Electric Auto Association

CURRENTEVENTS

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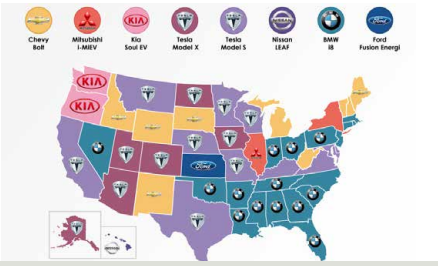

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If you have comments, please send them to ceeditor@electricauto.org.

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 choose.

Invitation to the EAA Board Room

Women and minorities, especially encouraged.

With Jerry Brown's signing of a landmark bill, SB 826, here at the EAA, we are compelled to reflect inwards. This bill, in its mandate for female representation on public corporation boards based in California, does not include a mandate for Electric Auto Association as we are not a publicly traded corporation. It is, however, a wake up call for us. Are we inclusive? Are we diverse? Do we reflect the society around us? Are we missing out on great minds and ideas with a lack of diversity?

Like so many Boards, we have a history of largely one gender leading our non-profit. We welcome the new Board addition of Treasurer, Kelly Berry. Including Kelly, we have three out of eleven EAA Board Directors who are female, and zero Directors of color. We have elections coming up in January, 2019 with four positions up for election. Our goal is to have the most dynamic, bright, motivated Directors we can attract: and also to have a good range of diversity. We are looking for talent in the following activity areas: Membership, Chapter Development and Services, Fundraising, *Current EVents*, Marketing and Advertising, Web Management and Website Sales.

Monthly meetings are conference calls (2nd Tuesday) and there is one [annual] in-person/call in meeting in January in Palo Alto, California (4th Saturday). Directors take on responsibilities in one or two activity areas. Time commitment is variable, but a good rule of thumb is two hours a week.

I extend an invitation to all interested EAA members and especially to women, to people of color, to all ages, consider becoming a candidate for a Director position on the EAA Board. In this time of huge growth for EVs and for our association, we need your voices and talents now more than ever.

The election will be held at our **Annual Meeting, Saturday, January 26th, 2019, 10 am – Noon**, Hewlett Packard, Bldg. 20, 3000 Hanover Street, Palo Alto, CA. EAA members will receive a Notice of Annual Meeting and later, a Proxy/ballot by mail. While we encourage you to attend the annual meeting, you need not be present at the meeting to vote. You can mail in your proxy/ballot. Candidate statements will be posted in the Members Only (far right tab) on *www.electricauto.org* for members to review the candidates prior to voting. More information will follow on the Agenda. An

Raejean Fellows

interesting and entertaining speaker will be part of the program. **SAVE THE DATE!**

Candidate statements must be submitted no later than **November 30th, 2018** when nominations close. You can nominate yourself, or someone else. Sample candidate statements are available. For questions and additional information, please contact, Simon Freedman, Director at:
SimonF@roadrunner.com.

We welcome your participation in our democratic electoral process. For those who step up to EAA leadership, the rewards you will receive, knowing what a difference you are making in the EV world, are electric!

National Drive Electric Week Shatters Records Eighth Year in Row

By Mary Lunetta

In its eighth annual celebration, National Drive Electric Week (NDEW) broke every record, with more than 180,000 people attending 321 events in three nations and all 50 states.

The huge popularity of this year's Drive Electric Week across the nation again proves that people from all communities are excited about zero-emission transportation. And why wouldn't they be? Electric vehicles are fun to ride, easy to maintain and operate, more affordable than gas-powered vehicles, and far better for our climate. Electric-vehicle adoption is also a great way to resist the Trump administration's rollback of our nation's major climate protections.

Pastor Dozier talks to KTLA-TV at the NDEW event in Watts, California. Photo by Cory Burns.

"I came to Drive Electric Week last year, which inspired me to buy myself a Nissan LEAF. I am excited to come again to give others a ride in it and inspire them to make a cleaner, greener choice." – Ali K. of Houston, Texas

The biggest source of greenhouse gas emissions — the main cause of climate change — comes from transportation, mainly our cars, trucks, and buses. As more drivers, transit agencies, school districts, business leaders, and public officials have a chance to see for themselves the variety of zero-emission vehicles and the many rebates and incentives available, they make the switch to electric.

"I am a paraplegic and the BMW i3 has easy access for

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Three of four Tesla Model 3s that showed up at the Golden, CO event; the one on the left had 26 miles on the odometer because its owners came straight from taking delivery of it at Tesla's store in Littleton (Photo Credit: Jim Smith)

Third annual EV car show kicked off National Drive Electric Week in Hyattsville, MD (Photo Credit: City of Hyattsville)

Electric cars at an event in Middletown, CT (Photo Credit: Andrew Kasznay)

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Zuteck, Michael

321 NDEW Events

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a disabled driver. My car is equipped with hand controls, which makes my car unique!" – Henry W. of Houston, Texas

NDEW events are getting bigger and better — Vermont governor Phil Scott announced the state's $2.4 million Electric Vehicle Charging Station Grant Program, funded by the Volkswagen settlement that resulted from the automaker's diesel emissions cheating scandal. Governors Murphy of New Jersey and Sununu of New Hampshire also recognized Drive Electric Week in their states. Andrea Friedman from the New Jersey Department of Environmental Protection attended the event at Egg Harbor Township and shared information about the state's new grant program that provides up to $6,000 for EV chargers at workplaces and multifamily dwellings. The governors of Washington State and Connecticut also issued proclamations declaring Sept 8-16 Drive Electric Week in their states.

Retailer L.L. Bean announced plans to host the largest number of charging stations in Maine at its flagship store, and California Governor Brown signed multiple bills to reinforce the state's fight against climate change and boost the state's electric vehicle market, particularly among low-income Californians.

In Pittsburgh, Duquesne Light announced at an event that it would be partnering with the Pittsburgh Parking Authority to install eight new charging stations in downtown garages; and Utica, New York had its first event that included a ribbon-cutting ceremony at City Hall for a newly installed EV charging station. Public EV charging installations boost EV adoption because they make it easier for drivers to plug-in while on the go or running errands.

Dozens of mayors attended events in their towns, including San Diego, San Luis Obispo, and Mammoth Lakes, CA; Erie, PA; West Hartford and Hamden, CT; Bellevue and Steilacoom, WA; and Annapolis, Hyattsville, and Poolesville in Maryland — just to name a few.

"Electric vehicles are being built in 20 states, including Alabama, and the EV industry creates thousands of well-paying jobs in our state and country and reduces our dependence on oil," said Mark Bentley, executive director of the Alabama Clean Fuels Coalition, in Birmingham.

Representatives from Juneau, Alaska, were excited to participate in Drive Electric Week this year as the city recently

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Despite stormy weather reports, the Bellevue, WA event turned out beautifully (Photo Credit: Grace Reamer)

A Tesla Model X draws attention at the Birmingham, AL NDEW event (Photo Credit: Mark Bentley, Alabama Clean Fuels Coalition)

NDEW's City Captain Garrick Garcia in Kihei, HI explains his excitement about EVs with a fleet of Teslas in the background (Photo Credit: Deanna Garcia)

received a $1.5 million grant from the U.S. Department of Transportation for the purchase of an electric transit bus. The city also issued a National Drive Electric Week proclamation and displayed ones of Alaska's first electric boats.

The NDEW event in Santa Cruz, California. Credit to Ecology Action.

The event in San Francisco on Pier 27 was the exclusive ride and drive event of the Global Climate Action Summit, where hundreds of summit delegates and members of the public test-drove several EV models and checked out an e-Lion electric school bus.

"The Hamden event was amazing. I am now convinced going electric is the only option for me. It was extremely informative to speak with actual owners. Their enthusiasm for their cars was tremendous, and they were so willing to share their experiences and advice, taking you out in their own cars to get a feel for the performance. I hope many people were convinced to go electric. I know I was. Thank you!" – Lisa M. in Connecticut

The event in Wilsonville, Oregon, focused on the affordability of electric vehicles, with a local dealership providing test drives on pre-owned vehicles like the Nissan LEAF, Kia Soul EV, and Chevy Spark. Mayor Tim Knapp addressed the crowd, which had a chance to attend a Q&A session on the state's EV rebate program, including the Charge Ahead program for pre-owned vehicles. With state and federal incentives combined, Oregonians can save up to an impressive $12,500 on the purchase or lease of a new electric vehicle.

The Atlanta event was organized by community group EV Hybrid Noire, which is committed to increasing opportunities for engagement with and connecting diverse communities to EV adoption. Their event featured a proclamation of Drive Electric Week by Mayor Keisha Bottoms, and

Klaus Vietor talks with a student about his 2012 Tesla Model S at the Orlando, FL event (Photo Credit: Michelle Barron, UCF Sustainability Initiatives)

A Fiat 500e and Nissan Leaf parked nearby a Tesla Model X at the Fargo, ND event (Photo Credit: William Weightman)

councilmember Michael Bond spoke to the crowd about the importance of zero-emission vehicle adoption among communities of color.

"We're glad to support Western New York Drive Electric's efforts to build awareness and excitement for electric vehicles. Switching to electric vehicles is a key part of a just and equitable transition to a 100 percent clean renewable energy future," said Sara Schultz, chair of Sierra Club Niagara Group at the Orchard Park event.

