

Electric Auto Association



CURRENT EVENTS

August 2018 Promoting the use of electric vehicles since 1967 Vol. 50 No. 8

JAGUAR I-PACE



20,000 eventual robocabs for Waymo – Google's self driving program.

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Southwest
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If you have comments, please send them to

Current Events Back Issues

The EAA has put most of its issues from 2001 to 2018 on its website.

Please visit

<http://electricauto.org/> and from the home page, click on "Documents" in the top navigation bar.

The resulting page has a listing of years (in a folder), which, when selected, will list the issues for each month. In that folder you will be able to download the pdf that contains the issue you

EAA – A Big Tent

Plenty of Room for Hobbyists, Environmentalists and Race Car Drivers

While our roots may have begun with hobbyists who worked passionately in their garages converting gas cars to electric, some may ask, who are we today? Is there still a place for these members? The answer is yes! EAA is a big tent.

Many of our members can speak with deep knowledge about the battery technologies that drive our EVs. This is our intellectual capital at EAA, and we are proud that we can share this knowledge with students and the general public.

Many of our members are also aligned with groups like National Drag Racing Association, taking joy out of the acceleration, power and pure fun in driving electric.

Our newer members, who own production EVs, may have had their interest triggered by a desire to combat climate change and clean up our air. Today, this is a very urgent and driving

force for many, giving a reason to get up the morning. In the same way that many younger people have never even used a landline telephone, we want future generations to never even consider driving the gas car, with its inferior technologies and polluting tailpipes.

We are proud of our “hobbyist” roots and history.

We are excited and entertained by the racing car aspect of EV performance. We are deeply grateful for the sense of social responsibility demonstrated by the environmentally active EV owners.

Whatever triggered our motivation to be EV curious, EV owner, EV educator, we are all in one big tent. Together, our education and advocacy efforts are making a big difference, propelling car choices towards a better future. As we head into National Drive Electric Week, I encourage each one of you to reach out to invite new members



Raejean Fellows

to join us under the EAA tent. Together we can do so much more.

Thank you for all you do for electric vehicles.

Raejean Fellows
President



Thank you to our Supporting Members **Your generous donations are vital to supporting our activities.** **High Voltage - \$500** Jason France, James Green

Supercharged - Plus \$240

Brown, Alexander
Casner, Karen
Freund, Ron
Greenberg, Steve
Lervold, Joe

Supercharged Up - \$120

Arrison, Alan	Matarese, Margaret (Peggy)
Braun, Stephen	Mathisrud, August
Bussler, Michael	Moret, Bernard
Callaway, Anton	Moyers, Jordan
Clayton, Don	Nisewanger, Jeff
Comstock, Keith	Pease, Norman
Cuzzort, Kyle	Rogers, Kim
Finn, Jeff	Sanchez, Maurilio
Graunke, Gary	Schiller, Mark
Hayden, Christopher	Thorp, James
Higham, Jon	Thwaite, Michael
Jacobs, Gary	Walton, Matt
Kominowski, Rick	Williamson, Stuart

Charged Up - \$60

Bagdasarian, Areg	Leury, Raymond
Bakke, Kent	MacDonald, Douglas
Brentlinger, Douglas	McCann, Sarah
Chatty, Omar	McCaston, Robert
Duncan, Monica	Miller, Gary
Flax, Todd	Mitchell, Duff
Gilbert, Steven	Oring, Jeff
Gilles, Patrick	Stack, Jim
Haupt, Phil	Swackhammer, Chuck
Heaney, Michael	Terpak, Jared
Hughes, Mark	Thesen, Sven
Knight, Sam	Wypyszczak, Steven
Kutz Heggie, Ray & Jen	Zuteck, Michael



ALTERNATING CURRENTS

Alternating Currents Letters and Opinion Policy

Current EVents welcomes letters commenting on its coverage and on topics of interest to the Electric Vehicle community. Be sure to sign your letter and please provide your address and daytime phone number so we can reach you in case of questions. Only your name, city and state will be published unless you request otherwise.

We encourage letters to be a maximum of 100-150 words. Letters can be sent via email to CurrentEvents@electricauto.org.

Current EVents reserves the right to edit letters for length and clarity and to correct factual errors known to us.

Current EVents strives to present a full spectrum of opinion on these pages. Alternating Currents letters, letters to the editor, commentary pieces, articles and cartoons reflect the opinions of their authors and do not necessarily reflect the editorial opinion of the Current EVents or the Electric Auto Association.

Let's Stop Talking About Range Anxiety

By Dale Miller

We are constantly being reminded that words matter. This reminder comes in a variety of contexts. Our choice of words matters in promoting electric vehicles as well.

The term “range anxiety” has a particularly negative impact on impressions about electric cars. Mention “range anxiety” and the person thinks about a stressful driving experience, not about the convenience of never going to the gas station, not about the lower cost of driving electric, and not about the exhilarating performance of electric cars.

Typical commute distances are well below the driving distance of electric cars. For example: According to a recent study for the Transportation Authority of Marin, the average daily trip in the San Francisco Bay Area is 6.9 miles. Drivers in some of the areas with longer trips average 10.2 miles. Are those drivers really anxious that an electric car is not going to make it to their destination?

The five top selling electric cars have a driving distance of more than 151 miles on a single charge, with some as high as 335 miles. Many of the new

models coming soon will go just as far or farther on a charge.

But talking about “range anxiety” at a test drive event, even in the context of trying to dispel the notion that EVs lack sufficient range on a single charge for nearly every one’s daily driving, immediately raises a concern and fosters doubt.

Most gas car drivers buy their gas at the same gas station for their local driving. They don’t need to know where every gas station in town is located because they typically use the same station because of price, discount loyalty programs, or perhaps a car wash. Are they anxious they will run out of gas and be stranded in the middle lane of the freeway?

Most gas car drivers are not stressed out about that happening because their car has a gas gauge and they know from experience how far they can go before they need to stop at their favorite gas station.

Isn’t it the same with EV drivers who charge at home every night? Do they really need to know where every charging station is for their routine

commute? Electric cars do have displays that indicate the number of miles remaining before the battery needs to be charged. Responsible drivers will pay attention to those displays just as gas car drivers pay attention to their car’s gas gauge. Completely depleting an EV battery takes deliberately ignoring the car’s displays and warnings. Electric car drivers aren’t gripping the steering wheel with white knuckles worrying that the battery will be depleted and the car will stop dead at any second. They are enjoying the responsiveness and the quiet, vibration free driving.

I believe we do more harm than good when we bring up the term “range anxiety.” When uninformed drivers bring up the term, we can explain why “range anxiety” is not reality and why EV drivers have the best driving experience, not an anxiety-filled experience. I think we would do well to remove “range anxiety” from our vocabulary.

Dale Miller is president of the Golden Gate Electric Vehicle Association chapter of EAA.



EV Educational Resources

for Individuals, Groups and Organizations

Electric Car
INSIDER



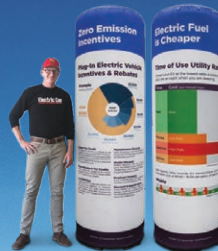
EV Buyers Guide

Compare electric cars with comprehensive full page profiles



Discount Pricing Guide App

Save thousands of dollars on EV purchases and leases



Educational Exhibits

Large scale interactive exhibits for indoor and outdoor events



Electric Car Guest Drive

Test drive the latest EVs and learn from EV owners



EV Navigator

Activity framework to guide prospective EV drivers on the path to EV ownership and advocacy

ECI creates educational resources to promote EV adoption from awareness to advocacy. Email or call us for a complete catalog of products and current pricing.

sales@electric-car-insider.com

619-337-4589

Alternative Insurance for Low Usage Vehicles

By Tom Sidle, Central Coast EAA

Obtaining automobile insurance coverage for a plug-in car is generally not a problem but conventional insurance may not provide cost-effective solution when several vehicles are included with widely differing annual driving patterns. Purchasing a new EV for short commutes and weekly errands while keeping the old family SUV for long summer vacations may be a great way to reduce vehicle maintenance costs while enjoying the benefits of EV driving but can create unusual driving patterns not well covered by conventional auto insurance policies.

Metromile insurance is a type of usage-based insurance that has been around since 2011. It is a monthly auto insurance that uses a plug-in dongle to measure actual miles driven. You pay a small fixed fee plus a fee per mile each month for insurance coverage comparable to the major brands.

To learn more, check out their web site <https://www.metromile.com/>, and request a quote. If you accept their coverage, you will be mailed a dongle similar to this.

Some EV drivers already have an OBD connection. You may be wondering how to handle those situations. You can use OBD splitters (male to twin female) to allow two devices (such as LEAFspy) so that's not a problem. These are available on eBay or Amazon for less than ten dollars. Just be sure to secure those loose cables away from the pedals with zip ties. **Note:** Metromile gets a little unhappy if their dongle appears to be unplugged for several days. This is understandable, as driving your car with the dongle unplugged is a way to "game" their system to get a low monthly bill. My son had a problem with his 12v battery so the Metromile dongle stopped working. With a new battery,



Figure 1 Metromile OBD Dongle



Figure 2 Installed and connected Dongle
Just insert the dongle into the onboard diagnostic port (OBD_II) under the dash of your car. The dongle gets power from the port and "calls home" to report info about status of your car.

we now keep a trickle charger on the car when the car is not going to be driven for long periods. I don't think their dongle represents an excessive power load, but his Honda 'Fit' is known to have very small capacity alternator and 12v battery, which causes owners grief in general.

A rough measure of the savings after our change of cars is coincident with the Metromile sign-up and is estimated to be at least \$200 per year for one car.

Appropriately, YMMV!

ADVANTAGE REALIZED

This scheme is great for gas cars that are parked for long periods until that long vacation trip. The max charged per day is limited to 250 miles so the eight-hour drive to LA or San Diego is discounted by hundreds of miles in the monthly bill. It is also great for low annual mileage cars, like many older EVs. If you own several cars and some are just parked most of the year then Metromile may be a good deal for you. This was my situation for several years when I found it difficult to convince my insurance company that the annual mileage on one of the cars was only 2,000 miles. However, if you have a long commute and drive 15,000+ miles per year, Metromile will cost more and will not offer any advantage over normal insurance coverage.

Our Experience

We have used Metromile for our 2003 Honda Odyssey, 2011 Nissan Leaf, and son's 2012 Honda Fit (now parked at Grandma's house until our next visit). We also have two other cars that are covered by a conventional insurance policy.

We have had good experiences when talking to agents on the phone, and so far have not filed any accident claims so can't speak to their service when paying out against repairs.

Metromile is not the answer to everyone's insurance needs but might be something to consider if your vehicle usage is a little unconventional.



Victory for Oregon's Clean Vehicle Rebate Program

A lawsuit filed last year by AAA Oregon/Idaho and the Oregon Trucking Association that challenged the state's proposed funding mechanism for the electric vehicle (EV) rebate program settled this morning. The state supreme court unanimously ruled against the lawsuit, which will allow the Clean Vehicle Rebate Program, approved by the Legislature in 2017, to move forward.

The Oregon Clean Vehicle Program consists of two rebates. The standard rebate of up to \$2,500 applies to the purchase or lease of any new electric or plug-in hybrid car with a base MSRP of \$50,000 or less. The additional Charge Ahead rebate of up to \$2,500 is available to lower-income drivers and can be combined to provide \$5,000 towards a new vehicle, or applied to a used electric car. The Oregon Department of Environmental Quality is accepting Phase I applications for all cars purchased or leased on or after January 1, 2018. To learn more about the rebates and eligibility requirements, click on the URL below.

Last fall, Governor Kate Brown signed Executive Order 17-21, which calls for rapidly accelerating electric vehicle adoption to reduce greenhouse gasses and address climate change. The order sets a state-wide goal to have 50,000 electric vehicles on the road by 2020. Currently, there are approximately 16,000 vehicles registered in Oregon and it is expected the rebate program will help increase EV sales.

<https://www.oregon.gov/deq/aq/programs/Pages/ZEV-Rebate.aspx>



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2 Luxury suites. Regenerate and tech-detox!

Book the Barn Gallery now at www.oex.club

This offer is not available on other rental websites

Tips For Engaging People When Showing EVs

By Guy Hall, SacEV

For those of us who show an EV to the community at such events, we'll arrive with our freshly washed EV ready to share our wisdom. However, this is much easier said than done. We have to remember, perhaps to our disappointment, most of the folks walking by did not come to the event to see an EV. So, It can be difficult to get passers-by to pause and engage in discussion instead of breezing on by.

How to get those passer-byers to pause and engage in a discussion.

