Getting The Most Out Of Your EV (Electric Car)

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Now that you have a working electric car you're going to need to know how to look after it so it can reward you with years of faithful service - and savings!

1: Maintaining Your EV

Unlike a gas car, your EV is almost maintenance free. The only thing you should be monitoring in an EV is the **water level in the batteries**.

With typical driving & charging it should be topped up every 2 to 3 months and you should only be using de-mineralized or distilled water. Don't use tap water as it's full of impurities.

If you find yourself refilling your batteries excessively check your charger is programmed correctly and isn't overcharging your pack excessively. Most pack chargers are designed to overcharge the batteries for a period of time in order to equalize the entire pack. This "boiling" will use more water but its normal.

Conversely, if you're clocking up the miles but the batteries are barely sipping then make sure they're all receiving a proper charge. Your batteries should be bubbling or fizzing during the charge. If one is using more or less water than the others check it's voltage and/or check to see if it's warmer or colder than the others. It could be faulty. If the battery seems fine make sure your pack charger is set up correctly for your sized pack. Contact the supplier if in doubt.

Another thing to consider if you're using individual chargers is that your charging system could be too far away and voltage drop is causing the batteries to be undercharged. This will lead to their early death so be sure to move the chargers closer, reprogram them to deliver a higher voltage or get a pack charger.

If you think there's a problem, try using an **infrared thermometer** to check each battery's temperature while charging. They should all be the same temperature (with very minor fluctuations between them).

After charging, your batteries should all be the same voltage, once again with minor fluctuations between them. If one battery reads 13.2 volts and the one next reads 13.0 volts I wouldn't be concerned. Just be sure to re-check your voltages every time you top up your water levels. Remember, with flooded lead acid batteries **overcharging** is better than undercharging!

The only other things to consider with running an EV is making sure your gearbox has oil and that your bolts are tight. I recommend running thorough the car and tightening all the bolts on all the terminals with each water level check as they do have a habit of unwinding during the first few months of driving.

Above is the result of a loose bolt on an EV during acceleration.
In fact you'll be surprised how often bolts come loose on EVs through vibration which increases resistance on those connections, which in turn heats them up.

Eventually it'll start arcing under acceleration – which is fun to watch but bad for your car's connections and it could leave you stranded in the rain.

2: Driving Tips For Extra Range

It sounds obvious but driving your EV conservatively will extend the range of the car per charge.

Some basics of extending your range (also known as hyper-milling) are:

- Accelerate gently to your desired speed.
- Allow the car to roll wherever possible.
- Stay at a constant steady speed instead of pulsing the accelerator.
- Look well ahead for traffic hold ups and red lights and roll towards them.
- Don't work your batteries hard, try to keep your ammeter reading as low as possible.
- Keep your tires pumped up.

You may have heard of a thing called the ***"Peukert Effect"***. The *peukert effect* describes how battery capacity is reduced depending on how heavily the battery is being used.

In simple English: ***"the harder you work your batteries, the shorter the amount of charge becomes, and not just because you're using the electricity faster!"***

The plus side of the *peukert effect* is that if you use your batteries gently you can expect to get much more range than if you worked them hard. Though *peukert effect* or not, sometimes you just *have* to zip away quickly when you get a green light!

3: Car Modifications For Extra Range

As well as modifying your driving technique, there are **physical things** you can do to your car to increase its range.

As I've mentioned before, weight is not your friend! **Reducing the amount of dead weight in any car will improve mileage** but more so in an EV where every mile is precious.

For example, don't leave your golf clubs in the trunk all week and make sure your prized collection of rocks, fishing sinkers and weightlifting equipment isn't left on the back seat. This is pretty obvious stuff so let's move onto the next big area for improvement: **aerodynamic modifications!**

Aerodynamic modifications can in extreme cases improve an EV's range by up to 30%. The faster you're likely to be driving your EV, the more aerodynamic modifications would be of benefit to you. There are a number of things you can do so let's look at the most popular modifications one by one.