At a time when just about every environmental protection is under attack at the federal level, we can be inspired by the increasing momentum of the clean transportation movement across the nation. Powerful and exciting efforts are underway to bring zero-emission transportation to our communities at the state and local level — from transit and school buses to motorcycles and light-duty personal vehicles. Eight years of successful Drive Electric Weeks have shown that the future is electric — and that future is much closer than most people think.

https://www.sierraclub.org/compass/2018/09/national-drive-electric-week-shatters-records-8th-year-row

EAA Board Chapter Liaison Recently Honored with 2018 Drive Electric Plug In American Award

Charles Gerena is the Chapter Liaison on EAA Board and was recently honored with a 2018 Drive Electric Plug In America Award. EAA took the opportunity to talk with him and learn about his life with EVs.

EAA: Let's start with a bit of your history. Are there certain areas in your background that brought you to this level of involvement you have with electric cars and with Drive Electric Richmond Virginia (DERVA)?

CG: I have never been an early adopter when it comes to technology, though I own every mobile device that Apple has made and I work in web content development for a living. But, as someone who cares about his impact on the environment, when it was time to buy a new car in 2014 I was looking for a way to burn less gasoline. My initial focus was on the Prius, but then my research uncovered the Nissan LEAF, so I went to test drive it. The experience was unique and the idea of burning no fossil fuel was so compelling that I made the leap. I have never looked back.

EAA: How many years have you been part of DERVA and in what capacity?

CG: I founded the group in March 2014 and have continued in the role as lead organizer. (I dislike using the term "president" because I am not elected and consider myself to be part of a larger movement.)

EAA: From the vantage point the last few years have given you, what do you see as the biggest challenges to mass EV adoption?

CG: The biggest challenge is the economic disincentives that discourage auto dealerships from selling the EVs that manufacturers produce. Next, there is a major misperception about the need to install DC fast chargers all over the place. Yes, some of them are needed to facilitate long-distance travel for EVs with a range of less than 100 miles. But most EV owners charge at home because they only drive 30-40 miles a day and can plug in when the workday is over.

EAA: You've done a lot, starting with a Facebook page for Richmond EVs, then founded the local EV club, organized several local Drive Electric events, and so forth. What do you look back on now as your proudest accomplishment?

CG: I'd say it was this past February, when our club took part in Conservation Day at the state capital here in Richmond. We set up a tent across from the capital and

offered rides to senators and their staff - and many took us up on the offer. We lobbied throughout the day, telling our story to any and all who would listen; it was fun to be part of democracy in action.

EAA: Which EVs have you owned, and what do you own now? Do you have an ICE vehicle in your garage as well?

CG: I have owned the 2013 Nissan LEAF since January 2014. My wife owns a Hyundai Santa Fe to facilitate long-distance trips, but she wants to replace it with a PHEV or all-electric car.

EAA: Looking to the future, which EVs do you look forward to trying out?

CG: I would like to test drive the Model 3 to see how it compares to the Model S, which is a beast of a car.

EAA: What is your description of the perfect EV for you?

CG: If the Bolt had been on the market four years ago, I would have bought it for the longer range contained in a compact package. That said, I love my LEAF because it is quiet, fast, and distinctive in its design. My ideal EV would be charged with solar panels on the roof, which is not technically feasible today. That is why, as the picture shows, I have 24 solar panels on the roof of my house!

EAA: Do you have an anecdote involving an EV that you like to tell?

CG: When people ask me, "What happens if you run out of charge?" I tell them I've never been stranded in my LEAF. Then, I share a rather embarrassing incident with my previous gasoline car, a Saturn SL-2: it ran out of gas and had to be towed to my mechanic. While you think you can just keep going and going on that tank of gas, driving an electric car makes you more "range aware."

Which States Love Electric Vehicles the Most?

By James McCrea, UK

The electric car has been subject to a great deal of coverage in recent years, not least due to its growing popularity. Americans all over the United States have been making the jump to electric vehicles (EVs). There are various reasons for this, but the main ones are wanting to cut down on their fuel emissions and benefitting from the financial incentives offered by state and federal governments.

It's become a well-known fact that California is the state in which the EV is most popular, with over 400,000 units sold between 2008 and 2018. But where are the true best places to live in the USA if you're an EV owner? Which states have the lowest refueling costs, or the highest number of charging stations?

We pulled together a great deal of data in order to rank every US state according to various statistics and look into each data point in more detail below.

Electric Vehicle Sales

The most obvious place to start would be with the sales numbers. States with more EV owners will be more driven to accommodate them by improving their EV-related facilities, thereby making those states better places to live for EV owners. However, the states that rank highest for sales numbers are, somewhat unsurprisingly, the states with the largest populations. We therefore decided to study the year-on-year sales increases of each state between 2016 and 2017 to find out where EV popularity growth is the largest.

Oklahoma was the state with the greatest sales growth from 2016 to 2017 (see chart top right). This is a particularly impressive result since the state offers no incentives or tax credits to its residents for buying an EV, as is the case with many states.

The state that saw the least sales growth between 2016 and 2017 was Wisconsin (chart at right), with a decrease of 11.4%, in spite of offering EV owners tax rebates and exemptions on fuel and equipment. Generally speaking, the only other states that had drops in sales were either states to the far south, like Georgia and Tennessee, or states to the far north, like Alaska and North Dakota.

Interestingly, California falls into the lower half in this category, although this is somewhat understandable considering how EV sales are already well-established there.

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ELECTRIC VEHICLE SALES - TOP 25

	State	EV Sales (2016)	EV Sales (2017)	YOY EV Sales Increase (2016-17)
1	Oklahoma	263	691	162.70%
2	South Dakota	37	79	113.50%
3	Mississippi	70	128	82.90%
4	Vermont	514	871	69.50%
5	New York	6,043	10,090	67.00%
6	New Hampshire	482	788	63.50%
7	Massachusetts	2,905	4,632	59.40%
8	West Virginia	71	113	59.20%
9	Hawaii	1,224	1,934	58.00%
10	Maine	298	464	55.70%
11	Iowa	280	433	54.60%
12	Colorado	2,711	4,156	53.30%
13	Connecticut	1,511	2,304	52.50%
14	Maryland	2,185	3,244	48.50%
15	New Mexico	254	369	45.30%
16	Rhode Island	299	433	44.80%
17	Montana	99	143	44.40%
18	Illinois	2,688	3,812	41.80%
19	Indiana	671	933	39.00%
20	Virginia	2,155	2,932	36.10%
21	Arkansas	138	187	35.50%
22	Missouri	870	1,150	32.20%
23	Washington	5,363	7,068	31.80%
24	Arizona	2,265	2,976	31.40%
25	Minnesota	1,083	1,398	29.10%

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ELECTRIC VEHICLE SALES - BOTTOM 25

	State	EV Sales (2016)	EV Sales (2017)	YOY EV Sales Increase (2016-17)
26	Kentucky	280	360	28.60%
27	California	73,854	94,873	28.50%
28	Ohio	1,630	2,091	28.30%
29	New Jersey	3,980	5,033	26.50%
30	Nebraska	206	260	26.20%
31	Wyoming	41	51	24.40%
32	North Carolina	1,670	2,055	23.10%
33	Texas	4,510	5,419	20.20%
34	South Carolina	469	562	19.80%
35	Delaware	337	401	19.00%
36	Kansas	384	452	17.70%
37	Alabama	330	381	15.50%
38	Oregon	3,486	3,988	14.40%
39	Idaho	214	241	12.60%
40	Nevada	953	1,068	12.10%
41	Pennsylvania	2,998	3,346	11.60%
42	Michigan	2,482	2,742	10.50%
43	Florida	6,255	6,573	5.10%
44	Louisiana	270	283	4.80%
45	Utah	1,135	1,163	2.50%
46	Georgia	2,435	2,427	-0.30%
47	North Dakota	40	39	-2.50%
48	Tennessee	855	791	-7.50%
49	Alaska	94	85	-9.60%
50	Wisconsin	1,778	1,576	-11.40%

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EV Popularity

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EV Popularity by State

The subject of sales prompted us to question which were the most popular EVs of each state. After some research we put together the map at right, illustrating the EV most often searched for on Google in each state.

Although some of the cars shown here are reasonably priced electric vehicles like the Chevy Bolt and the Kia Soul EV, the majority are more expensive than many people can likely afford. One might expect the most popular brand to be Tesla due to it being synonymous with the electric car but, surprisingly, the most popular EV in the highest number of states is the BMW i8 — a hybrid sports car. Coincidentally it is also the most expensive car on the map.

The most searched for car in the 2nd and 3rd highest number of states are both Tesla models – namely, the Model X and Model S. Although both of these cars are not as expensive as the i8, they're still rather costly.

Of course, these results can likely be attributed to the fact that many of the people searching for these cars aren't looking to actually buy them; they may just be looking for information on them out of curiosity.