However you start the conversation, it's important that it's authentic, personal and honest. You are bringing the special value of your personal experience and a balanced perspective, quite different from a sales incited dealer or factory rep. I've found "Do you have any questions about EVs?" or its variants not very effective. Those questions are just too easy to respond with "No" as they keep on walking on, especially if they think you might be a car sales rep. Often they are curious, but not sure of what questions to ask, so they keep walking. I asked the members of our Sacramento EAA chapter to share what works for them as an engaging opener. Here are some ideas from their experiences for good opening lines or actions.

- My personal favorite is to call out the question: "Have you ever driven an electric car?" 90% of the time they will stop and think about the question.
 - If response is "Yes," then follow up with "What one? Did you like it? How long have you owned it?" "What was your favorite thing about it?"
 - More often than not, if they say they have driven an electric car you'll find out they only own a traditional hybrid, such as a Prius, or another hybrid, which in the strict sense are not an EV and can't be plugged in. That gives you the opportunity to start a conversation. It could be something like, "That's a hybrid and



Photo 1 (above) Mark Williams, of Sacev, explaining concepts to two captured victims.

they're better than basic gas cars. But, the all electric cars really kick it up a notch in terms of performance, cost to drive, air quality, and savings. Plus, they are more fun to drive." You can then explain how this is possible, with their low center of gravity, the peppy electric motors, clean electricity from the wall, etc.

- Assuming it is a real EV, not just a Prius or other standard hybrid but one with a plug, then either they have one or their friend has one. If it's a friend, follow up with "Did they like it?" If it's their personal car, ask what they think of it and check to see if they will consider joining your EV group and share their experiences at a future event.

continued next page

ENCOURAGING EV CONVERSATION

- If response is “No” they have not driven an EV, then follow with “You should test drive one. They are a kick to drive. Peppy, great handling, inexpensive, fun to drive,” etc etc. An alternate to a “No” response is : “This is our family car. It’s a kick to drive. ...” This helps break away from their assumption of you being a dealer.
- A second successful approach I use with families is to stand by the car holding a J1772 plug and call out to families, “Can your daughter (son) help me out by filling up my electric car?” Then hand the J1772 plug to the child. As they try to figure out how to plug it in, engage the parents with additional information. “This is how easy it is to connect the car.” “No worries about shocks (or in the case of a gas car), of spilling explosive gasoline.” “It’s very quick to do!” Note: your J1772 doesn’t have to be plugged into power, it’s just a prop.
- Another highly successful approach has been to create EV hand stamps with different ink colors. Call out to kids, “Do you want your hand stamped with an Electric Car?” The kids would drag the parents over and you can start a conversation while stamping the kid’s hand.
- Car Painting: We have taken our older Nissan LEAF and allowed kids to write on it with a Dry Erase pen. The black color required a little more elbow effort to wash off. Try some out before the event!

If one set of opening lines is not working for you, keep trying different variations or check what others doing, until you find something that works for you.

Lastly, I also have found that most people will think I’m a dealer or factory sales rep, which also inhibits the interaction. So as soon as you can fit it into the discussion, it’s important that you establish that you are not a car dealer or factory rep. Use lines like:



- We’re volunteers showing our personal electric cars to the community
- This is our family car that we’ve had for two years

If you are an event leader, part of your responsibilities are to help other new EV owners engage the community at the event. Pass along these ideas, along with your own, to help the newbie’s be successful.



George Parrott describing the joy of driving electric



Hydrogen Shortage Hits Hard: Toyota Mirai Owners Urged to Top Up Frequently



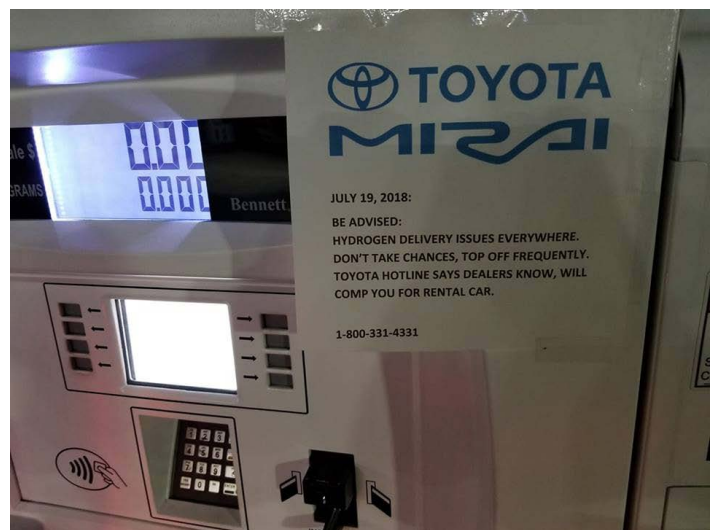
By Mark Kane

Hydrogen shortages in California are causing trouble with refueling hydrogen fuel cell cars, particularly in the Los Angeles area. We were often told that hydrogen is the most abundant element, so we wonder how it could be that there are shortages? Especially shortages at places like hydrogen refueling stations, where there should be hydrogen everywhere.

According to a *Green Car Reports* article, at least at some of the 33 hydrogen refueling stations in California, FCVs owners might be surprised by a lack of hydrogen.

At one station there is even a message with info from Toyota: “Be advised: Hydrogen delivery issues everywhere. Don’t take chances, top off frequently. Toyota hotline says dealers know, will comp you for rental car.”

Not only Toyota Mirai drivers (3,687 sales by the end of



June 2018) but also those with Honda Clarity Fuel Cell and Hyundai Tucson Fuel Cell vehicles will be affected. Well, the cause seems to be unexpected disruptions at Air Products,

continued on next page

HYDROGEN SHORTAGE

which supplies the hydrogen. They are suggesting it will be early August before supplies are restored.

“Toyota is aware that certain fuel-cell vehicle owners in the Los Angeles area are currently experiencing refueling challenges because of limited hydrogen supply at several local fueling stations. While the station operator works to resolve this short-term issue, we are working with our Mirai (fuel-cell car) customers to help identify alternative fueling options, including as a temporary measure, opening our commercial hydrogen fueling station at the Port of Long Beach...We sincerely regret the current inconvenience for our customers,” Toyota said in a statement emailed to *Green Car Reports*.

“We are actively working to resolve this unexpected disruption, which has been caused by a contemporaneous series of unrelated issues at several liquid hydrogen production and supply sites. We are addressing the matter as rapidly as we can and are hopeful to have the situation remedied and have restored regular hydrogen supply in the early days of August. We regret any inconvenience that may have resulted.... We regret any inconvenience fueling customers may be currently experiencing, and reassure you we are focused on resolving the issue as soon as possible,”

Well, we can now add worries of lack of hydrogen to the lists of doubts we have connected to FCVs.

And following is what *Green Car Reports* learned from Air Products spokesman Arthur George:

Source: Green Car Reports

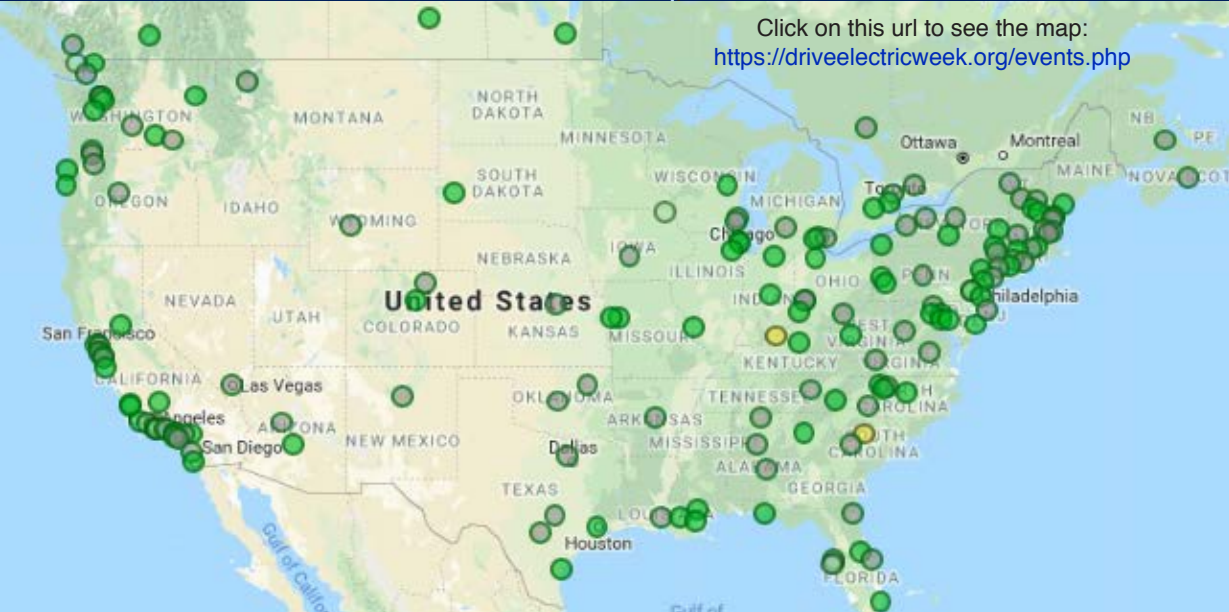
<https://insideevs.com/hydrogen-shortage-hits-hard-toyota-mirai-owners-urged-to-top-up-frequently/>



National Drive Electric Week™

Join us in September!

Click on this url to see the map:
<https://driveelectricweek.org/events.php>



National Drive Electric Week™ is Sept. 8-16, 2018. Find a place to attend.

<https://driveelectricweek.org/>

Tesla Model 3 Outsold All Mercedes-Benz Passenger Cars Combined

And passengers cars from BMW, Audi, Lexus and so on...



By Mark Kane

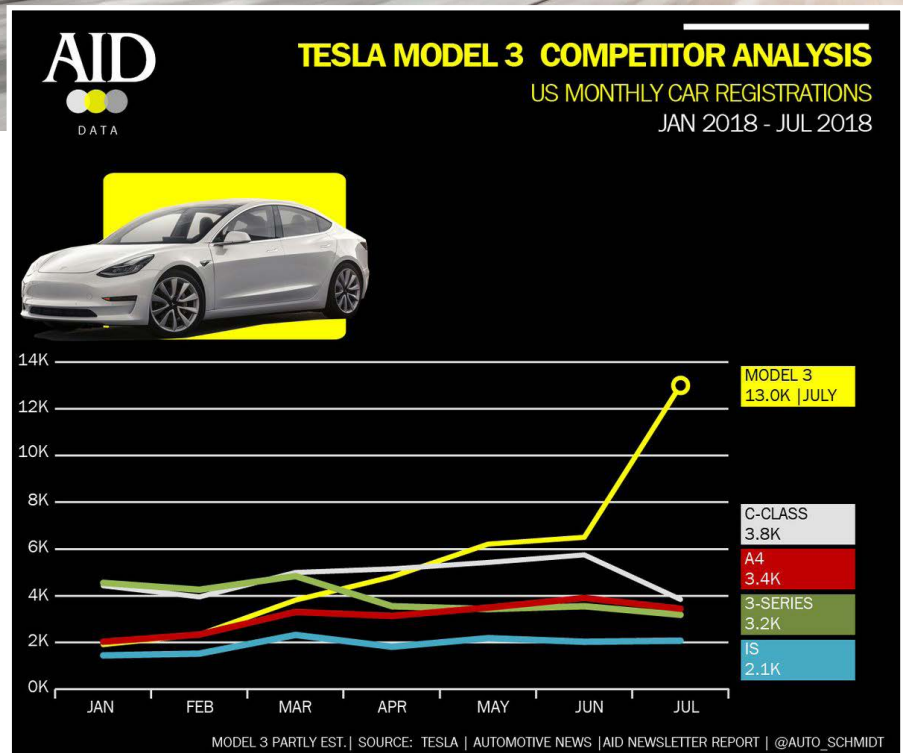
Here is a more detailed look at the Tesla Model 3 and its closest competitors in the segment.

Tesla already stated that the Model 3 outsold in July all other models from the mid-sized sedan segment in the U.S. But this new graph shows us how big the difference really is compared to a few particular models.

According to AID, around 13,000 Model 3 (numbers vary depending on estimations) were sold last month compared to just:

- 3,800 Mercedes-Benz C-Class
- 3,400 Audi A4
- 3,200 BMW 3-Series
- 2,100 Lexus IS

Well, Model 3 not only outsold particular models (all passenger cars except for maybe seven), but for example, it outsold all Mercedes-Benz passenger cars – ≈8,500



(SUVs excluded). Mercedes-Benz sold in total just 20,034 vehicles in July (down 22.7%). Interestingly, Ford and Chevrolet don't have a single passenger model that can

beat the Model 3 in volume. That's rather surprising to us, but what's really intriguing is the outlook for the Model 3 in the coming months when production increase even more.