3.1: Install a "Belly Pan"

Installing a flat belly pan or thick plastic board underneath the car will allow the air to rush straight past instead of moving around the motor, gearbox, former exhaust tunnel and all the other pockets, dips and bulges that all cars have underneath them.

You wouldn't drive around with a roof-rack full of bicycles above your car so consider smoothing out the unseen menace that is the underside of your car.

Some converters use corrugated plastic sheeting (what real estate signs are made of) or if you're familiar with spraying fiberglass or know someone who is, you could make a molded pan yourself. Try to cover as much as you can from the bottom of the front fender to the bottom of the rear fender.

3.2: Streamline Your Front Fender

Chances are your front fender is full of vents and "sports holes". Many converters simply block these off so that the oncoming air can rush around the front of the car. Once again try fiberglass. Some have even used expanding foam as a base, then automotive filler to give the top a hard layer perfect for painting.

3.3: Cover The Rear Wheel Arches

Wheel arches are a major obstruction for moving air and covering the rear arches will reduce a reasonable amount of drag. The trick is to try and make it look good! The rear wheel arches are a main visual point of any car and it's a fine line between looking sleek or ultra tacky.

Don't forget that you'll have to remove it if you need to change a tire! Covering the front wheel arches is normally not possible due to the horizontal movement of the front wheels when turning.

3.4: Install Air-Guides For Each Tire

Installing air guides or diffusers in front of and behind each tire can help push the air around the tire. Each is a little plastic or fiberglass triangular block shaped aerodynamically to sit in front of the tire on the car body.

I've typically seen them mounted on the end of the fender closest to the front tires with similar sized "followers" on the back of the tire mounted to the sill of the car, allowing the air to glide back along the car body.

3.5: Lower Your Car

This will reduce the total front area and according to Mercedes can improve air resistance by 3%. The down side is that the ideal height for each car is different - and it's expensive, though if you're upgrading your springs & suspension anyway it's not going to be too much of a problem. There is the question of aesthetics however; some could confuse you as being a boy racer.

3.6: Get Wheel Covers

The ideal wheel cover for aerodynamics is a flat or slightly convex disc with no holes, covering the entire wheel and matching the wall of the tire. As boring as they sound, they often suit EVs as they look slightly "space age".

3.7: Eliminate Unnecessary Drag

Got a roof rack? Get rid of it! Same goes for plastic window louvers and big aerials, even over sized side mirrors – every little bit helps. Try to **cover up gaps around fenders** and lights so that air is forced to sweep past everything and not get caught up in it. Some even remove their side mirrors completely and use internal mirrors or external video cameras projected onto screens inside. I'm not sure if the gains are worth that amount of cost & effort though!

3.8: Get Low Rolling Resistance Tires

Those are the tires that Hybrids use. The have a low resistance on the surface of the road. Alternatively you could try to find a good set of second hand tires as in many cases **the rubber is older and hard**, also reducing friction on the road.

The downside to these tires is that you won't have as much grip during wet & rainy driving. The upside to these tires is that you won't have as much grip for wheel spins and general playing about in wet weather. Not that I advocate that sort of driving - certainly not in writing anyway!

As mentioned before, keeping your tires properly inflated can improve your car's range by up to **3.3%** according to the US government – and that's a lot of extra miles each year.

Over the next few years you'll be able to experiment with all kinds of driving techniques. You'll find out what works well for your setup and in your driving conditions. Don't be scared to experiment!

4: Energy Independence

Your car doesn't need gas and its carbon footprint is much smaller than that of a gas powered car. Those are two great reasons to feel pretty darn good about what you've achieved. Not only that but your electric car is no longer affected by the rise in gas prices or the threat of oil embargoes imposed by oil producing nations. It's one big headache that you no longer need to worry about.

You have the benefit of "refilling" your car from electricity produced in your own town or city. You also have the option of recharging your car with solar and wind from your very own front yard.

From my experience, the benefits of owning an electric vehicle far outweigh the downsides. I'm sure you'll agree – once you've finished smiling that is.