Fuel Costs — Electric vs Gasoline

(Chart at right)

A significant factor in car ownership is the cost of fuel. We thought it would be interesting to compare the eGallon (the cost of driving the same distance as could be travelled on a gallon of gasoline) against traditional gasoline. The state that comes first in this regard is Louisiana, charging only 87¢ per eGallon. Interestingly Louisiana tends to suffer in other statistics – for instance, it comes 44th for year-on-year sales growth and as we'll find out below, has one of the lowest amounts of charging stations compared with other states. So, it may be a great state for eGallon prices, but you'll have to hope you live in driving distance to one of the public stations or you may find yourself in trouble.

continued next page

FUEL COSTS - TOP 25

	State	EV Re-Fuelling Cost per eGallon (2018)	Avg Cost of Gasoline per Gallon (2018)	Fuel Cost Difference
1	Louisiana	$0.87	$2.57	$1.70
2	Washington	$0.88	$3.28	$2.40
3	Arkansas	$0.90	$2.57	$1.67
4	Oklahoma	$0.92	$2.73	$1.81
5	Idaho	$0.96	$2.96	$2.00
6	Kentucky	$0.97	$2.73	$1.76
7	Utah	$0.98	$2.96	$1.98
8	Tennessee	$0.99	$2.73	$1.74
9	Oregon	$1.02	$3.12	$2.10
10	North Dakota	$1.02	$2.73	$1.71
11	Montana	$1.04	$2.96	$1.92
12	North Carolina	$1.04	$2.67	$1.63
13	Nebraska	$1.04	$2.73	$1.69
14	Florida	$1.05	$2.72	$1.67
15	Georgia	$1.06	$2.67	$1.61
16	Texas	$1.06	$2.56	$1.50
17	West Virginia	$1.07	$2.67	$1.60
18	Colorado	$1.09	$2.74	$1.65
19	Wyoming	$1.09	$2.96	$1.87
20	New Mexico	$1.10	$2.57	$1.47
21	Nevada	$1.10	$3.12	$2.02
22	Mississippi	$1.10	$2.57	$1.47
23	South Dakota	$1.10	$2.73	$1.63
24	Virginia	$1.12	$2.67	$1.55
25	Indiana	$1.12	$2.73	$1.61

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Louisiana and the rest of the Top 25 are all very closely bunched together – there's only a 25¢ difference between 1st and 25th places. Meanwhile, in the Bottom 25, the results are rather more spread out… see chart at right.

The state in which the EV fuel prices are highest is Hawaii, with $2.91 per eGallon. At nearly a dollar more than Alaska (2nd from the bottom on this list), Hawaii doesn't seem to be in a great position. That said, the state does offer discounts and exceptions for electric car owners: the Hawaiian Electric Company offers time-of-use rates for both residential and commercial customers, and the state provides exemption from certain parking fees as well as the free use of HOV lanes.

You may also be interested in the cost difference between gasoline and electric vehicles if you're considering changing your car. In that regard, the highest ranking state is Washington with a sizable difference of $2.40 which, you can imagine, would save money significantly over time. As well as this large discrepancy (mainly due to the low cost of electric fuel in that state), Washington also offers some tax exemptions and a $500 rebate to customers with qualified Level 2 chargers, making it a great state for EV owners.

Number of Charging Stations

Fuel accessibility is also important, so we ranked every state by its total number of public charging stations. However, this doesn't take population size into account – a smaller state may have less stations than a larger state because there is less need for a high number of them. We therefore took these results and divided them by the state population estimate, revealing a ratio of population versus public charging stations. (See the chart at right).

Vermont ranked highest in this category, with 3,780 people for every charging station. Studying the state further, it only ranked 42nd for fuel costs so it isn't one of the cheaper states to live in if you own an EV. On the other hand, Vermont has also seen a large increase in EV sales between 2016 and 2017, which will likely precipitate further positive developments in the state's EV-related facilities. Therefore, it may still be a good state to keep an eye on as it develops.

The state with the highest number of people per charging station is Alaska, which is hardly surprising consider there are only nine public charging stations in the entire state! Alaska's position becomes even weaker because — as

continued on page 12

FUEL COSTS - BOTTOM 25

	State	EV Re-Fuelling Cost per eGallon (2018)	Avg Cost of Gasoline per Gallon (2018)	Fuel Cost Difference
26	Missouri	$1.13	$2.73	$1.60
27	Alabama	$1.14	$2.57	$1.43
28	Ohio	$1.17	$2.69	$1.52
29	Kansas	$1.17	$2.73	$1.56
30	South Carolina	$1.17	$2.67	$1.50
31	Illinois	$1.20	$2.73	$1.53
32	Arizona	$1.21	$3.12	$1.91
33	Maryland	$1.21	$2.91	$1.70
34	Iowa	$1.21	$2.73	$1.52
35	Delaware	$1.25	$2.91	$1.66
36	Minnesota	$1.25	$2.74	$1.49
37	Pennsylvania	$1.30	$2.91	$1.61
38	Wisconsin	$1.38	$2.73	$1.35
39	New Jersey	$1.44	$2.91	$1.47
40	Michigan	$1.45	$2.73	$1.28
41	Maine	$1.48	$2.86	$1.38
42	Vermont	$1.67	$2.86	$1.19
43	New York	$1.68	$2.91	$1.23
44	California	$1.72	$3.46	$1.74
45	New Hampshire	$1.80	$2.86	$1.06
46	Rhode Island	$1.82	$2.86	$1.04
47	Connecticut	$1.96	$2.86	$0.90
48	Massachusetts	$1.97	$2.86	$0.89
49	Alaska	$2.02	$3.12	$1.10
50	Hawaii	$2.91	$3.12	$0.21

YourMechanic

PUBLIC CHARGING STATIONS - TOP 25

	State	No. of Public EV Charging Stations (2018)	No. of People per Charging Station
1	Vermont	165	3,780
2	Hawaii	257	5,555
3	Oregon	597	6,939
4	Colorado	730	7,681
5	California	4,978	7,942
6	South Dakota	105	8,283
7	Minnesota	662	8,424
8	Iowa	370	8,502
9	Washington	830	8,923
10	Maine	139	9,611
11	Maryland	592	10,223
12	Connecticut	339	10,585
13	Wyoming	54	10,728
14	Nebraska	168	11,429
15	Massachusetts	576	11,909
16	Missouri	496	12,326
17	Nevada	236	12,704
18	Rhode Island	83	12,767
19	North Dakota	58	13,024
20	Wisconsin	440	13,172
21	Georgia	771	13,527
22	Kansas	214	13,613
23	New Hampshire	97	13,843
24	Utah	224	13,847
25	Tennessee	468	14,350

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EV Popularity

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previously mentioned — it comes 2nd highest for fuel costs. It also saw the 4th lowest number of EV sales in 2017 and saw the 2nd lowest amount of sales growth between 2016 and 2017. Evidently, Alaska isn't a great state for EV owners (Chart at right).

Electric Vehicle Market Share

This next statistic displays the EV market share of each state (in other words, the percentage of all light vehicles sold in 2017 that were electric vehicles). Much like the EV sales statistic, this provides an indication of the states in which EVs are the most popular and are therefore more likely to prioritize EV-related development.

As might be expected, California has the highest market share with 5.02%. This is twice the market share of Washington (the 2nd highest ranked state), illustrating just how much more widespread they are in relation to every other state. California also offers a huge number of incentives, discounts and rebates to EV owners, so it almost goes without saying that it would be a good state to live in for EV owners. Other states with high market shares in EVs include Oregon (2.36%), Hawaii (2.33%) and Vermont (2.13%).

The state with the lowest EV market share is Mississippi with a total of 0.1% - hardly surprising considering that there were only 128 EVs sold there in 2017. As we've already seen, the state also has a poor charging station vs population ratio and an average year-on-year sales increase. Although refueling costs are fairly low, it doesn't seem like too great a state for EV owners.

Conclusion

So, without further ado here is our order for the best states for electric car owners. (See the charts for these figures on page 13) If you'd like to see our methodology for creating the scores, you can do so at the bottom of the article.

California follows up in a close 2nd place. While it has the highest EV market share and one of the highest charging station vs population ratios, the state suffered due to average refueling costs and a poor year-on-year sales increase 2016-17.

3rd place goes to Washington. While its EV market share was average and its year-on-year sales increase didn't rank

PUBLIC CHARGING STATIONS - BOTTOM 25

	State	No. of Public EV Charging Stations (2018)	No. of People per Charging Station
26	Arizona	474	14,802
27	Michigan	666	14,958
28	Illinois	816	15,689
29	Indiana	423	15,761
30	North Carolina	638	16,103
31	Virginia	512	16,543
32	New York	1,115	17,802
33	Florida	1,173	17,890
34	South Carolina	280	17,944
35	Oklahoma	207	18,990
36	West Virginia	95	19,114
37	Delaware	47	20,467
38	Ohio	566	20,598
39	Texas	1,351	20,951
40	Pennsylvania	550	23,283
41	New Mexico	85	24,566
42	Idaho	64	26,827
43	Kentucky	161	27,666
44	Montana	36	29,180
45	Arkansas	100	30,043
46	New Jersey	274	32,867
47	Alabama	132	36,930
48	Louisiana	114	41,091
49	Mississippi	58	51,450
50	Alaska	9	82,199

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ELECTRIC VEHICLE MARKET SHARE

	State	EV Market Share (2017)		State	EV Market Share (2017)
1	California	5.02%	26	North Carolina	0.49%
2	Washington	2.51%	27	Kansas	0.49%
3	Oregon	2.36%	28	New Mexico	0.47%
4	Hawaii	2.33%	29	Michigan	0.45%
5	Vermont	2.13%	30	Missouri	0.42%
6	Colorado	1.57%	31	Idaho	0.41%
7	Connecticut	1.39%	32	Indiana	0.41%
8	Massachusetts	1.35%	33	Texas	0.39%
9	Maryland	1.05%	34	Ohio	0.37%
10	New York	1.03%	35	Alaska	0.37%
11	Utah	0.94%	36	Iowa	0.36%
12	Rhode Island	0.92%	37	Tennessee	0.33%
13	New Jersey	0.91%	38	Nebraska	0.32%
14	Arizona	0.90%	39	Montana	0.28%
15	New Hampshire	0.89%	40	Kentucky	0.27%
16	Delaware	0.86%	41	South Carolina	0.27%
17	Virginia	0.80%	42	Wyoming	0.25%
18	Maine	0.80%	43	South Dakota	0.22%
19	Nevada	0.79%	44	Alabama	0.19%
20	Wisconsin	0.67%	45	Arkansas	0.16%
21	Illinois	0.62%	46	Louisiana	0.15%
22	Minnesota	0.61%	47	West Virginia	0.15%
23	Pennsylvania	0.55%	48	North Dakota	0.12%
24	Georgia	0.53%	49	Oklahoma	0.10%
25	Florida	0.52%	50	Mississippi	0.10%

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continued next page

highly, it made up for it with a great proportion of charging stations to population, as well as a particularly low fuel cost. In fact, if you switched to an electric car in Washington you'd be making $2.40 saving per gallon, which could equate to a saving between $28 to $36 per tank, depending on the size of the car. Now let's take a look at the less successful states…

The results at the other end of the rankings are not particularly surprising. Alaska comes dead last, only securing a score of 5.01. While the state's fuel costs were merely average, in every other factor it performed very poorly: it came very close to the bottom for EV market share and YOY sales increase, while its position at the bottom of the charging station rankings sealed its fate.