<https://insideevs.com/tesla-model-3-outsold-all-mercedes-benz-cars-combined/>



SEPTEMBER 8, 2018 — JOIN A GLOBAL DAY OF ACTION

REAL CLIMATE LEADERSHIP RISES FROM THE GRASSROOTS UP.

Local action is leading the way — Be part of the movement that's ending the era of fossil fuels and building 100% renewable energy for all.

SEPT 8TH
**RISE
FOR CLIMATE
JOBS + JUSTICE**

CALIFORNIA

Join the march on September 8:

Every EV owner knows that EVs are fun to drive, cost less to operate and maintain, and reduce noise and pollution. In addition, EVs reduce greenhouse gases, making it possible to achieve our climate stabilization goals.

Join the EV contingent at the RISE for Climate, Jobs and Justice march in San Francisco on September 8.

Drive your EV to Spear and Mission at 10 AM to bring up the rear of the march, which leaves for Civic Center at 11:00.

Please RSVP to
elenajengel@gmail.com

Check the web site
<http://GGEVA.org> for updates and
more details

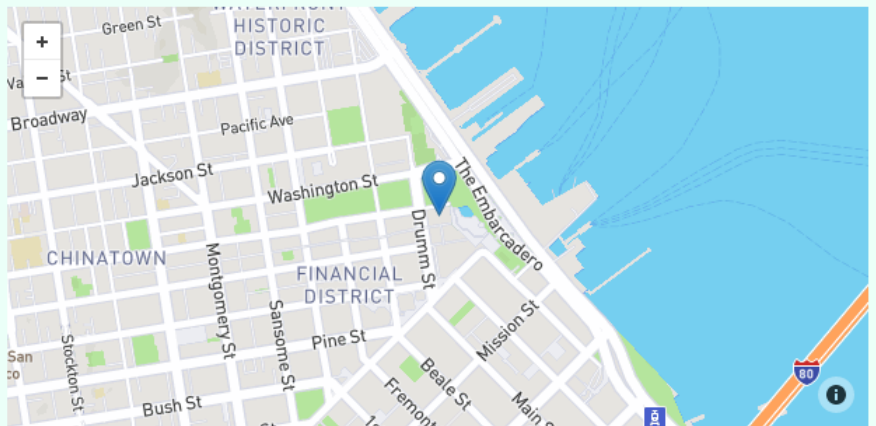
<https://ca.riseforclimate.org/>

September 08, 2018

10:00 AM

Embarcadero Plaza

Four Embarcadero Plaza, San Francisco, CA 94105



On September 8, thousands will march in San Francisco for the largest climate march the West Coast has ever seen. Together we will Rise for Climate, Jobs & Justice as part of a global day of action to demand our elected leaders commit to no new fossil fuels and a just and fair transition to 100% renewable energy.

Join us as we hold our local leaders to account and demand that they walk the talk on climate action.



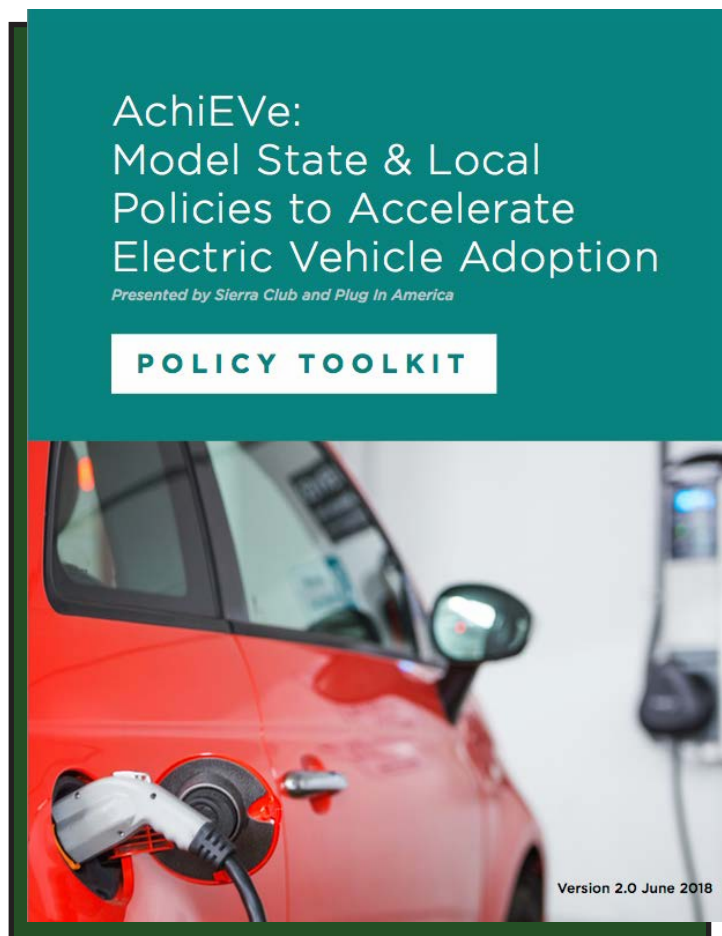
EV Public Policy ToolKit

By Jon Higham, EAA Board

Have you ever been ICE'd out of a charging location and wish there was something you could do to have the offender ticketed? That simply isn't an option in most states, but that doesn't mean there isn't anything you can do about it.

The Electric Auto Association are beginning to publish a recurring, monthly to bi-monthly feature in which we report on legislative affairs. This issue, we want to bring your attention to a new EV public policy toolkit that was the subject of a webinar on 31 July.

The toolkit outlines various policies and programs being implemented in various states and regions that are aimed at the adoption of electric vehicles. The policies in question vary widely region to region, from rebates given to electric vehicle consumers to the proliferation of charging stations, so we invite you to familiarize yourself with the contents of the toolkit and pay attention to what is being done where you live. We also encourage members to reach out to their state legislators and local government to consider additional ways to further electric vehicle adoption.



For those further interested in what is being discussed by the EAA and were not able to participate in the webinar, we are also providing the link to the webinar video as well as the toolkit.

Below is the link to the toolkit and webinar video, respectively:

<https://www.sierraclub.org/sites/www.sierraclub.org/files/blog/EV%20Policy%20Toolkit.pdf>

<https://www.youtube.com/watch?v=KisTActTAtU>



Automatic Rapid Charging Robot Becomes Reality, But Not From Tesla

Researchers at Graz University of Technology reveal robot-controlled CCS EV fast-charging system



recognizes the charging socket of the vehicles and is thus able to autonomously set different parameters – Cars, which successively drive into the charging station, charge. The problem of positioning the vehicle at the loading bay could thus be solved, so that the system works even when parking misalignments occur.

By Steven Loveday

The current prototype was a joint effort between Graz University of Technology, BMW AG Munich, MAGNA Steyr Engineering Graz, the Linz automation specialist KEBA, and the Austrian Association for Automotive Technology (ÖVK) in Vienna. It is the first of its kinds that will allow vehicles to be loaded in various parking positions in series, waiting to charge. This means it can charge vehicles successively, one after another. It also corrects for a driver's parking misalignments. The system requires no changes to a vehicle's existing hardware, nor are any special adapters needed.

Way back in 2014, Tesla CEO Elon Musk declared via Twitter that the automaker was working on a similar system. Though we've yet to see this become reality from Tesla.

The leader of this particular research area at Graz University of Technology, Bernhard Walzel, is writing his dissertation on the subject. He explains:

For the first time, we have succeeded in a robot-based charging station autonomously charging several vehicles one behind the other, without the vehicles being specially adapted for it have to. Thanks to ingenious camera technology, the robot

Graz University says that the goal is to offer convenient, automated fast-charging in a matter of minutes. The system employs liquid-cooled connectors and cables. The project's next step is to pair it with autonomous parking.

Many of you probably remember Tesla's snake-like robot charging prototype from several years back. It has never come to production, but perhaps sometime in the future both of these systems will be available.

[Get more details and see the video at the URL below]



<https://insideevs.com/rapid-charging-robot-becomes-reality/>

You May Limit the Speed of Your Car with the New Tesla Update

By Fred Lambert

Going a step further than its 'valet mode', Tesla is now letting owners limit the speed of their cars with a new mobile app update alongside a vehicle software update. Tesla owners with vehicle software version "2018.24 or above" and the latest mobile app update (Version 3.4.1) can now access a new speed limiter feature.

The automaker describes the feature in the update:

"Limit vehicle speed and acceleration with speed limit mode. Maximum vehicle speed can be set between 50-90 mph (80-145 km/h)."

It follows Tesla's release of the 'Valet Mode', which temporarily puts a series of limitations on Tesla's vehicles:

- Top speed is limited to 70 MPH
- Power and acceleration are limited to 25% (80KW)
- The glove box and frunk are locked
- Access to certain vehicle settings is disabled
- Access to personal information is restricted



Now the new feature gives more flexibility to the owners in terms of setting the actual speed limit.

As usual, Tesla vehicle software updates are gradually rolled out to the customer fleet and it can take some time before it is accessible to every owner.

Update: With the vehicle software update, Tesla confirmed that the feature must be enabled from the car when parked.

<https://electrek.co/2018/06/20/tesla-remotely-limit-speed-mobile-app-update/>



DID YOU KNOW?

Tesla's Gigafactory in Nevada is currently producing cells for their automotive and energy storage products on 10 parallel production lines. The plant is 30% owned by Panasonic, who states they will soon be expanding that to 13 lines, just to keep up with their demand!



Tesla will Release a New Autopilot interface with Version 9 Software



By Fred Lambert

Tesla CEO Elon Musk has started gradually releasing information about the automaker's next important over-the-air software update this week. Recently, Musk confirmed that it will come with a new user interface.

In this case, he is specifically referring to the Autopilot interface, but Tesla's interface, on both the instrument cluster and the center display, has evolved a lot over the years.

In Lambert's review of a 5 year old Model S, he shared a look at the different versions of the user interface over the years:

Version 8.0 came back in 2016. It was Tesla's most significant over-the-air software update at the time. It featured a user interface refresh, a few new features, and several improvements related to Autopilot.

Now almost two years later, Musk announced that Tesla's version 9 software update is coming now in August with the first 'full self-driving features'.

Kevin Wang asked Musk if the instrument cluster could display vehicles in the blind spots as he pictured above in the render. In response, Musk confirmed that the interface will change with the upcoming Version 9 software update.



To read about Electrek's take on the interface and more details about it:
<https://electrek.co/2018/06/13/tesla-new-user-interface-version-9-elon-musk/>



Tesla Extends Free Supercharging For Model S, X

Anyone referred by an existing Tesla owner will get unlimited free Supercharger access



By Vanja Kljaic

The referral program that allows new Tesla owners to gain free unlimited Supercharging for their Model S and Model X was supposed to end the other night. However, it seems that the carmaker is ready to extend this opportunity for a bit longer – in this case, for at least two more weeks. This means that all new Tesla Model S and Model X owners – who buy a new vehicle through a referral – will get free unlimited Supercharging for their vehicles.

Previously, the default Supercharger access model for a new Tesla Model S or Model X purchase is pay-per-use. The same applies to all Model 3 purchases, as they don't have the referral incentive, to begin with, thus falling under the pay-per-use scope entirely. For every owner that falls under the scope of this program, every visit to a Supercharger presents a cost where they're billed either per kWh charged from a Supercharger or per minute they use a Supercharging station – depending on whether or not Tesla can actually officially "sell" electricity in that country, state or area.

Right now, almost all Model S and Model X buyers used referral codes when they've purchased their cars. In turn, they all have the option of using the Supercharger network entirely for free. Even though Tesla threatens to do away with this option with every referral program round, but the company keeps reintroducing it every single time, thus allowing for free supercharging to more Model S and Model X owners. The same happened with the last round, which officially started on May 1st and was planned to go on until

July 15th. However, Tesla updated its referral program support page last night and extended the ongoing round until July 31, giving more would-be Model S and Model X owners a chance to utilize their Supercharger network for free.

How about those referral awards?

Besides the free supercharging, Tesla owners who refer several new owners are eligible to receive referral awards. These referral awards start with the signature black wall connector for those that have 1 or 2 qualifying referrals. These are followed by early access token for the solar roof for those with 3 referrals and go the way to 21" Arachnid wheels for the Model S or 22" Turbine wheels for the Model X for those with 4 referrals under their belt. For those with 5 referrals, either a Founders Series Powerwall 2 or an invite to a Tesla unveiling are the referral awards. One gets you a home charger with Elon's handwriting, the other, an invite to a special unveiling event, held by the car maker the next time Musk sets out to show the world another revolutionary product.

