 2.5 kW charger is inexpensive and will do the job in about 6 hours. But if you want your 22 kWh battery pack to be fully charged in an hour or two, a 22 kW AC charger will set you back an extra $6,000 or so. When it comes to range and recharging times, you get what you pay for.

Conclusion

Unless you are planning on converting an old Ford Falcon into a car that will just take you around the block a few times, an EV conversion is going to cost you at least $25,000. High end conversions using a professional can set you back $100,000 or more. It's best to go through a mental checklist like this before you begin to make sure you fully understand what the conversion will to cost you in terms of time, effort and money.

If you read the above sentence and found yourself saying, "Oh, that's a bunch of baloney. I can do it for half of that," you are very likely to find yourself chest high in fast water before you know it. My old Irish grandfather had a rule: "Do not start vast projects with half-vast ideas." That's pretty good advice!

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