The rest of the Bottom 25 are rather more closely grouped together. Many them are actually among the cheapest states for fuel costs, ranking highly in that respect. Where they tend to fall down is in the market share (the only real exception for this rule is Hawaii).

We chose to focus in on just a few factors that might give you an idea of which US states most love the electric car, but there are countless others that could have an effect. What are the circumstances that would matter the most to you?

If you'd like to see more details on our data, as well as their sources, go to the URL below.

https://docs.google.com/spreadsheets/d/1V45GEoOEEGvAqLCIe-hgNIZB_9ZotGDTHXj_fB2Ro7s/edit#gid=0

Methodology

After analyzing all the above data, we wanted a way to score each of our data points against each other so that we could try to create a definitive final score and find out which state was the best for electric car owners. So, we standardized each research element using minmax normalization to get a score out of 10 for each factor. Below is the exact formula:

Result = (x-min(x))/(max(x)-min(x))

We then added together the results to get a final score out of 40 for each state See below for URL of the original study. [Thank you to James McCrea for sharing this article.]

WHICH STATES ARE BEST FOR ELECTRIC CAR OWNERS? - TOP 25

	State	EV Market Share Score	EV Fuel Cost Score	No. of People per Charging Station Score	YOY Sales Increase Score	Final Score
1	Oklahoma	0.00	9.75	8.06	10.00	27.82
2	California	10.00	5.83	9.47	2.29	27.59
3	Washington	4.90	9.95	9.34	2.48	26.67
4	South Dakota	0.24	8.87	9.43	7.17	25.72
5	Colorado	2.99	8.92	9.50	3.72	25.13
6	Oregon	4.59	9.26	9.60	1.48	24.94
7	Vermont	4.13	6.08	10.00	4.65	24.85
8	Maryland	1.93	8.33	9.18	3.44	22.88
9	Iowa	0.53	8.33	9.40	3.79	22.05
10	Maine	1.42	7.01	9.26	3.85	21.54
11	Virginia	1.42	8.77	8.37	2.73	21.30
12	West Virginia	0.10	9.02	8.04	4.06	21.22
13	Arizona	1.63	8.33	8.59	2.46	21.01
14	Illinois	1.06	8.38	8.48	3.06	20.98
15	Minnesota	1.04	8.14	9.41	2.33	20.91
16	Nebraska	0.45	9.17	9.02	2.16	20.80
17	Missouri	0.65	8.73	8.91	2.50	20.79
18	Indiana	0.63	8.77	8.47	2.89	20.77
19	Utah	1.71	9.46	8.72	0.80	20.68
20	New York	1.89	6.03	8.21	4.50	20.63
21	Nevada	1.40	8.87	8.86	1.35	20.49
22	Wyoming	0.30	8.92	9.11	2.06	20.40
23	North Carolina	0.79	9.17	8.43	1.98	20.37
24	New Mexico	0.75	8.87	7.35	3.26	20.23
25	Massachusetts	2.54	4.61	8.96	4.07	20.18

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WHICH STATES ARE BEST FOR ELECTRIC CAR OWNERS? - BOTTOM 25

	State	EV Market Share Score	EV Fuel Cost Score	No. of People per Charging Station Score	YOY Sales Increase Score	Final Score
26	Connecticut	2.62	4.66	9.13	3.67	20.08
27	New Hampshire	1.61	5.44	8.72	4.30	20.07
28	Kansas	0.79	8.53	8.75	1.67	19.74
29	Montana	0.37	9.17	6.76	3.21	19.50
30	Georgia	0.87	9.07	8.76	0.64	19.34
31	Arkansas	0.12	9.85	6.65	2.69	19.32
32	Delaware	1.54	8.14	7.87	1.75	19.30
33	Texas	0.59	9.07	7.81	1.82	19.28
34	Ohio	0.55	8.53	7.86	2.28	19.21
35	Florida	0.85	9.12	8.20	0.95	19.12
36	Kentucky	0.35	9.51	6.95	2.30	19.11
37	Rhode Island	1.67	5.34	8.85	3.23	19.09
38	South Carolina	0.35	8.53	8.19	1.79	18.86
39	Tennessee	0.47	9.41	8.65	0.22	18.76
40	North Dakota	0.04	9.26	8.82	0.51	18.64
41	Idaho	0.63	9.56	7.06	1.38	18.63
42	Hawaii	4.53	0.00	9.77	3.99	18.29
43	Mississippi	0.00	8.87	3.92	5.42	18.21
44	Michigan	0.71	7.16	8.57	1.26	17.70
45	Pennsylvania	0.91	7.89	7.51	1.32	17.64
46	Wisconsin	1.16	7.50	8.80	0.00	17.46
47	New Jersey	1.65	7.21	6.29	2.18	17.32
48	Louisiana	0.10	10.00	5.24	0.93	16.27
49	Alabama	0.18	8.68	5.77	1.55	16.18
50	Alaska	0.55	4.36	0.00	0.10	5.01

YourMechanic

https://www.yourmechanic.com/article/states-electric-vehicles

Lobbying for Policy that Promotes EV Adoption

By John Higham

The 2018 legislative season is over and the EAA Board has been proactively lobbying for policy that promotes EV adoption and opposing policy that would impede adoption.

On the Federal level, **HR 6274** (aka Electric CARS Act of 2018) *https://www.congress.gov/bill/115th-congress/house-bill/6274* is legislation that has been introduced to the House Ways and Means Committee. If passed, HR 6274 would effectively remove the 200k car limit that is currently imposed on each manufacturer, allowing consumers to apply a $7500 tax credit toward their income taxes. The EAA believes that the 200k vehicle limit penalizes the market first movers, like Tesla, which hit that limit in 2018. In its place would be a calendar based limitation, currently January 1, 2029. This bill enjoys the support of 17 Democratic cosponsors demonstrating broad, if not lopsided, support from around the nation. The EAA has teamed with Plug In America and the Sierra Club to demonstrate support and plans are already being made for a "full court press" lobbying effort after the upcoming mid-term elections.

With apologies to the other 49 states, the EAA has also been quite active at the state level during the 2018 California legislative season, which ended in September. EV legislation that the EAA has supported which were signed into law include.

- **AB 2127**, *http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB2127* introduced by EAA member and Assemblyman Phil Ting serving the 19th Assembly District, which encompasses western San Francisco and northern San Mateo County. This piece of legislation is the equivalent of requiring the state to put its money where its mouth is to ensure that EV charging infrastructure keeps pace with the adoption rate of EVs and also the state goals of putting 5M EVs on the road by 2030. It requires the State Energy Commission to prepare a statewide assessment of the electric vehicle charging infrastructure needed to support the levels of electric vehicle adoption required for the state to meet its goals of putting at least 5 million zero-emission vehicles on California roads by 2030 and then to update that assessment every two years.
- **SB 1014**, *http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB1014* which gives state regulators authority to establish emissions reduction targets for ride-hailing services like Uber and Lyft.
- **AB 2885**, *http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB2885* which directs the state to prioritize low-income applicants for electric vehicle rebates
- **SB 957**, *http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB957* which allows low-income Californians to obtain carpool lane stickers for clean cars bought secondhand.
- **AB 193**, *http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB193* which provides rebates for replacement batteries in used EV that fall below a predetermined capacity.
- **SB 1000** *http://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180SB1000* prohibits a city, county, or city and county from restricting which types of electric vehicles may access an electric vehicle charging stations. In other words, it requires cities to treat all cars with a plug equally as some city had started to ban PHEVs, like a Volt, from accessing public charging infrastructure. SB 1000 also directs periodic assessments into whether charging station infrastructure is disproportionately deployed among geographic regions and demographic groups.
- Last, but not least, is **AB 2806** *https://leginfo.legislature.ca.gov/faces/billTextClient.xhtml?bill_id=201720180AB2806* which the EAA actively opposed which was withdrawn by the author. This legislation, had it passed, would have allowed ICE cars with handicapped placards to be exempt from the state's anti-ICE laws.

Looking forward toward to 2019, the EAA has plans to support other EV-friendly legislation as well as oppose any EV-hostile legislation that we learn about. We will write more about those plans in upcoming Current EVents. If you'd like to help with this effort or provide any feedback, please write to us at *ev.policy@electricauto.org*.

https://leginfo.legislature.ca.gov/faces/billNavClient.xhtml?bill_id=201720180AB2127

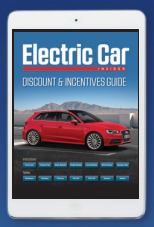
EV Educational Resources

for Individuals, Groups and Organizations

Electric Car INSIDER

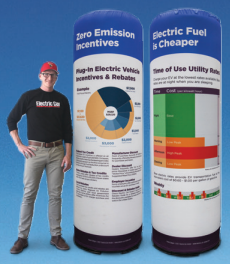
EV Buyers Guide

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 outoor 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.