Unfortunately, reports have been floating around the internet that Tesla is behind on delivery for many of the previous referral rounds. This means that plenty of those who have referred other Tesla Model S and Model X owners aren't getting their free goodies. But, according to Electrek, the long-awaited Powerwall 2 Founders Series, signed by Elon Musk himself (a must-have Tesla item) is finally getting delivered.

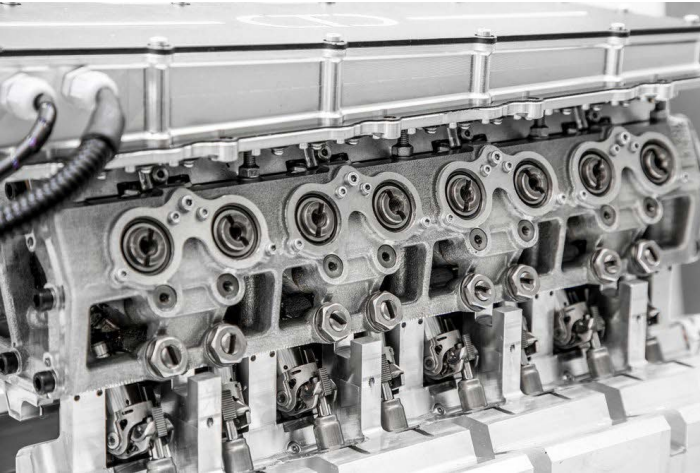
Source: *Electrek*



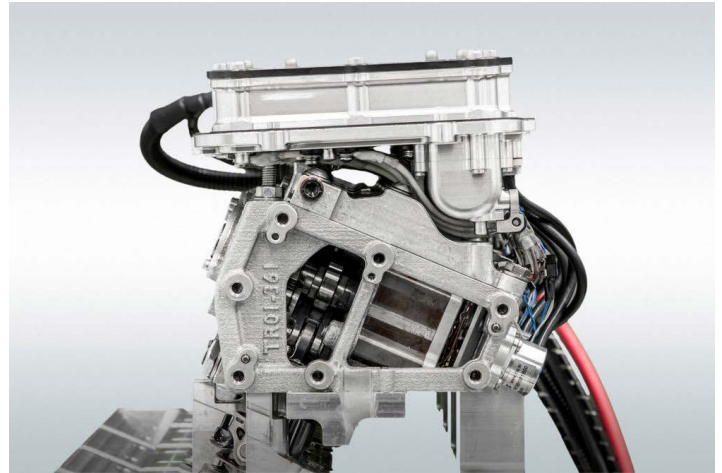
<https://insideevs.com/tesla-extends-free-supercharging-for-model-s-x/>

World's First Fully Digital Valves Open Up Engine Possibilities

It seems like a simple enough idea, moving to electronic control of the valves. So why hasn't it been done before? The difference is in the electronics that control it. What's happened in the recent past is that there's now sufficient processing bandwidth at a low price that can tolerate top of engine conditions, so you can actually put real time control on top of these motors.



Camcon's Intelligent Valve Actuation system is the world's first fully digital valve system, uncoupled from the crankshaft (Credit: Camcon Automotive)



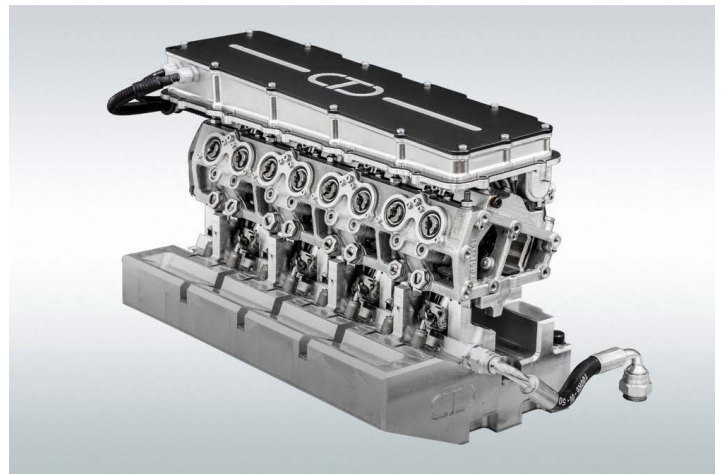
Camcon's Intelligent Valve Actuation system completely uncouples the valve system from the camshaft (Credit: Camcon Automotive)

By Loz Blain

British company Camcon Automotive has built the first fully electronic engine valve system, uncoupled from the crankshaft, that offers unprecedented control over the combustion cycle. On top of power and emissions improvements, it also opens up some weird and wonderful capabilities we've never seen before, such as giving 4-stroke engines brief 2-stroke power boosts.

Variable valve timing is nothing new. It's been obvious to manufacturers for decades that the optimal valve operation is different when the engine's doing different things, and that changing the timing, lift and duration of the valve events on an engine to suit different scenarios can result in power, torque, efficiency and emissions advantages.

What makes Camcon's system different is that it allows complete, instant and unrestricted control over exactly what any intake or exhaust valve is doing, at any time, regardless of what the engine itself is doing. That's because Camcon's IVA (Intelligent Valve Actuation) system is fully electronic, with no mechanical attachment to the crankshaft.



Camcon's Intelligent Valve Actuation system offers full digital control over what all valves are doing, at all times (Credit: Camcon Automotive)

valve getting its own miniature camshaft, complete with a desmodromic system that opens and closes the valves precisely and mechanically. And instead of being driven off the crank, each valve's camshaft is controlled by an electric motor.

There are no timing belts or valve springs, with each

[Interested in learning more? Go to the URL below.]

<https://newatlas.com/camcon-digital-iva-valve-system/55827/>



Driving Bolt 900 Miles on California Coast

By Rafael Reyes

As an exercise to assess long-distance performance of the Bolt and associated charging I drove my 2017 Chevy Bolt from the City of San Mateo to the City of Orange and back. Here are the key details and results.

Dates: Depart: Fri. Feb 23rd Return: Sun. Feb 25th 2018

Vehicle: 2017 Chevy Bolt EV, 60 kWh battery, CCS connector, (maximum 80 kW) Ref. #1

Total Distance: 904 miles round-trip via highway 101

Major Take-Aways

Overall

1. Incredible that it can be done pretty easily, two yrs ago couldn't be done as a day trip (outside of a luxury non-major automaker vehicle Tesla).
2. Not yet truly practical but close. Projected best time is 10.5 hrs with 3 stops under current conditions.
3. Costs approximated gas even paying EVgo credit card charges (no subscription), especially if unnecessary stop were excluded. Cost excluding home charges: \$115.13 for ~176 kWh. With home charges est: add ~\$10 @\$0.12/kWh for ~85 kWh for total of \$125 for 260 kWh, 904 mi (\$0.14/mi). Est gas cost @30mpg, \$3/gal \$90 or \$0.10/mi.
4. Gas car experience for long trips is close. With EVs to be available in ~3 years it should be little different than a gas car. Alternatively, ultra-fast chargers (100 kW) and better siting (Paso Robles) would significantly improve the time.

Car

5. Average total vehicle efficiency was 3.6 miles/kWh maintaining 70 miles per hour making the theoretical maximum range 216 miles. However, charger siting prevented optimizing range.

6. Car is incredibly comfortable – quieter, less vibration, less tiring.
7. Driving style matters (still) as do all the other efficiency factors: climate control, mountains and wind, i.e., with current battery capacity, these issues still need to be taken into account.

Charging

8. There are a good number of chargers in urban areas but missing where most needed (Paso Robles)
9. Fast charger utilization appears good. Every charger had multiple cars (two chargers had three, 2 EVSE had two)
10. 50 kW means charging at 40 kW (37-42 kW experienced at onset), actual rates are slower than rating and overall still too slow for long haul charging relative to what the typical driver will tolerate.
11. EVgo call center is quick and reliable but the 30 minute cutoff is designed for local FC, not long haul. Likely need to change when 3rd generation higher capacity battery EVs (350 mi range) reach the market.
12. There are not good stations between Salinas and San Luis Obispo

Other

13. Phone got a serious workout with continuous mapping, calls to EVgo
14. Everything worked. PlugShare works very well – info was accurate
15. EV driving community is quite friendly. Early adopters are very enthusiastic and understand that everyone is managing the same limitations with an exciting new thing.
16. Route planning still must include backup charge locations in the event of problems.

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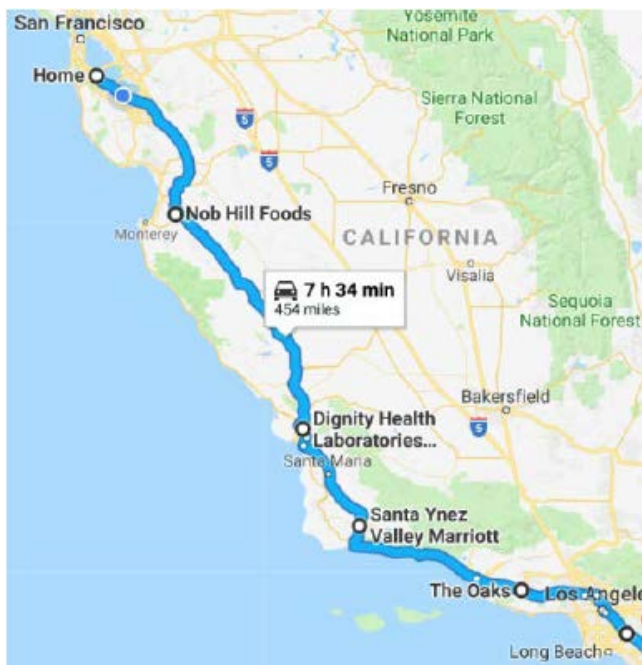
Reference:

¹ https://www.greencarreports.com/news/1109714_more-details-on-fast-charging-rate-in-2017-chevy-bolt-ev-electric-car

South-Bound Stops

Fri. Feb 23rd: Heading south I had two problems. I had to wait 45 minutes in Salinas where the charger had only one port and I was too aggressive with my driving after Buellton which degraded my range and made a fourth stop which would have been unnecessary but I did the extra charge as a safeguard. Terrible overall time of nearly 13 hours. \$61.07 for ~87 kWh (excluding home charge).

Location	Distance	Times / Miles Available	Comments
San Mateo, CA	0	Dep: 10:10 am, 240 mi	Start
Salinas <u>Nob Hill Foods 2-34 E Blanco Rd, Salinas, CA</u>	88 mi	Arr: 12 noon Ch: 12:45p Dep: 1:15p ~175 avail 13.716 kWh, \$12.15	1 50kW EVgo https://www.plugshare.com/location/68135 Delayed 45 mins with another Bolt also driving to SoCal
Paso Robles			Skipped b/c one 22kW station poorly rated on PlugShare
San Luis Obispo <u>Marigold Center, 3900 Broad St, San Luis Obispo, CA 93401</u>	215 mi	Arr: 3:37pm 48 mi Dep: 4:57pm 184 mi 37.511 kWh, \$24.50 (2 sessions)	2 50kW EVgo https://www.plugshare.com/location/76752 backup: Kontiki Inn
Buellton <u>Santa Inez Valley Marriott, 555 McMurray Rd, Buellton, CA</u>	274 mi	Arr: 6:20pm, 120 mi Dep: 7:23pm, 197mi 22.233 kWh, \$12.27	2 stations, 50kw CP https://www.plugshare.com/location/73118 Best stations and stop on route backup: La Cumbre Plaza, 121 S Hope Ave, Santa Barbara
The Oaks Mall Thousand Oaks		Arr: 9:00pm, 80 mi Dep: 9:30pm, 133 mi ~14 kWh, \$12.15	2 50kW EVgo This stop was a safeguard but unnecessary
Orange	453 mi	Arr: 10:55pm, 75 mi	End



1 station 50 kW EVgo:

<https://www.plugshare.com/location/68135>

2 stations 50 kW EVgo:

<https://www.plugshare.com/location/76752>

2 stations 50 kW EVgo:

<https://www.plugshare.com/location/73118>



Buellton

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California Coast

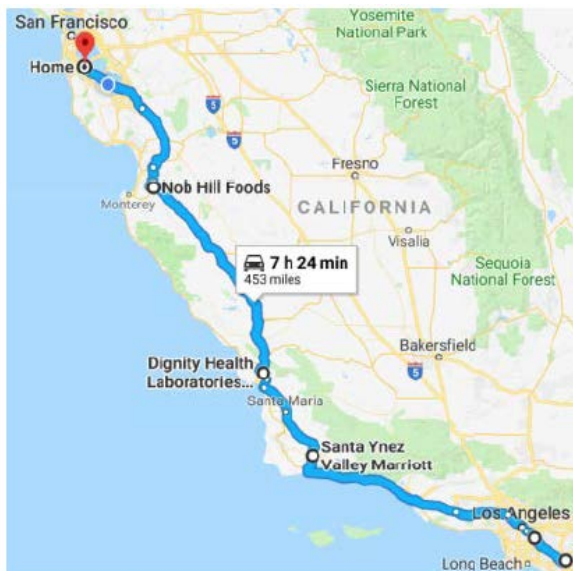
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Return