5: Alternative Energy Creation

With the ever increasing costs of living and Climate Change all over the news, there is no better time to consider saving money on electricity. While your new electric car is cheap to run, there's no reason why you shouldn't consider generating your own electricity to power it!

The downside to home energy generation (especially Solar Panels) has always been the cost, but I've tracked down a DIY Green Energy Guide that allows you to actually *create* your very own solar panels and wind turbine for a **low price** – actually a mere *fraction* of the cost of actual photo voltaic panels.

Here's the link: http://www.evsecrets.com/recommends/solar-panels-diy.html

Those living under generous sunlight can take advantage of using home-made solar panels to collect the direct sunlight and convert it into electricity.

Those who live in areas that have more wind than sunlight (count me among that demographic) the option of building your own wind turbine can be an attractive method to cut your power bill right down.

The power generators on the above website can help you to save up to 80% of home electricity – including your electric car!

Imagine that: not only would you be not paying for gas, but you'd actually be making your own "fuel" for your car!

5.1: What Building Skills Are Required to create my own solar panels?

Just the basic tools & skills that most homeowners acquire over time such as using a jigsaw, using an electric drill, soldering, hammering, sawing, screw driving & painting etc. Nothing too complex.

5.2: How Much Time Does It Take To Build Solar Panels?

Once the parts and raw materials have been acquired it will take about a weekend for an organized and experienced handy-man. It might take at least a week per solar panel or windmill for those of us with more average skills.

Home-generated electricity is gaining in popularity very fast. In fact it's becoming so popular that the price of factory-made solar panels has been climbing steadily over the last decade. **Being able to make your own panels at a fraction of the price will save you thousands of dollars**. Not only that but once you know how to make them there's no reason why you couldn't start selling them yourself!

6: Conversions for Fun and Profit

Once you've build your EV you'll know exactly what it takes. You'll have learned all the "secrets" that once seemed so mysterious. You'll know what works and what doesn't. This means you know just what's required to **convert cars as a hobby or for profit**!

With your new set of skills there's no reason why you can't start converting a fleet of cars in your very own garage and selling them. The demand grows every time the price of gas increases. Not only that, but every time the major auto manufacturers drag their heels it opens up more potential customers for you!

The secret is efficiency. You need to convert cars in the shortest amount of time to maximize output and profits.

For example: if a car takes you 100 hours to convert, you have to include 100 hours of labor into the cost of the car itself. But, if you concentrate on one model of car only and convert this model by two or three at once you'll be able to only put 30 or so hours into each car. With the right conversion plan and all the parts available you could be converting one car every two days.

It's not complicated! Imagine converting a car for $6000 US and selling it for $12,000 US. That gives you a profit margin of 100%. The major auto makers can't manage that - but you can!

7: Taxation credits & rebates for your electric car

In USA there's a growing number of tax breaks for electric car owners at both the state and federal level. Government officials are encouraging ownership of electric vehicles to deal with current and future shortages of fossil fuels. While typically aimed at new electric cars there are tax breaks available for converters too.

US citizens get quite a good deal. For example at the federal level plug-in electric conversions are eligible for a **federal income tax credit of 10% of the cost of the conversion, up to $4000.**

The state level (also for US citizens only) has a range of rebates and credits available. There are simply too many to list so click on your state here
http://www.afdc.energy.gov/afdc/fuels/electricity_laws.html
to see exactly what you're entitled to.

To assist in claiming tax rebates with your next tax return, US citizens can download the current IRS tax rebate form here:

http://www.evsecrets.com/doc/f8910.pdf

As well as rebates, there are other benefits available at the regional or municipal level such as: reduced registration costs, elimination of congestion charges in some cities, exception from paying road tax, free parking, access to carpool lanes and even free charging in some cities!

The benefits aren't only for US citizens either; check with your local government, local council or Ministry of Transport to see if any of those apply in your area.

I wish you happy driving and good luck! ☺

Gavin Shoebridge