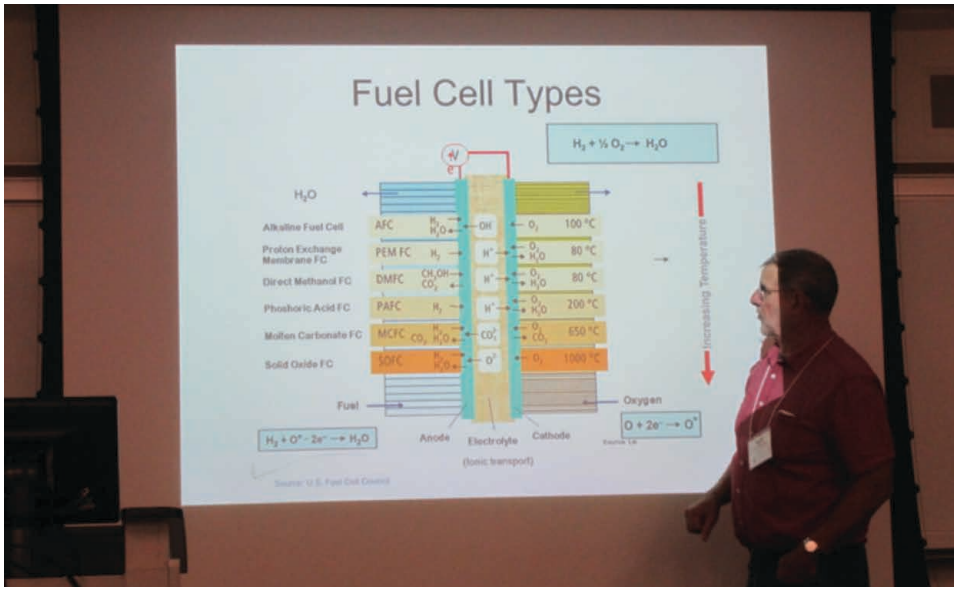
sales@electric-car-insider.com **619-337-4589**

A Battery Researcher's Toolkit: An Electrochemistry Workshop

By Lee Gasper-Galvin, WIEVA

The massive, worldwide electrification of vehicles of all types is well underway. Consequently, battery researchers everywhere are scrambling to discover the next better lithium-ion battery, or the next big energy storage breakthrough.

The Workshop in session with Professor Henry White describing Scanning Electrochemical Microscopy



Professor Robert Savinell showing how different types of Fuel Cells work

But how does one get the right kind of background to become a battery researcher? The dominant field that needs to be learned is known as electrochemistry. Electrochemistry is a multidisciplinary combination of fields which are related to the chemistry, physics, and even biology courses you may have had in high school. Electrochemistry demands a deeper dive into many subtopics related to these fields, including thermodynamics (heat effects), chemical equilibrium (which helps define what reactions will occur spontaneously), kinetics (speed of reactions), analytical chemistry (e.g. the use of specialized instrumentation to measure battery performance), properties of materials, behavior of subatomic particles (e.g. electrons), and statistical mechanics (explaining and predicting macroscopic properties and behaviors of systems based upon knowledge of the characteristics and interactions of microscopic constituents of the systems). Subtopics such as these are taught at the undergraduate college level, and in greater depth at the graduate school level, to those majoring in fields such as chemistry, physics, chemical engineering, electrical engineering, materials science, and to some extent in biology. The multidisciplinary nature of electrochemistry, with its specialized analytical methods and unique terminology, make it a challenging subject for even the most experienced scientists/engineers to learn.

In addition to battery research, electrochemistry is used in a wide variety of other intriguing applications, including continuous monitoring of blood glucose levels in diabetics, as well as deep brain stimulation achieved by placing an electrode into the skull while a patient is awake, e.g., to prevent people with Parkinson's disease from having tremors.

It turns out that the most efficient way to learn electrochemistry quickly is to participate in this one-week workshop, the "Annual Workshop on Electrochemical Measurements", which was taught at Case Western

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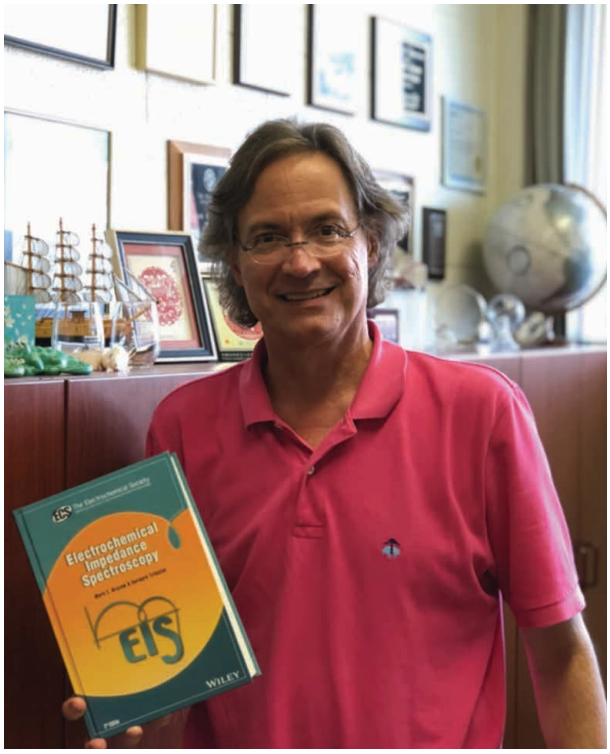
Professor Daniel Scherson instructing a laboratory group



Professor Mark Orazem told us about his new textbook, co-authored with Bernard Tribollet, "Electrochemical Impedance Spectroscopy", 2nd Edition

Reserve University during August 13-17 this year. It is the only electrochemistry workshop offered in the U.S., and one of only a few available in the world.

It's not surprising that Case Western Reserve University (CWRU) has become the epicenter of electrochemistry instruction. The university's third president, David Vincent Ragone (RA-GO'-KNEE), was a metallurgist and world-renowned pioneer in electrochemistry, famous for his development of the Ragone plot (which he invented prior to joining CWRU as President). The Ragone plot is widely used by electrochemists in comparing the power vs. energy capabilities of various energy storage devices.

The workshop utilized an all-star line-up of professors and others well-known in their fields. For example, the director/main instructor, Daniel Scherson, Frank Hovorka Professor of the Department of Chemistry, and Director of the Ernest B. Yeager Center for Electrochemical Sciences at CWRU, has over 250 publications and 7 patents. He first became involved with the workshop as one of its students about 40 years ago, and he has been the workshop director for the past decade.

The instructors and the topics which were covered at this year's workshop are shown in the table below:

Instructor	Organization	Subtopics
Professor Daniel Scherson	CWRU	Introduction to electrochemistry concepts; the electrochemical double layer; thermodynamics and kinetics of interfaces
Professor Henry White	University of Utah	Mass transport (including diffusion and migration of charged particles in electrolytes); electrochemical measurements and methods (including reference electrodes and instrumentation)
Dr. Richard Middaugh	Consultant	Batteries
Professor Mark Orazem	University of Florida	Corrosion and electrochemical impedance measurements
Professor Gerald Frankel	Ohio State University	Corrosion/passivation
Professor Robert Savinell	CWRU	Fuel cells
Professor Uziel Landau	CWRU	Electrochemical engineering and modeling
Professor John Miller Mr. Mirko Antloga	JMI CWRU	Electrochemical capacitors

Workshop participants' learning was enhanced by a series of hands-on laboratory sessions and demonstrations with electrochemistry equipment. For example, Cyclic Voltammetry (CV), one of the most widely used techniques in electrochemical research, was demonstrated. CV relies on the application of a linear voltage

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Researchers

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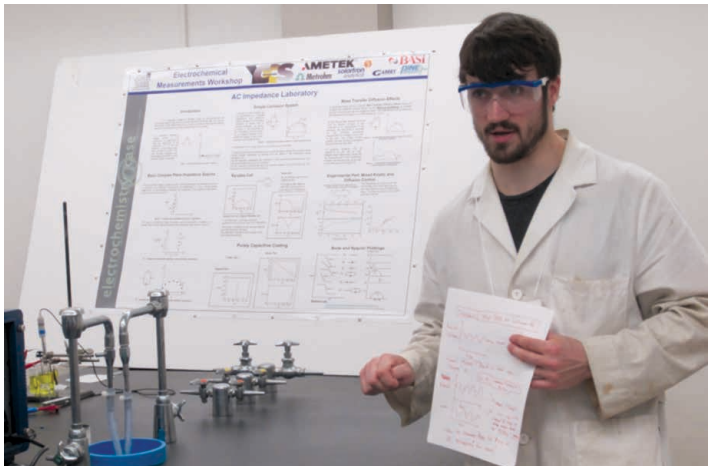
scan between two prescribed limits while monitoring the current flowing through the electrode. The data obtained reveals information such as the amount of charge picked up or released by the electrode, reaction rate at the electrode, and mass transfer rate of the reacting species to the electrode surface.