Sun. Feb 25th: On the return I was much more diligent about maintaining a speed of no more than 70 miles per hour. This provided a 3.8 mi/kWh efficiency nearly the entire trip except when I hit the Salinas Valley which had high

[head] winds. This brought my overall efficiency down to 3.6 mi/kWh. Also, I had very poor charging on a 120 plug in Orange, charging a meager 93 miles in 34 hours. Had I raised the 120 charge throttle to 12 amps it would have helped considerably, probably adding another 45 miles. This would have eliminated the near-miss at Buellton. 11 hours total. This could probably be optimized down to 10.5 hours but not much more under current conditions. \$54.06 for ~89

Location	Distance	Times / Miles Available	Comments
Orange	0 mi	Dep: 9:00 am, 168 mi	Start Charged 110 but forgot to increase 110 charge throttle to 12 amps
<u>Buellton</u> <u>Santa Inez Valley</u> <u>Marriott, 555</u> <u>McMurray Rd,</u> <u>Buellton, CA</u>	171 mi	Arr: 11:44am, 9 mi Dep: 1:43, 215 mi (full) 58.020 kWh, \$29.56	2 stations, 50kw CP https://goo.gl/maps/N9tV25pTmis Scary. Forgot there was a big hill before Buellton. Gauge blinking empty & in turtle mode up hill. Chose to charge 100%. 1 hr to 80% full. 1 more hour to full.
<u>San Luis Obispo</u> <u>Marigold Center,</u> <u>3900 Broad St,</u> <u>San Luis Obispo,</u> <u>CA 93401</u>	231 mi	Arr: 258pm, 153 mi Dep: 3:39pm, 196 mi ~11 kWh, \$12.15	2 50kW EVgo https://www.plugshare.com/location/76752 backup: Kontiki Inn
<u>Salinas</u> <u>Nob Hill Foods 2-</u> <u>34 E Blanco Rd,</u> <u>Salinas, CA</u>	360 mi	Arr: 5:45pm, 36 mi Dep: 6:30pm, 110 mi ~20 kWh, \$12.35	1 50kW EVgo https://www.plugshare.com/location/68135
San Mateo, CA	451 mi	Arr: 8:00pm, 28 mi	End



2 stations, 50 kW CP:

<https://goo.gl/maps/N9tV25pTmis>

2 stations 50 kW EVgo:

<https://www.plugshare.com/location/76752>

1 station 50 kW EVgo:

<https://www.plugshare.com/location/68135>



San Louis Obispo



Stalking the Desert Southwest, Tesla-Style



Valley of Fire State Park

by Elaine Borseth, President EVAoSD

When I heard about the EV museum in Kingman, Arizona, my first thought was: hmm, that would be a great trip for my P85D. I don't know how many days/hours/minutes later that it came to pass, but on one morning this past March I found myself starting out from Cardiff, California. My first destination was Bullhead City, Arizona, and my friend, Hilde, who would join me for the part of the adventure. As I drove along, I thought about how many have said to me that the desert is a boring drive, but I love the colors—taupe sand against a Danube-blue sky, the hills changing color with the shifting light of the day; I can hardly keep my eyes on the road. Yes, that suggests a topic to EV fans, but let's not go there in this article, shall we?

After a quick top off at the Needles, CA supercharger (SuC.), it wasn't long before Bullhead City's asphalt passed beneath my tires, the trip's first day done and dinner awaiting. The next morning, with Hilde on board, I pointed the P85D toward the Powerhouse Route 66/EV museum. It was an effortless drive, as the museum is less than an hour away. The building is historical, originally enclosing an oil-fired powerplant that provided light at night for Route 66 travelers (and power for toasters, Atwater Kent radios, and those newfangled electric irons, one presumes).



Amazing Desert Colors

Built in two phases between 1907 and 1911, the powerplant was operated by the Desert Power & Light Company. In addition to the items mentioned above, it also electrified mines in the area. Perhaps that means lights too, so miners could see if their canary was still alive? The plant's contribution to history included supplying power for the construction of Hoover Dam in the early 1930's. A bittersweet gig that was, because the dam's power ended up being much cheaper than DP&L's. Sigh. The old powerplant was soon mothballed, abandoned to rust in peace, to pieces.

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Southwest

Continued from page 23

But it wasn't the end of the story. Sixty years later, in 1997, the powerplant's flaking iron remains were hauled out and the building was restored to its former Frontier luster. Reincarnated as a Visitor Center, the museum houses nostalgic displays of good 'ol Route 66 history. And, of course, the Electric Vehicle Museum, which opened in 2014 and is the first of its kind. The collection includes a Detroit Electric car which, since I grew up in Detroit, is near and dear to my heart. (The only other example I've seen was at the Seal Cove Auto Museum in Maine two years ago, on my coast to coast Tesla trip.)



Tesla on Route 66



Detroit Electric and more EVs



Just Some of the EV museum Displays

In addition to the Detroit and many other EV's is the one-time EV land speed record holder: the Buckeye Bullet 2.5. In 2010, it set an F.I.A. record of 307.6 mph. That was bested by the Buckeye Bullet 3.0 in 2016, which went 321 mph. The record for a wheel-driven ICE, set in 1947, is 394 mph—something to gun for.

The museum's curators have made EV history come alive. It's easy to imagine this multiplicity of electric cars on the road, and somewhat sobering to know that if things had been just a little bit different, the EV might have not only won the early automotive days, but all the days since then. Well, at least we're getting to see it happen now.

After the museum, just because it's there (kinda like Everest), Hilde and I stopped by the Kingman SuC to soak up some electrons. They're such a draw for me, those superchargers, watching the battery fill like a pint glass at a pub. Who says road trips in an EV aren't a multi-splendored joy?

The next day, solo once more, I headed off for Red Rock Canyon, one of my favorite places on earth. It's close to Las Vegas, and yet ask people who have been there many times and most have never been to Red Rock, even though it's less than 30 minutes from the Strip. I cruised into the canyon, selected a scenic viewpoint, and immediately spotted a gorgeous Alfa Romeo sports car and a random BMW convertible (details on it are irrelevant, your honor).

Walking over to take in the view, I overheard two guys talking cars. They'd seen me pull in and the Alfa Romeo owner asked the BMW dude if he'd experienced a Tesla. He hadn't, so yeah, it was time for a spin. Yes, I know it's borderline harsh to bring a proud Beemer owner down like that, but it's also irresistible. When we returned to the parking lot he leapt out of the car and started telling everybody within earshot, including a bewhiskered group of motorcycle riders, how amazing the Tesla was. And in this story he told, my name was Maria Andretti.

You're wondering? Yeah, I'm good with that.

But, I digress...back to Red Rock Canyon. The place must be seen to be believed, as words can't paint the picture (and so I have pictures). There is a 13-mile scenic loop with miles of hiking trails, world class rock climbing, horseback riding, biking, and picnic areas. Lots of parking areas at the trail heads and amazing scenery throughout the Conservation Area. Well worth the cheap-at-twice-the-price entrance fee.

continued next page

That evening I stayed in Primm. This was convenient as there is a—hear it coming, don't you?—supercharger station there. The next day I drove about 20 minutes up the road to the Seven Magic Mountains Art Installation. Here's how that works: you're driving through curving desert roads, expecting, let's say...more desert. Then what, to your wondering eyes, do you behold? Stacks of charms from Paul Bunyan's bracelet? Booty from the Big Rock Candy Mountain heist? Jawbreakers for a T-Rex? The mind boggles.



The Seven Magic Mountains

Look closely at the pictures. Yes, those are people in and among the stacks, each praying an earthquake doesn't happen right about now. These seven stacks of Day-Glo boulders, each rock weighing thousands of pounds (the largest coming in at over 56,000 pounds), were created by Swiss artist Ugo Rondinone. His expression of human presence in the desert, Seven Magic Mountains, dramatically contrasts the Mojave with a poetic burst of form and color. See it soon, or maybe not at all. Word is, it will only be there until the end of 2018.

The day itself was perfect: beneficent, warm sun, temps in the 70's, a light breeze to tousle the hair. Life was good. Back in White Lightning, I rolled north to Valley of Fire State Park. I hadn't been there before and didn't know what to expect. Umm, maybe fire? A valley? If it was up to me, I'd condense its name down to one word: WOW! My pictures simply don't do the experience justice, as it's a multisensory thing. I drove the roads and hiked a path and checked out the petroglyphs. Breathtaking, all of it. My main recommendation: hike the Fire Wave Trail with its gorgeous ochre and cream-colored waves of rock. Oh, and don't worry: this display is going to be there after 2018. With a little luck, after 3018...

On my way home, I decided to—you know the drill by now—check out some new supercharger stations. The original SuC in Las Vegas was in a small parking garage, a location that was, well, let's be kind and say subprime. But now Tesla has added a new one in a great location. Lots of shopping



New Urban Superchargers in Riverside



Kind of lonely at the new Baker Supercharger

and restaurants nearby; I scored some Bang Bang Shrimp at Bonefish Grill while the car hyperventilated electrons.

The next power stop was the new 40 stall SuC in Baker. I was the only one charging there, which is something people probably won't believe could happen a few short years from now. There's just a Dairy Queen and Tapioca Express there, so I only plugged in long enough to stretch my legs. From there, on to the new 18 stall SuC in Yermo, located in the lot of a new Eddie's World. Now this was quite the place—brand new building with candy, coffee, poke, sushi, pastries and lots of other choices. The final waystation was the 20 new urban SuCs in Riverside. From there it was an easy cruise home.

Chalk up another road trip in the Tesla and start thinking about the next one. Seems like I've heard something about an Alaskan highway...



The Jaguar I-Pace is the Most Compelling EV Yet

On the road, off-road, and at the track, this EV excels.

By Jonathan M. Gitlin

The Jaguar I-Pace might just be the most significant new car we'll drive this year. It's an all-new, all-electric vehicle from the British automaker, the first installment of its ambitious plan to electrify the entire model range over the next few years. We first saw the I-Pace as a concept at the 2016 LA Auto Show. Now, less than two years later, the production version is ready, almost unchanged.

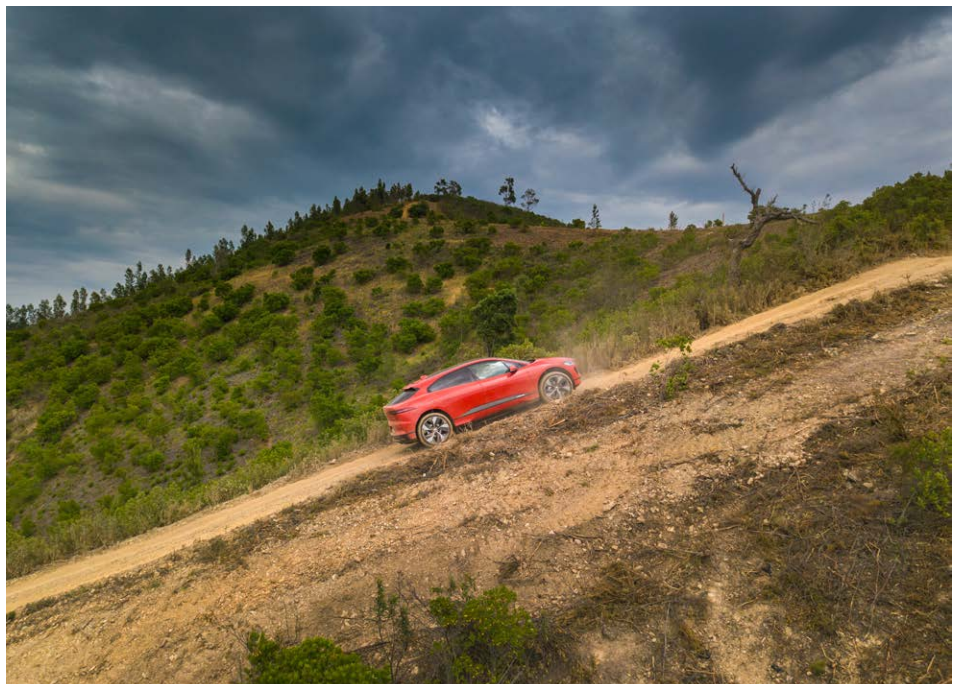
And we've driven it—on the road, off-road, and even on track. It's not perfect (no car is), but make no mistake: it is very, very good. So good that Waymo—Google's self-driving program—has ordered 20,000 I-Paces to put into service as robocabs in the next couple of years.