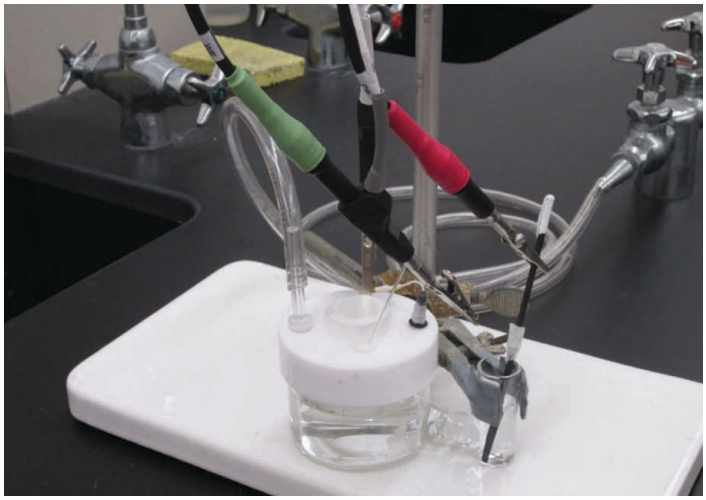


Graduate student John Strobl explaining AC Impedance Spectroscopy

Another technique that was demonstrated was Electrochemical Impedance Spectroscopy (EIS).

EIS applies a small AC signal of about 5 to 10 mV, superimposed on an electrochemical cell at a finite DC open circuit voltage, and the impedance (which is the AC equivalent of resistance, R, in DC measurements) is determined over a wide frequency range. The type of information that can be gleaned from EIS relates to electrode-electrolyte parameters such as solution resistance, charge transfer rate,

Professor John Miller describing Electrochemical Capacitors



A two-compartment Electrochemical Cell

and capacitance (defined as the amount of charge transferred over the potential difference between electrodes).

Can one truly master electrochemistry in one week? The answer is no, but the workshop provided a great foundation from which to start. The instructors gave participants their email addresses, and urged them to follow up with any questions they might have during their future self-study of the material.

Mr. Mirko Antioga showing fabrication equipment at the Capacitor Prototyping Center (CPC)

Next year's workshop is scheduled for August 2019, with the exact dates yet to be determined. Workshop director Professor Daniel Scherson can be contacted with questions about the workshop at dxs16@case.edu or 216-368-5186.

Startup Aims to Prevent EV Charging From Overloading the Grid

NREL is testing a novel adaptive load management system from PowerFlex

By Jason Deign

The U.S. National Renewable Energy Laboratory (NREL) is testing a novel technology that could prevent electric-vehicle charging from crashing the grid.
https://www.greentechmedia.com/articles/read/how-electric-cars-could-sink-the-texas-grid#gs.gzWWaSg

The technology, from Californian startup PowerFlex Systems, is aimed at building owners looking to provide EV charging points, for example in parking lots.

Not only does it make sure simultaneous EV charging does not overstress the grid, but it also prevents building owners from incurring peak demand charges.

"PowerFlex's technology reduces peak demand needed to run electric-vehicle stations by 50 percent, by incorporating driver inputs and real-time load monitoring," said Trish Cozart, NREL manager for the Wells Fargo Innovation Incubator program, which is funding the firm.

The company achieves this cut in peak demand power in two stages. The first looks at how many vehicles are connected to charging points, and how long they are able to charge for.

When drivers hook up their cars to a PowerFlex charger, they use a mobile app to tell the system which charging point they are using, what kind of vehicle they have, when they need to pick it up and how far they will be traveling afterward.

This information allows the system to work out how much power to send to each vehicle, and when, while keeping the overall energy draw within a reasonable limit.

Such load management techniques are already being investigated elsewhere and can help ensure that simultaneous wide-scale EV charging does not bring the grid down.

But they could still land building owners in trouble, because if a charging station is creating a significant load on the electrical system then the owner could end up paying demand charges if other facility loads, such as heating or air conditioning, push consumption up too high.

The PowerFlex system gets around this with its second stage of operation.

PowerFlex technology reduces peak demand from electric car chargers.

Here, it plugs into the building electrical system and monitors the flow of power to major loads such as lighting, heating, ventilation and air conditioning, as well as the potential output from solar panels, batteries and other distributed energy technologies.

PowerFlex's system uses this information to determine when it can reroute extra power to the vehicle-charging station and when to cut back on the station's energy. Besides avoiding demand charges, the system could potentially help building owners accommodate extra charging points without having to pay for electrical upgrades.

According to a PowerFlex presentation from July last year, the conduits and wiring needed to accommodate electric vehicles cost about $3,000 per parking space for fewer than 10 spaces.

But above this number of vehicles, the cost rises to $7,000 per space due to the need for transformers and distribution panels. Beyond 30 vehicles, the cost is $10,000 per space because of the need to install new feeders and switch boards.

The PowerFlex system, which is "at a commercially ready stage," said Cozart, has been deployed at locations including the NASA Jet Propulsion Laboratory, the Los Altos School District in California and NREL's National Wind Technology Center in Colorado.

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Preventing Grid Overload

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The NWTC installation covers 16 EV charging stations. PowerFlex "is seeking assistance testing joint optimization of EV charging and grid operation, for which NREL will provide expertise," said Cozart.

NREL has also given PowerFlex $250,000 in funding through the incubator program. Companies that have participated have gone on to raise more than $89 million in follow-on funding, Cozart said. They include ESS Inc., a flow battery maker that last December raised $13 million from investors including BASF, the global chemicals giant, and Growing Energy Labs Inc., which in April pulled in $5.5 million after previously being backed by Shell Technology Ventures.

Of 20 firms that have participated in the incubation program so far, four have been subject to mergers and acquisitions, Cozart said.

Analyst Timotej Gavrilovic, lead author of the *EV Charging Infrastructure Development* *https://www.greentechmedia.com/research/report/ev-charging-infrastructure-development-global-market-sizing-and-forecasts#gs.8ej1Qkc*

and *EV Charging Infrastructure Landscape* *https://www.greentechmedia.com/research/report/ev-charging-infrastructure-development-global-market-evolution#gs.GVyoG_Q* reports from Wood Mackenzie Power and Renewables, said the charging optimization software being developed by PowerFlex is interesting. "Overall, I think they are definitely worth keeping an eye on," he said.

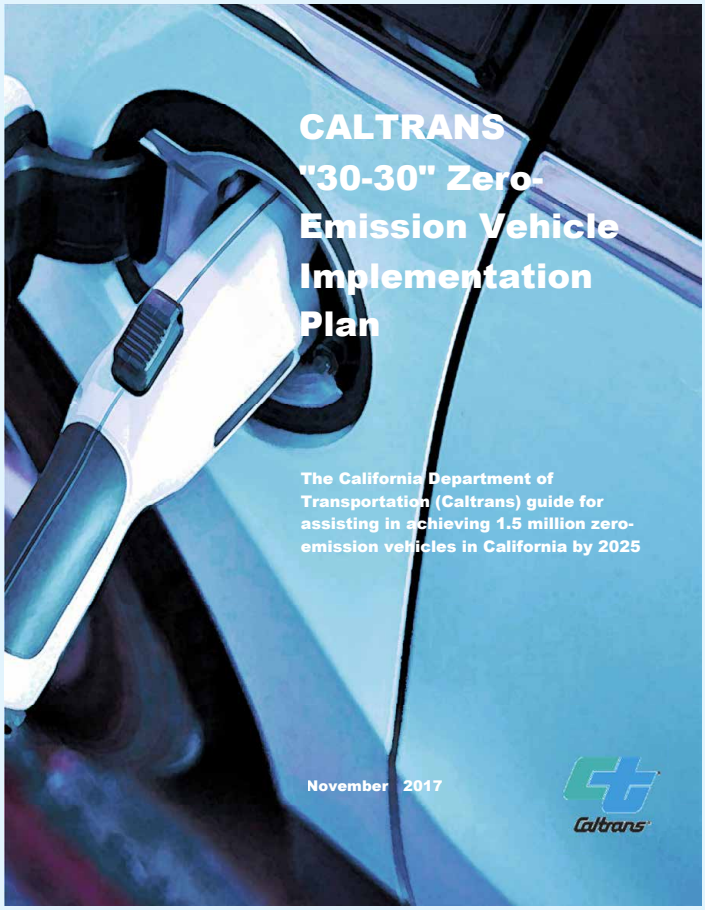
Ed: Two representatives from PowerFlex came to visit Silicon Valley EAA chapter members and present their product during our regularly scheduled meeting this month. One question they immediately set the record straight on was if any special hardware was required for any EV to participate in their program.

The answer was a resounding "No." Any EV capable of charging from a J-plug is supposedly a candidate.

Their ability to reduce demand charges should be of interest to facilities that cross that line every month, because of their flexibility.

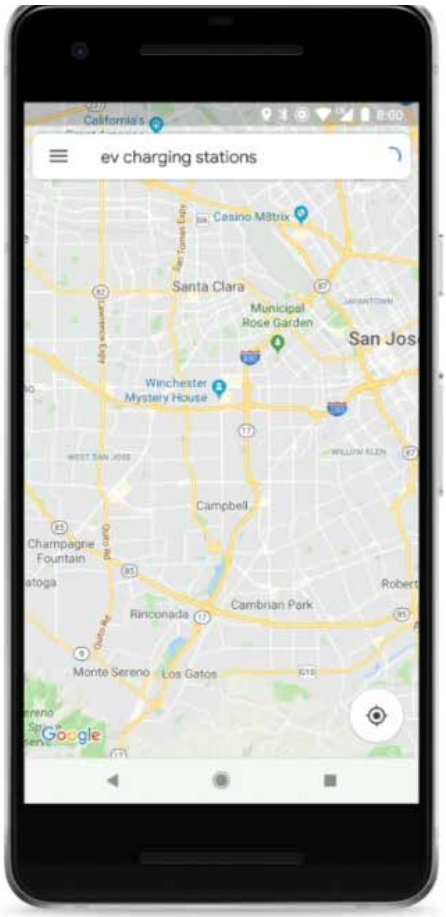
https://www.greentechmedia.com/articles/read/startup-aims-to-solve-electric-car-power-overload-problem#gs.9IOwEis

CalTrans Roadmap Summary



http://www.catc.ca.gov/meetings/2017/2017-12/49_4.20.pdf

Google Maps Will Now Help You Find EV Charging Stations



New update lets users search for nearby chargers, rate, and review

This is significant!
Everyone using Google will immediately see this and EV drivers will benefit.

By Sean O'Kane

Finding a place to quickly top off your electric car's battery might get a little bit easier: Google announced today that it's adding support to Google Maps for EV chargers. Both Tesla and Chargepoint's global network of EV chargers will be added to the iOS and Android versions of the app starting today, with support for the desktop version of Maps coming in a few weeks.

Google Maps will support different charging networks specific to certain countries. It will display chargers in the EVgo, Blink, & SemaConnect networks in the U.S.; Chargemaster and Pod Point chargers in the UK; and Chargefox in Australia and New Zealand.

Nearby chargers will show up in Google Maps when a user searches for related terms like "EV charging," or "charging stations." Maps will include information about what types of ports are available at a given location, how powerful they are, pricing, as well as driver reviews and ratings.

That last bit is crucial. While new EV chargers come online every week, they're still not nearly as reliable or quick as something like a gas station. Ports can go offline for a variety of reasons, EV-only parking rules can be ignored, and sometimes picky business owners (in particular, parking lot managers) shoo people away who are only looking for a short pit stop to charge. It also still takes a long time to charge an electric car from empty to half, let alone full battery.

The social component of apps like PlugShare (or even Chargepoint's own app) helps mitigate these problems by encouraging drivers to regularly update the status of chargers, log problems with the tech or onsite personnel, and offer tips on the best times to charge.

One thing that's missing in the initial Google Maps rollout is the ability to check if individual charging stalls are occupied. That means drivers won't know for sure if chargers are available when they arrive at the location. Other services, like PlugShare or Tesla's interface for its Supercharging station, put this information front and center. Google also doesn't yet have Electrify America, the budding network born out of Volkswagen's Dieselgate scandal, included in its results.

https://www.theverge.com/2018/10/16/17983986/google-maps-electric-car-charging-tesla-superchargers

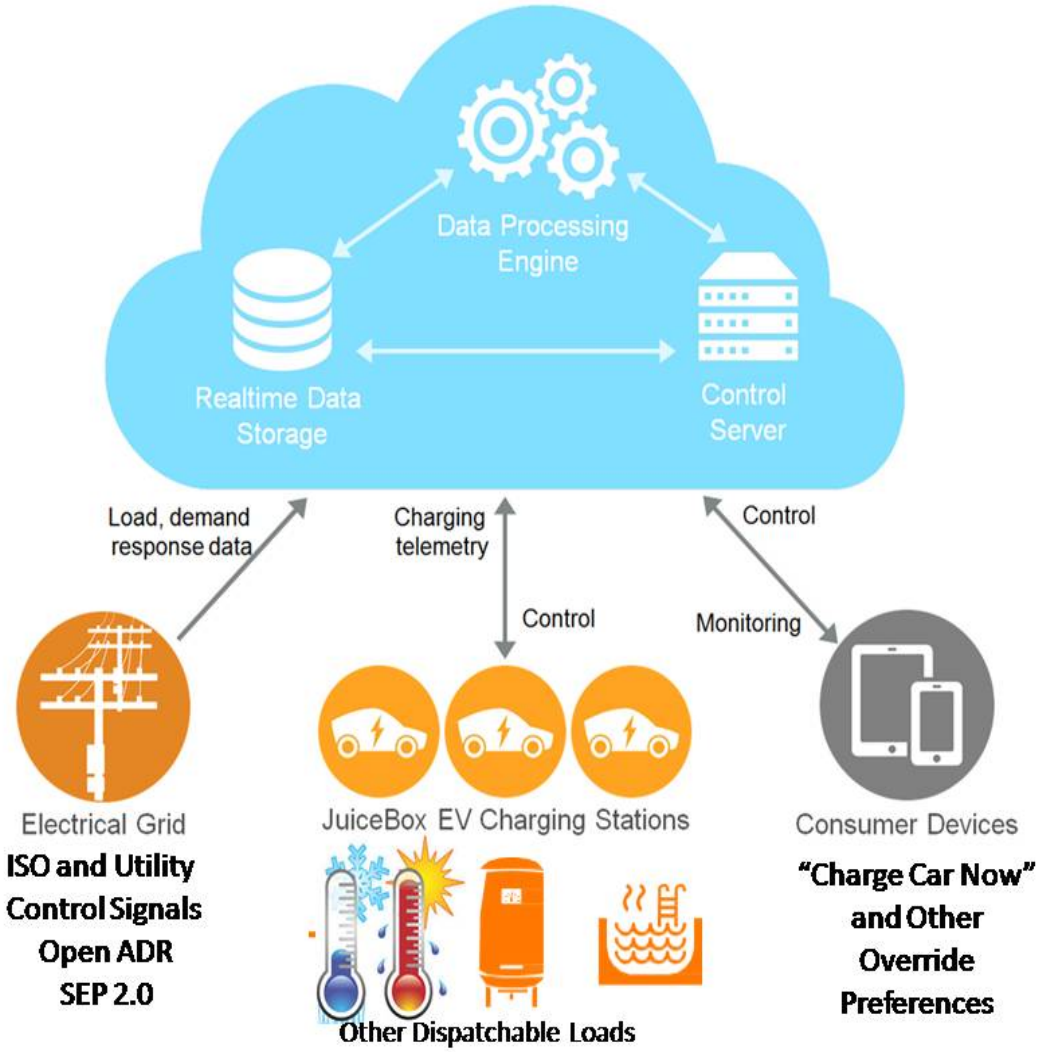
Alternative Fuels Incentive Grant #75417

Participant's Bi-Monthly Newsletter

Partnerships One, LLC

July-August, 2018

Electric Vehicle-Grid Integration



Thanks to Oliver Perry for contributing this article.

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Introduction

This newsletter is intended to keep our participants up to date on events occurring in AFIG project #75417 "Electric Vehicle-Grid Integration" partly funded by the Pennsylvania Department of Environmental Protection, and on external events relevant to it. It is an extension to the information contained in the sign up sheet that you received when you joined the network. If you need another copy of the sign up sheet, please let us know. We will try to keep you current as the project develops.

The Objective

We are trying to determine what electrical load management services are feasible and desirable to accomplish two goals:

1. To reduce the stress on the grid that will be imposed by uncontrolled charging as EVs become the dominant mode of personal transportation, (and to get EV owners compensated for it).
2. To provide the EV owner with a transparent charging service that ensures that his or her vehicle has at least the required range, ready to go when required.

We are partnered with eMotorWerks who have the same objectives that we do. They have developed the top quality EVSEs known as Juice Boxes that we have supplied to you, and the JuiceNet to control and monitor them, which is shown schematically on our cover. eMW warrants the Juice Box and Juice Plug hardware that we have supplied to you. If you have a hardware problem, they can help. If it's a network problem, we both will try to help.

New Members

As a result of a friendship with one of our principals we have a new member:

Meena R.	Smart Car Electric Coupe	Philadelphia, PA

What's New

The consensus that EV sales will undergo spectacular growth, and that EVs will play a major role in the future, seems to be holding. The International Energy Agency[1] now forecasts growth from 3 million EVs currently, worldwide, to 125 million by 2030, (approximately 5% of almost 2 billion total vehicles). Bloomberg New Energy Finance sees 100 million EVs, and Goldman Sachs estimates 127 million. A more optimistic study[2] by IEA, assuming continuing government subsidies and progress in fast charging and battery technology, sees 220 million EVs by 2030, (10 % penetration). All of this encourages me that we are at the dawn of a new age, and that what we are doing matters.

Results

Since January, 2018, we have demonstrated that we can indeed shift the peak demand for EV charging from the early evening to the early morning hours without inconveniencing our members. The results for June and July, 2018, are shown below. For June the situation is much as it has been since April 9 with the emphasis on maximizing the load in the early morning hours when energy is cheapest. In July we

[1] https://www.cnbc.com/2018/05/30/electric-vehicles-will-grow-from-3-million-to-125-million-by-2030-iea.html
[2] https://www.fuelfreedom.org/cars-in-2050/

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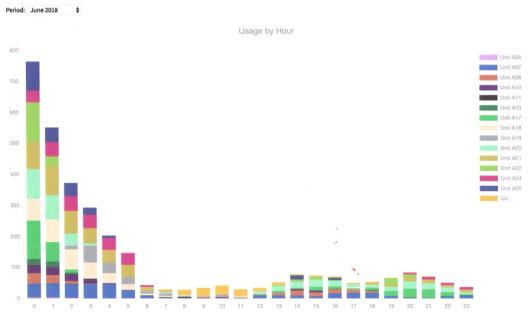
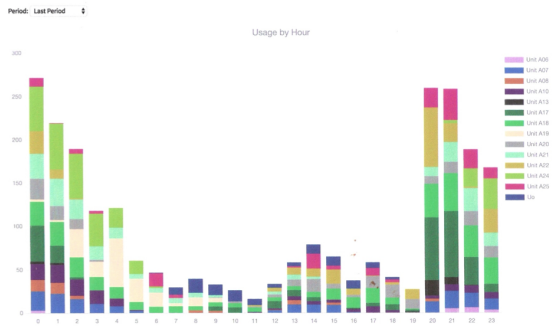
started working on our other major objective to provide regulation service to PJM, the Mid-Atlantic regional Transmission Operator. This involved moving some of the load to 8 PM for convenience in modifying the charging conditions and observing the results.