Nine months ago, Jaguar Land Rover announced it was planning to phase out internal combustion engines, along with offering electrified versions of all its models by 2020. But the I-Pace—its first battery electric vehicle—predates all of that. Apart from the Chevrolet Bolt EV, it's the only EV on sale that can compete with Tesla on range thanks to a whopping 90kWh battery pack. And unlike the Bolt (which remains a rather no-frills affair), the I-Pace is most assuredly a luxury car. Its exterior and interior seem leagues ahead of anything the Internet's favorite car company has given us so far.

Like any battery EV, this remains a vehicle that's not right for everyone. If your needs include being able to drive across the country in a single day in as short a time as possible, you might want to look elsewhere. Ditto if you need to carry five or six passengers. And the



Because Jaguar is only offering I-Pace drives in Portugal, we elected to accept a paid flight and three nights in a hotel (two in Portugal and then one at CDG because we had to wait for our return flight) in order to attend this event, rather than having to wait several more months to drive the vehicle. Photo by Jonathan Gitlin



Jaguar's drive route took us off the usual twisty roads onto more challenging terrain. Photo by Jaguar

continued next page

I-Pace is not particularly cheap—prices start at \$69,500 in the US before any federal or local incentives are taken into account. But it's better looking and better made than any other BEV on sale today, with a good warranty and plenty of gadgets. With 295kW (394hp) and 694Nm (512ft-lbs), it also has plenty of performance and doesn't take up that much space. Its footprint is about the same as Jaguar's petite E-Pace SUV even though there's tons of room regardless of whether you're sitting in the front or back.

Let's get under the hood (and behind the wheel) to better understand why I was so impressed.

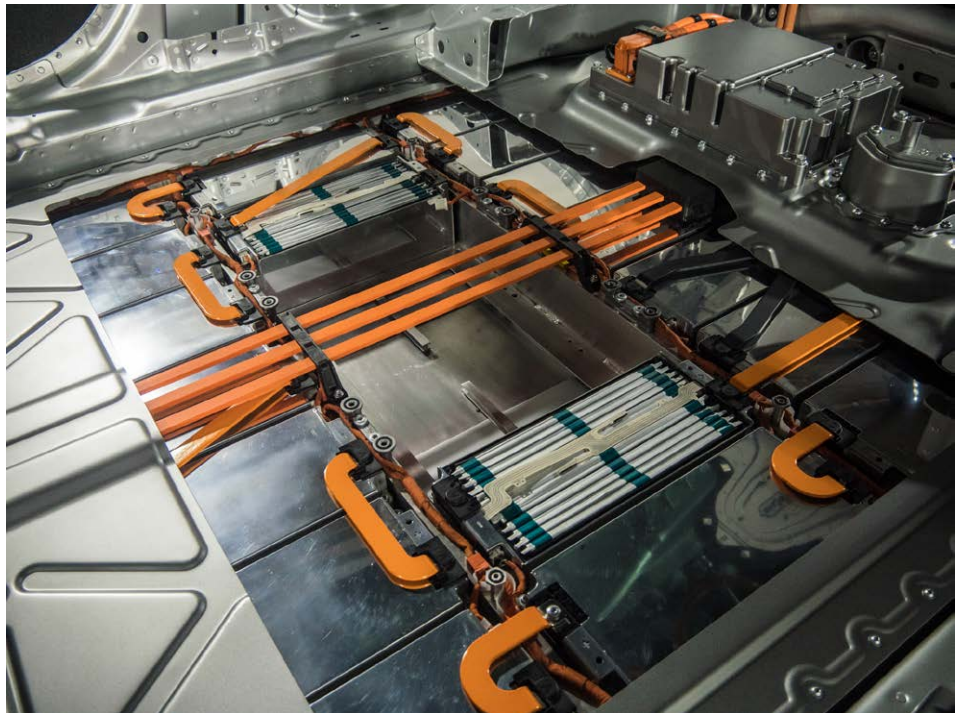
Design and engineering

We've actually delved into the design aspects of the I-Pace on several occasions in the past: with Jaguar Design Chief Ian Callum about the original concept, then more recently with his right-hand man Wayne Burgess and Jaguar Technical Director Wolfgang Ziebart. Per Ziebart, the choice of making the I-Pace an SUV wasn't really a choice at all—the packaging requirements of the car's battery cells dictated that. But the I-Pace's shape was a conscious effort, the goal being to make it as aerodynamically efficient as possible. Consequently it has a drag coefficient (Cd) of 0.29, which Burgess told us was the lowest of any Jaguar SUV to date. We still don't know the car's CdA (the drag coefficient multiplied by the frontal area), which is arguably the more important statistic, but we don't know the CdAs for any of the other BEVs on sale right now, either. Bench racing will have to wait for another day.

As with every other EV we've tested, the I-Pace keeps its battery pack between the axles and underneath the passenger compartment, which keeps



The I-Pace cockpit. The white cars were fitted with very comfortable bucket seats. Photo by Jaguar.



A look at the **lithium-ion pouch cells**. Photo by Jonathan Gitlin

the center of gravity nice and low and reduces polar moments of inertia. Simon Patel, the car's senior program manager, told Ars that this is the stiffest Jaguar body ever, at 36kNm per degree. The monocoque chassis is made from aluminum to keep the weight down, but, all told, the I-Pace tips the scales at

4,702lbs (2,133kg).

On either side of the battery pack is a synchronous permanent magnet electric motor. It's a compact design that sees the driveshaft run through the middle of the motor, and it is bespoke to Jaguar.

continued on page 28

JAGUAR I-PACE

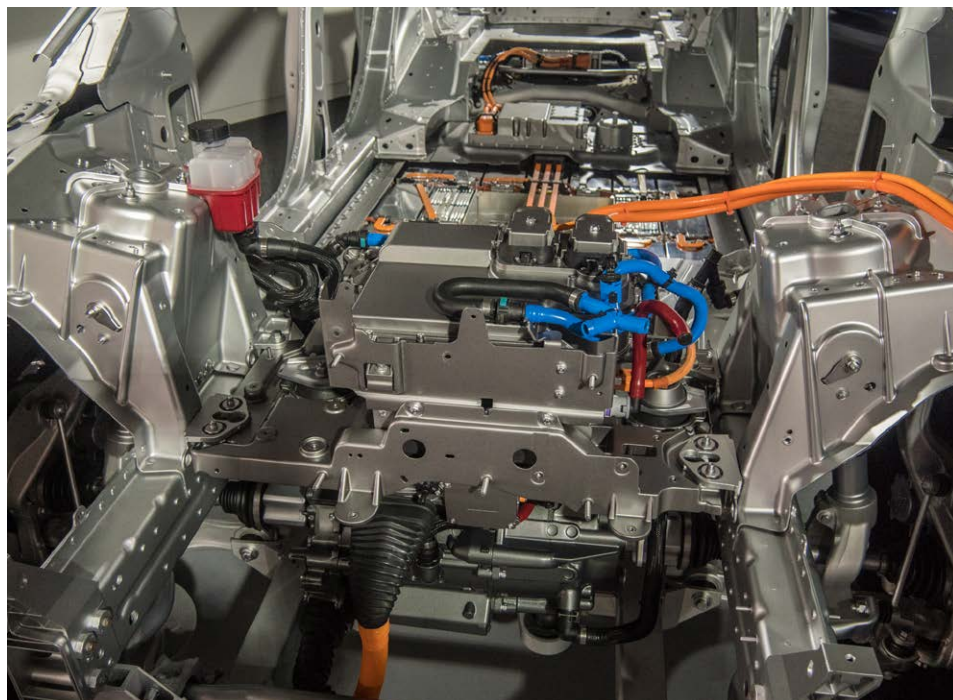
Continued from page 27

In large part, that's because the I-Pace was greenlit quite a while back. "This means that the supplier infrastructure wasn't interested in this type of car, so many of the components were done in-house; today you'd be tempted to do it with a supplier," Ziebart told me. Likewise, the battery and software were also done internally by Jaguar. "This led to a lot of know-how accruing in our company," Ziebart said.

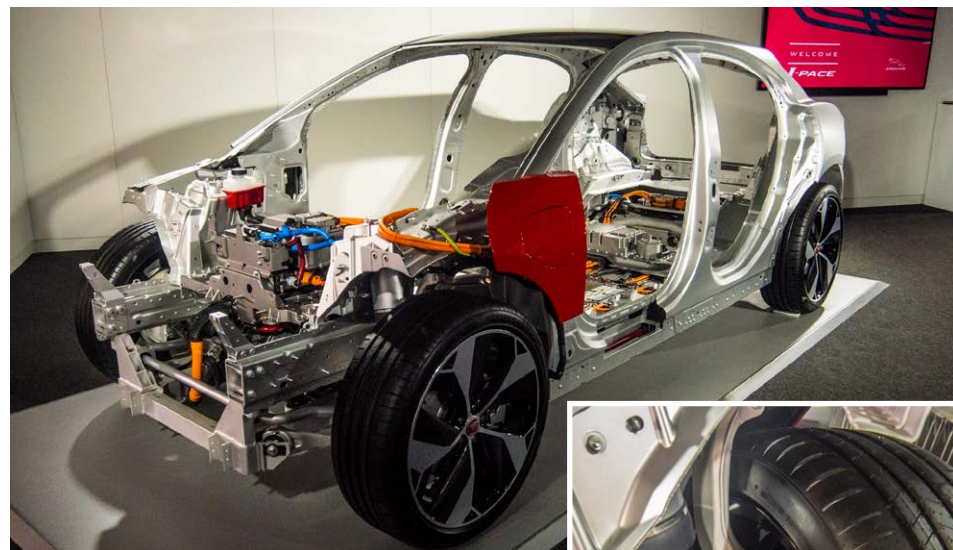
Each motor is rated at 147kW (197hp) and 350Nm (258ft-lbs), and maximum power and torque outputs are 295kW and 694Nm. The 90kWh lithium-ion battery pack is made from pouch cells with 432 of them in all. They use a nickel manganese cobalt chemistry that is the best available, according to Patel, although he would not be drawn on the company's supplier. (However, the prominent Panasonic branding on the Jaguar Formula E car might be a good giveaway...)

Heat management was a key concern, and there are actually three separate cooling systems: one for the cabin, one for the battery, and a third just for the control electronics. The batteries are happiest at between 30°C and 40°C, according to Patel, and on track they can feed the motors up to 1000A, accepting up to 450A under regenerative braking. The I-Pace will accept either 100kW or 50kW DC Fast charging, using the CCS plug format. The former will take you from 0-80 percent in 40 minutes, the latter takes 85 minutes to achieve the same. And for home use, the onboard 7kW charger will do the 0-80 percent top-up in 10 hours.

Under the European WLTP cycle, the I-Pace has been rated at 400km of range. The more accurate EPA test the



That's the 7kW on-board charger, sitting atop the front motor's inverter. Photo by Jonathan Gitlin



The aluminum chassis is extremely rigid. Photo by Jonathan Gitlin



The front suspension comes from the Jaguar F-Type. Photo by Jonathan Gitlin

continued next page

US uses hasn't been completed yet, but Jaguar says you should get at least 240 miles from a full charge. I have no reason to doubt this, but I am waiting to get some data from Jaguar about the actual energy consumption I and my fellow journalists experienced in the cars.

The best EV to drive yet?

I'll be honest with you: after my first half-hour stint behind the wheel of the I-Pace, I was less than impressed. We set off on day one in a bright red \$85,900 First Edition model, a fully loaded I-Pace equipped with massive 22-inch wheels. After a stretch of Portuguese highway, our route took us down a sinuous but narrow route that was barely wider than the car (84.2 inches or 2,139mm, in case you were curious.) Down such a narrow road, I'd have been far happier in a Bolt or something much smaller and lighter like my dear, departed Ford Ka (sold when I moved to the US back in 2002).

But later on as we headed to the racetrack at Portimão, the road opened up to the point that a dashed white line was painted down the middle and things began to gel. The power delivery, as with any EV, is instantaneous, and I have no reason to doubt the quoted 4.5 second 0-60mph time. Top speed is 124mph (200km/h), which we didn't get near on the road but did approach on track later on.

Day two saw us switch cars, this time driving slightly cheaper (\$80,500) HSE versions. These wore smaller wheels—if you can describe 20-inch rims as such—and were much more suited to the I-Pace. Much of the tire roar was eliminated, and there was a noticeable improvement in ride quality and steering feel. Take it from me: the 22s might look cooler, but if you're spec'ing an I-Pace you really want the smaller ones.



Back to the test drive. This road was not my favorite. Photo by Jonathan Gitlin



At one point the road was replaced by this stream. No one was electrocuted. Photo by Jonathan Gitlin

As with every other EV we've tested, you can change the I-Pace's regenerative braking setting between high and low. Set to high, you can really drive it with just the accelerator pedal, as it will decelerate with a vigor when you lift your foot (up to 0.4G in fact). By contrast, the Nissan Leaf will regen at up to 0.2G, which is more than any other EV we'd tried to date. Like the Leaf,

the Jaguar will come to a complete stop if you take your foot off the throttle, and the brake lights illuminate once you begin slowing at more than 0.12G, which ought to prevent you from getting rear-ended by a tailgater.

But as any EV driver will tell you, high regen is best-suited for low-speed urban

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JAGUAR I-PACE

Continued from page 29

driving; at highway speeds you want to be able to coast rather than constantly keep your foot on the throttle. This exposed my biggest complaint about the I-Pace: switching between the two modes was nowhere near as easy as it should be. A Bolt, Volt, or Leaf all give you a physical control to toggle between these modes—using a gear selector in the case of the GM cars and a button in the case of the Nissan. In fact, originally the I-Pace also used a physical button, according to Patel.

But at some point the decision was made to bury the setting underneath several layers of menus, accessed via the infotainment screen. That's not something you want to do when you're driving, and it's not even the simplest task for a co-driver, truth be told. Patel told Ars that the production car UI will make it much easier to access this setting. But if you're reading this, Jaguar, you need to make it as simple as possible, please. A physical button might not work at this point, but it should be a setting on the home screen.

As you will have gathered from the photos, our time with the I-Pace involved a little more than the usual first drives we go on. At several points on the route, Jaguar had us detour onto less conventional terrain. On day two, there were several miles on unpaved roads, which the all-wheel drive I-Pace took in stride. With so much power and more than enough torque, it was very tempting to drive the Jag sideways through each corner, but respect for my passenger meant I kept things somewhat sensible.

The day before was a much more extreme test, requiring us to leave the road behind altogether, including



When you're driving off-road, the car will help out by bounding the sides of the track. Photo by Jonathan Gitlin



An I-Pace negotiating one of the Portimão circuit's turns. Photo by Jonathan Gitlin

negotiating some extremely steep grades plus ford a stream. The real off-road stuff happened on day one in the red cars, and, despite those low-profile summer tires, the electric cat behaved like a true feline, doing all that we asked of it and more. The odds of any I-Pace owner ever actually driving

up a 1-in-2 grade dirt track seem very remote, but should the need ever arise, it's reassuring to know this SUV should be able to cope.

I'll admit it, I'm not really a fan of off-roading, but the race track really is

continued next page

my happy place. Which made me glad that our next stop was the Autódromo Internacional do Algarve circuit in Portimão. Fans of The Grand Tour will know this as the place that Clarkson, May, and Hammond thrashed those hypercars, and having now lapped it myself I have a newfound respect for that episode. It's a technical and tricky 4.2km loop, with plenty of elevation change and blind crests that require some commitment.

Driving a car on track lets you explore the limits of its handling in ways that just aren't safe or responsible on public roads. After a couple of sighting laps in an F-Type, we swapped over to the I-Pace, which once more acquitted itself with aplomb. Braking performance on track was admirable for such a heavy car, and round the track's final long right-hand sweeper I was able to push past the car's grip and provoke a little bit of a four-wheel drift. I'm the first to admit I'm no driving god, but I feel comfortable saying the I-Pace has a very neutral chassis balance that turns to mild understeer at the very limit.

Gizmos, gadgets and gewgaws

After several decades of neglect under British Leyland, Ford, and as an independent, Jaguar's past few years under Tata's ownership has seen the brand return to its old position as one of the more technology-focused automakers. The I-Pace is probably the foremost example of this.

Obviously there's the powertrain, which we've already discussed. On top of that, there's its infotainment system, Touch Pro Duo, which is an evolution of the two-screen setup we previously encountered in the Range Rover Velar. It's not the best infotainment OS on the market—I'd rank Audi, Volvo, and BMW as the class leaders here—but it's certainly less objectionable than



The Touch Duo Pro infotainment system. Photo by Jonathan Gitlin



There are a lot of storage cubbies in the car. You can fit two wine bottles in the one between the front seats! Photo by Jaguar



There is a lot of room in the trunk—25.3 cubic feet (716L) with the seats up, 51 cubic feet (1,444L) with them flat. Photo by Jaguar



35.0in (890mm) of rear leg room. I spent some time in the back seat while my 6'3" co-driver was at the wheel, and it was more than spacious. Photo by Jaguar



The rear seats are heated, and there are two 5V USB ports and a 12V DC port in the back. Photo by Jaguar

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JAGUAR I-PACE

Continued from page 31

many other OEM platforms. I was also happy to see a bevy of USB ports—four up front and another two in the back, which are in addition to several 12V DC outlets.

Over the course of a couple of weeks, owners can expect their I-Pace to learn their routines and preferences. And the navigation system takes into account things like temperature, topography, traffic, and so on to calculate your expected energy consumption along your route as well as highlight convenient chargers along the way.

As we detailed earlier this year, the I-Pace is the first Jaguar to benefit from over-the-air updates. “It was key for us,” explained Hanno Kirner, executive director of Corporate and Strategy at Jaguar Land Rover. “As a company it gives you some interesting challenges, because once you’re connected, you have to connect it to something. Suddenly we need a back end, which you need to make sure is incredibly secure because you can’t have anyone get into it, so it’s a really exciting journey to do.”

While we’re sure many of our readers will hate the idea, the I-Pace is highly connected. There’s a remote app for your phone, which lets you monitor the car’s status as well as do things like preconditioning the climate control and so on. If using your phone is too much of a hassle, the I-Pace also has Alexa integration, so you can simply ask Amazon’s personal assistant to do the same things for you. (Alexa isn’t present in the car as of now, so you don’t have to worry about it spying on you there... yet.)

(Below) This app tells you how the car’s features are affecting range. Photo by Jaguar



(Left) This dial controls the AC as well as the heated/cooled seats. It’s one of the better bits of the car’s UX. Photo by Jaguar

new InControl feature is the homelink app, which allows you to interface your I-Pace with your smart home to control Hue bulbs, Nest thermostats, and so on.

[Ed: There is much more to this article and more photos for you to look at. Go to the URL below for the information.]



Jonathan M. Gitlin is the automotive editor at Ars Technica, covering all things car-related. Jonathan lives and works in Washington, D.C.

Touch Pro Duo doesn’t support CarPlay or Android Auto, but a whole range of individual smartphone apps can be cast to the infotainment system. Jaguar Land Rover calls this InControl, which we’re pretty sure leverages Bosch’s MyLink technology. According to Matthew Waller, who works on the I-Pace’s connected technologies, a

<https://arstechnica.com/cars/2018/06/forget-about-that-tesla-the-jaguar-i-pace-is-the-most-compelling-ev-yet/>

Tesla Model 3 Teardown Gives Incredible Look at the Electric Powertrain

By Fred Lambert

On the surface, Tesla's Model 3 is already highly successful and well-received among those who have driven it.

But the vehicle's architecture and technology are also believed to represent a significant step change by several people doing breakdowns and reverse engineering the vehicle.

Now we get a great visual look at the powertrain through a new teardown.

After its own Tesla Model 3 teardown, Munro and Associates thought of the vehicle's electronics as a masterpiece and a German engineering firm was also quite impressed after reverse-engineering the Model 3.

The entire powertrain is extremely compact with Tesla incorporating a lot of the electronics directly into the battery pack enclosure.

We already managed to have a good look at the details of the powertrain architecture with previously leaked information, but we now get to see the impressive architecture thanks to longtime Tesla hacker/tinkerer Engineerix who has been tearing down a Model 3 and posting a series of videos about the vehicle's powertrain.

The videos [in this article] are very short and to-the-point which makes the whole series easy to watch and only about half an hour in total and I highly recommend it for anyone interested in the Model 3 or electric vehicles in general:



Model 3 Drive Unit



Model 3 Drive unit bare. Engineerix says that he weighed the whole drive unit and that it weighs just under 200 lbs. Here we see it without the inverter.



Model 3 Drive Unit

continued on page 34

Model 3 Teardown

continued from page 33



Tesla 3 Battery Pack



Model 3 Inverter



Tesla 3 Battery Pack

Model 3 Cooling System Overview

Here Engineerix just gives a quick overview of the cooling system on a still assembled Model 3

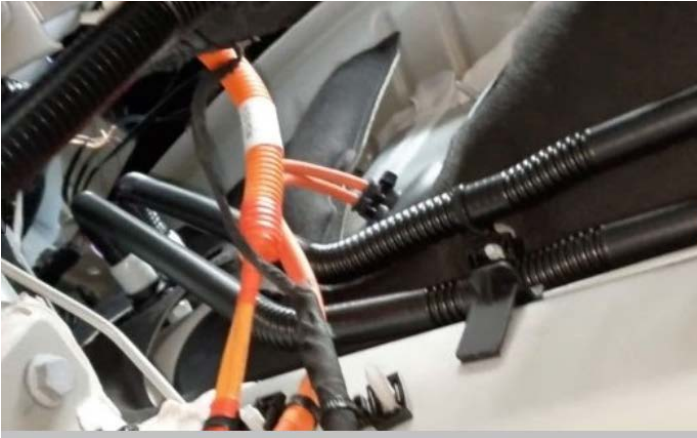


Tesla 3 Battery Pack



Tesla 3 Battery Pack

MODEL 3 TEARDOWN




Model 3 High Voltage System Overview

Here Engineerix just gives a quick overview of all the high voltage connection on a still assembled Model 3:



<https://electrek.co/2018/07/26/tesla-model-3-teardown-electric-powertrain/>

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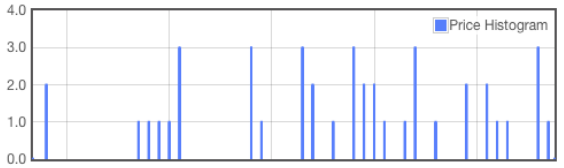
U.S.A. **256** <

Model S Used Inventory

Current Listings

U.S.A. Canada Europe Asia/Pacific Middle East

Price Histogram



Looking for a certified pre-owned (used) Tesla?

This site can help you speed the search and narrow down your target.
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<https://ev-cpo.com/hunter/>

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SHOW** 02/02/19 - 02/10/19

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SHOW - BALTIMORE**
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Don't Miss These...

From time to time there are articles and videos we would like to bring to your attention but are not able to reproduce in this newsletter. The Electric Vehicle is continuing to be newsworthy on many different levels so when we find interesting items we will share them with you.

Videos of Interest

How to drive the Tesla Model 3 efficiently



Generalized EV driving tips for all brands of cars, but here with a focus on the new Tesla Model 3: Minimize acceleration, minimize deceleration, try not to use much A/C, but most importantly try to use very little cabin heat. Use the seat heaters if it gets somewhat cold. Those are the big ones. This short but well presented details the conditions to watch for.

<https://www.youtube.com/watch?v=q4CT0Imx2jY>

Inverters, How Do They Work ?



Converting Direct Current (like from a battery or a solar panel) to Alternating Current requires some electronics. This short seven minute video explains what an inverter is and how it operates clearly. (Warning: It does requires a basic understanding of electrical circuits but does keep it simple.)

<https://www.youtube.com/watch?v=qVeERT4nyz8>

Electric Cars in Italy in 1941 Newsreel July 1941



The open cockpit was essential for the Italian driver's hand and arm gestures as part of their pilot duties through the traffic... ciao!

<https://www.youtube.com/watch?v=yUdIFljWVhY>

The Story of Building Tesla



Titled as "The Story of Building Tesla" describes some of the early days when the founders were searching for money from Venture Capitalists, with Elon Musk just on the board with various other CEO's getting their limited production (fully paid in advance) cars to customers. It's only 21 minutes long. His insights about future opportunities are fascinating.

<https://youtu.be/pGf1tyPXBpA>

Videos of Interest (cont.)

Hands on With Worlds First Tesla Powered Audi!



Rich (from YouTube channel 'Rich Rebuilds') hits the Long Island EV meetup called "Supercharged Sunday — All Tesla Dyno Day and BBQ" to discover an Audi S5 with Tesla battery, motor / inverter plus a bunch of other mods. **NOTE:** This is what the conversion crowd is looking at now: taking proven technology (the three key pieces) and transplanting them.

In about 16 minutes, many questions are addressed. The subject vehicle here is done by two guys from www.polykup.com
https://youtu.be/IOYY_AIRWQA



Is The Sono Sion the Most Important Car You Might Not Have Heard Of?



A European effort to crowdsource finance and launch an EV company with some neat features has garnered 6,800 reservations already, and they're looking for a manufacturing partner! It has a progressive technological design (including solar as well as Vehicle to Vehicle charging...) plus some other items that raise eyebrows. It has reasonable costs, but many hurdles to cross in their quest, as well. Check this "Sono Scion" out:

<https://youtu.be/d2Iwv1Bpewa>



Showcasing The Tesla Model 3 Top Five Features



In this video, we showcase our Top 5 features on the Tesla Model 3! Be sure to share this video with your friends and family, and spread the word on Tesla's amazing technological advancements!

In no particular order, the list showcases the car's qualities as:

- Clean (when compared to ICE vehicles)
- Cheap (comparably priced to Audi A4 or BMW 3 Series, while cheaper to operate and maintain*)
- Safe (no engine means more effective front crumple zone)
- Range (competitive range and convenient charging options)
- Driving Experience (OTA updates, Autopilot, instant torque, quick acceleration, low center of gravity)

**While many publications continue to cite the >2,000 moving parts in an ICE car versus <20 in an EV (Model 3), this is an exaggeration. However, regardless of the skewed numbers, the overall point remains the same. Less is less.*

<https://insideevs.com/showcasing-tesla-model-3-top-5-features/>





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Don't Miss These (cont.)

Volta's Ad-supported Electric Vehicle Charging Service Raises \$35 Million

By Jonathan Shieber

As increasing numbers of electric vehicles are expected to hit the streets, thanks to new models from big automakers soon hitting the market, charging networks like Volta Charging are raising new cash to meet the expected demand.

The company today said it raised \$35 million from investors led by the Invenergy Future Fund, the technology investment arm of renewable energy project developer Invenergy, and Activate Capital (a relatively new \$200 million investment fund raised by cleantech veterans including Raj Atluru, Michael DeRosa, Anup Jacob and David Lincoln).

The San Francisco-based company combines outdoor digital advertising with charging stations to give electric vehicle owners FREE POWER. It has already rolled out a network



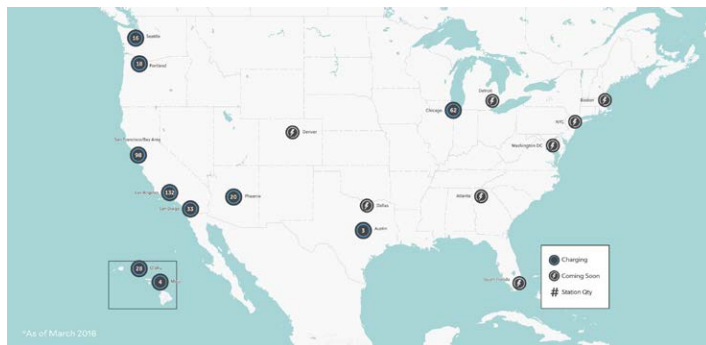
of 1,000 charging stations that are open for sponsorship, and hopes to reach 2,000 by the end of 2018, according to a statement from the company.

There's probably nothing more 2018 than ad-supported electric vehicle charging, but Volta may be sitting at the intersection of a few trends that could give the company a charge. Outdoor advertising is one of the only growth markets in the ad-business that's not online, and it's one that investors are beginning to sink dollars into (I wrote about AdQuick, which is another startup looking to take advantage of the newfound interest).

Meanwhile, a study published jointly by the International Energy Agency, the Clean Energy Ministerial and the Electric Vehicles Initiative predicts that the number of electric light-duty vehicles on the road will reach at least 125 million by 2030. More optimistic figures could boost those numbers to 220 million, the study says.

That's a lot of cars that are going to need a lot of charging stations.

<https://techcrunch.com/2018/07/23/voltas-ad-supported-electric-vehicle-charging-service-raises-35-million/>



Volta rolled out its initial charging stations in Hawaii, but now has expanded its network to include the top 10 media markets in the U.S. (valuable real estate for any would-be advertiser). So far the company's sponsored charging stations have given away 22 million miles worth of juice, or the equivalent of nine million pounds of carbon dioxide emissions.

"Volta distills the surrounding complexity and accelerates the market by executing on consumer preferences that won't change: free charging in premier convenient locations," said John Tough, a partner at the Invenergy Future Fund in a statement.

That sentiment was echoed across the company's investor base, which has grown with the \$35 million Series C round to include a slew of new investors, including: GE Ventures, Orsted Venture, Nautilus Venture Partners and Idinvest all join as new investors.

Initial investors Virgo Investment Group and Autotech Ventures also returned to put capital into the company. In all, Volta has raised \$60 million since it was founded in 2010.

"Volta brings us an opportunity to elegantly advance the intersection of two of our most important sectors — energy and transportation," said Anup Jacob, managing director, Activate Capital. "By leveraging sponsorship to underwrite free charging and infrastructure, Volta has created a unique model to accelerate the future of mobility."



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Contact: Darryl McMahon
info@evco.ca

VANCOUVER EVA

Web Site: www.veva.bc.ca
Contact: Bruce Sharpe 604-897-9072

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EVA of SONORA (AVES)

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Contact: John Metric, 979-665-5621

PLUG IN AMERICA

Web Site: www.pluginamerica.org
Contact: Joel Levin
info@pluginamerica.org

ALASKA

JUNEAU EVA

Contact: Duff Mitchell, 907-723-2481

ARIZONA

PHOENIX EAA

Web Site: www.phoenixeaa.com
Contact: Jim Stack, 480-659-5513

TUCSON TEVA

Web Site: tucsonelectricvehicle.org
Contact: David Gebert 520-881-8010
tevadave@cox.net

CALIFORNIA

CENTRAL COAST (CCEAA)

Web Site: eaacc.org
Contact: Will Beckett, 831-688-8669

CHICO EAA

Web Site: www.chicoeaa.info
Contact: Jerry Brandstatt
530-343-0331

EVA OF SAN DIEGO (EVAOSD)

Web Site: www.evaosd.org
Contact: Elaine Borseth
858-395-8181

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Web Site: www.evaosc.org
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Web Site: www.nbeaa.org
Contact: Alan Soule, 707-477-1299

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SAN JOSE EAA

Web site: rotordesign.com/sjeaa
Contact: George Stuckert
408-377-5037

SILICON VALLEY EAA

Web site: www.eaasv.org
Contact: Tom Sidle, 408-446-1538

COLORADO

DENVER ELECTRIC VEHICLE COUNCIL (DEVCC)

Web Site: www.devcc.info
Contact: J David McNeil
719-633-4924

CONNECTICUT

NEW ENGLAND EAA

Web Site: www.neeaa.org
Contact: David Oliveria
860-526-1460

DELAWARE

COASTAL CAROLINA WILMINGTON

Contact: Blair E. Brown, 910-617-1643

FLORIDA

CENTRAL FLORIDA EVA (CFEVA)

Website: www.centralfloridaeva.org
Contact: Larry Wexler 407-256-6244

GOLD COAST EAA (GCEAA)

Contact: David Kerzel , 954-785-2184

NORTHWEST FLORIDA EAA

Contact: Nathan Kercher
850-472-0341

SUN COAST EAA

Web Site: www.suneva.org
Contact: Don Bouquet
941-739-2868

TALLAHASSEE AREA EVA

Web Site: www.taeva.org
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GEORGIA

EV CLUB OF THE SOUTH

Web Site: www.evclubsouth.org
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HAWAII

BIG ISLAND EVA

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IOWA

IOWA EVA

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IDAHO

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FOX VALLEY EAA

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KENTUCKY

EvolveKY

Web Site: www.evolveky.org
Contact: Jon Tyson, 502-644-1719

MASSACHUSETTS

DRIVE ELECTRIC CARS NEW ENGLAND EAA

Web Site: neeaa.org
Contact: Mark Scribner
860-336-7295

PIONEER VALLEY EAA

Web Site: pveaa.org
Contact: Karen Jones

MICHIGAN

MICHIGAN EAA

Web Site: michiganEAA.org
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MINNESOTA

MINNESOTA EAA

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MISSISSIPPI

MISSISSIPPI EAA (MSEAA)

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MISSOURI

GATEWAY EV (GEVA)

Web Site: gatewayev.org
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NEVADA

EAA NORTHERN NEVADA

Web Site: www.lveva.org
Contact: Chuck Swackhammer
530-479-0269

LAS VEGAS EVA

Web Site: www.lveva.org
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NEW JERSEY

EASTERN ELECTRIC VEHICLE CLUB

Contact: Oliver H. Perry
609-268-0944

NEW JERSEY EAA (NJEEA)

Web Site: njeaa.org
Contact: Michael Thwaite
908-405-8688

NEW MEXICO

NEW MEXICO EVA (NNMEV)

Contact: Richard Dunn, 505-672-1095

NEW YORK

GREATER HUDSON VALLEY EAA

Contact: Seth Leitman, 914-703-0311

GREATER NY EAA

Web Site: lieaa.org
Contact: Carl Vogel, 516-443-1715

NORTH CAROLINA

BLUE RIDGE EV CLUB

Contact: Joe Baum, 828-645-1412

CHARLOTTE EAA

Contact: Jess Montgomery
704-302-4156

TRIAD EVA

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TRIANGLE EAA

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OHIO

CENTRAL OHIO EV ASSOCIATION (COEVA)

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EAA OF NORTHWEST OHIO

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OREGON

OREGON EVA

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OREGON SOHEVA

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PENNSYLVANIA

THREE RIVERS EVA

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CHATTANOOGA EVA

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TEXAS

ALAMO CITY EAA

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AUSTIN AAEAA

Web Site: www.austinev.org
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HOUSTON EAA

Web Site: www.heaa.org
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NORTH TEXAS EAA

Web Site: www.nteea.org
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VIRGINIA

DRIVE ELECTRIC RVA

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RENEWABLE ENERGY & EVA, DIY PROJECT CLUB

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continued on next page

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WENATCHEE EVA (WEVA)Web Site: www.pluginncw.com

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WASHINGTON D.C.**EVA OF WASHINGTON DC**Web Site: evadc.org

Contact: Ron Kaltenbaugh

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WEST VIRGINIA**WEST VIRGINIA ELECTRIC
AUTO ASSOCIATION (WVEA)**Web Site: www.wveaa.org

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WISCONSIN**WISCONSIN EAA**Contact: Benjamin J. Nelson
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The Future of Transportation Electrification: Utility, Industry and Consumer Perspectives

The Future of Transportation Electrification: Utility, Industry and Consumer Perspectives has just been published by LBNL. This downloadable file prepared by our national energy labs in Livermore, offers some perspective from National Consumer Law Center (NCLC), and in part the report covers equity and access issues, including utility rate design issues as well as the intersections between poverty and race with utility security and car ownership.

Date Published: 08/2018**Authors:** Philip B Jones, Jonathan Levy, Jenifer Bosco,
John Howat, John W. Van Alst**Series Editor:** Lisa C Schwartz**Abstract:**

Electric vehicles (EVs) today are a small part of the U.S. transportation fleet. Technological advancements, automotive industry investments and state policies are driving increased transportation electrification. Bloomberg New Energy Finance projects that by 2040, 55 percent of new sales of automobiles worldwide will be EVs.

Increased transportation demand for electricity will require additional investments in the distribution system and will impact the bulk power system as load profiles change. At the same time, managed EV charging and discharging can make more efficient use of distribution system assets and increase grid flexibility. EVs also hold promise for lowering transportation costs and reducing air emissions.

Infrastructure needs to electrify transportation across the United States far exceed current investment plans by EV charging companies, the public sector and others. Utilities are

building “make-ready” infrastructure to ease development of public charging stations and offering rates tailored for EVs, and some utilities are directly investing in charging stations.

The growth of EVs raises a number of questions for policymakers and others:

- How much public charging infrastructure will be needed, where should it be built and when will it be used?
- What role should utilities play in developing the infrastructure, compared to EV charging companies?
- How should charging infrastructure costs be allocated among utility customers?
- How should electricity rates be set to encourage efficient grid use and minimize negative grid impacts?
- How are states preparing for increasing electrification of the transportation sector?

This report in the Future Electric Utility Regulation series from Berkeley Lab, *The Future of Transportation Electrification: Utility, Industry and Consumer Perspectives*, tackles these questions and more. The report approaches the issues from three perspectives: utilities, the EV charging industry and consumers.



<https://emp.lbl.gov/publications/future-transportation-electrification>

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