Usage by hour for June, 2018, showing peak demand shifted to the early morning hours.



Usage by hour for July, 2018, showing some demand shifted to 8 PM for convenience in working on Frequency Regulation.

We do not have bidirectional energy transfer capability to the vehicles (V2G), and we wouldn't be allowed to use it if we did because of the restrictions on "injecting" energy into the grid (net metering is limited to renewable electrons only, not tired old electrons that have seen a storage battery). As a result we are providing regulation by modulating the rate of charge (V1G).

When we have enough capacity for revenue participation in the ancillary service market for certain hours of the day, we will bid in the day-ahead regulation market to provide that capacity for those hours. We will then receive a signal every two seconds from PJM via our curtailment provider partners, Customized Energy Solutions-Ltd, to give or take so many of the kW we have bid. By setting everyone's EVSE to take half the maximum power they are capable of taking we are able to modulate the total down and up to take less or take more (which is equivalent to giving and taking relative to our average draw) and to comply with PJM's signal to vary the load on the grid.

This we have been doing since mid July with a test signal provided by PJM, and you can see that the peak is not only shifted from midnight to 8PM, but it is also broadened because we are running at half power and it takes twice as long to charge.

If this is a problem to anyone, and you need a fast charge, you can always override our commands with the override button, or go into the time of use settings and change them to suit yourself, or ask us to change them for you.

Preliminary results of this activity are shown on the next page. The horizontal orange line in the middle is the base charging level set at slightly more than 50 % of full load because a minimum of 6 Amps is needed to ensure continuous charging of the vehicle. The horizontal green and purple lines are the bounding limits of up and down regulation. The difference between the orange line and either of the bounding lines equals the kW of regulation bid.

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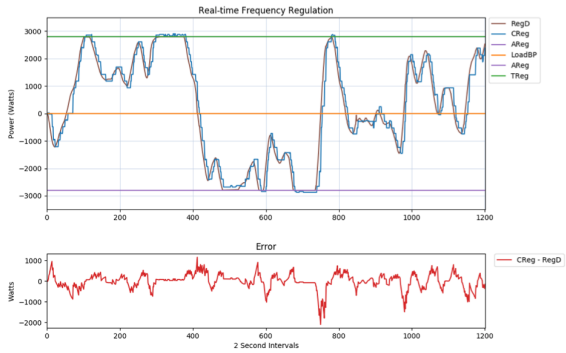
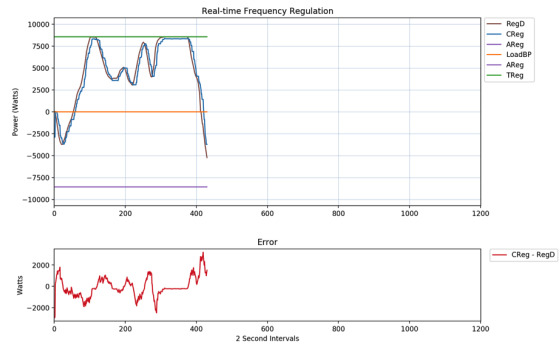


Regulation by a single vehicle "Lightening Bug" showing good fidelity to the PJM Reg. D signal (orange) by our C Reg. response (blue). The red line is the error between the two in Watts.



Regulation by four vehicles, also good fidelity. The number of vehicles that can be aggregated is still in question.

You can see that for the single vehicle only 3000 watts were controlled. For the four vehicles the bid was up to 8 kW. The minimum acceptable bid for reimbursement is 100 kW in a single Electric Distribution Company territory like PECO, which will require something like 50 vehicles. This is about five times our current membership, which we will not reach soon. With the anticipated growth in single-family members plus what we hope to generate from multifamily, which also can charge at night, we hope to get there next year. The task is made easier by the fact that our network is concentrated geographically and the hours of charging are limited to the off peak minimum. It is made harder by the fact that we have to reduce to half power to have something to modulate. Our plan for AFIG is to demonstrate the technology to do the aggregation, find out how big a fleet we can aggregate, and evaluate how much revenue we could earn if we were big enough to participate.

The average wholesale cost of the energy we used is shown in the following table:
May and June show remarkably low average prices on our usual 3 MWh monthly load. We have lost some load in July for whatever reason, and the average price is in line with earlier data.

	kWh	$	$/kWh
May, 2018 Midnite-6AM	3329	58.52	0.0176
June, 2018 Midnite-6AM	3251	70.49	0.0217
July, 2018	2439	64.00	0.0262

Commercialization

V2G Energy, LLC, was incorporated in Delaware as of January 23, 2018. The objective of this company is to commercialize the technology and the network of participants created under this AFIG project in which we have all cooperated. We hope to provide all of our participants and other interested parties an opportunity to grow this company as founder members. Our intention is to recruit a first class

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team from among the participants, and others, and to staff the company for growth by the end of 2018. We are partway along this path, but are still too few to do justice to the very large opportunity that we see in a wholly revolutionized personal transportation industry.

We plan to hold another project review meeting in early October. The objective is to update our progress report to our participants and the EV-aware public generally, and to offer them the opportunity to join us in this endeavor. Please plan to attend.

As mentioned in the last newsletter, promising market sectors have been identified as Residential, Multifamily Residential and Workplace charging. We expect to gain experience with workplace charging from the Juice Station shown here installed behind Building 101, PIDC's head quarters at the Philadelphia Navy Yard. We have spent the last two months getting the unit to actually work as advertised. We believe that our teething troubles are behind us and we can begin to generate some revenue. We are hoping to install other EVSEs at the Navy Yard. It is a perfect environment to develop workplace charging. This may be done in conjunction with Clem, a French EV Sharing technology company, who are Ben Franklin Partners. They have an EV driver interface, which may complement our managed charging offering. We have made a proposal to Penn State for additional EVSEs at their Building 7R, perhaps with V2G capability, which they have in their plan.

We are pursuing Multifamily Residential charging at a brand new 25-unit apartment complex in center city Philadelphia. This will involve new technology ultimately providing V2G storage. It opens up a wholly new route to participation in the DR market with CES as well as a powerful and very valuable way to control demand charges. We have filed a provisional patent on this.

Troubles

If you are having trouble with your EVSE, we want to know about it. Please e-mail us if you need anything, or if you have suggestions for improvement in our service. If you know of anyone who might be interested in joining a pioneering enterprise on the leading edge of the energy and transportation future, please let us know, or give them a copy of this newsletter or your signup sheet.

Paul H. Kydd, President, Partnerships One, LLC

partnershipsone@gmail.com

August marked the 35th consecutive month of year-over-year sales growth for electric cars in America.

https://insideevs.com/august-2018-plug-in-electric-vehicles-sales-report-card/

Condominium Charging for Electric Vehicles

Photo: www.reminetwork.com

By Simon Freedman, EVAoSD

A possible impediment to continued expansion of Electric Vehicle (EV) growth is the possible lack of a home charging option for residents of condominium developments. However, in at least four states there are laws on the books that provide a path for an EV owner to be able to install a home charging station for their EV. Even more promising, there just might be a way to get someone to help pay for it. This article is directed to both EV owners, and members of the Board sitting on homeowner associations, who have an interest in installing charging stations for EVs. What follows is a brief review of laws that favor the installation of EV charging stations in condominium developments, and then a discussion of what it will take to actually get an EV charging station (or more formally – the Electric Vehicle Supply Equipment (EVSE)) installed.

OVERVIEW

The Community Association Institute states there are 342,000 Community Associations comprising 26.3 million housing units with 69 million residents in America. In California alone, there are 45,400 Community Associations with over nine million residents (Ref: 2016 Statistical Review). The study goes on to estimate that Condominium developments comprise 42-45% of this amount.

Most Electric Vehicle (EV) owners prefer to charge at home. ChargePoint, a provider of charging infrastructure claims EV sales are on track to increase 39% each year thru 2020. However, one need look no further than the roll out of Tesla's Model 3 (which was for August, 2018 the fifth best-selling car in America) to realize that EVs are well on their way to becoming quite main stream. A critical issue for the continuing roll-out of EVs is the ability of future owners to charge their vehicles at home when they reside in a condominium development.

BACK TO BASICS

In California a condominium is defined as an undivided interest in common property together with a separate interest in space called a unit. There is typically a set of Covenants, Conditions & Restrictions (CC&Rs) recorded against the entire property. The CC&Rs establish a Homeowners Association (HOA), usually a nonprofit corporation, to manage the common area of the development. The HOA is governed by a Board of Directors, which normally consists of homeowners elected by the members of the HOA. CC&Rs typically provide that any changes to the common area must first be approved by the HOA, and many times require the homeowner to submit any proposed changes first to an Architectural Committee. While an exhaustive review

contined on page 28

CONDO CHARGING

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of condominium law in other states is beyond the scope of this article, the author believes that many other states have similar rules when it comes to condominiums.

Residents of a condominium may be assigned a parking space, which is called Exclusive Use Common Area. Other Associations have general parking in common area. Whenever a homeowner wants to make changes to their Exclusive Use Common Area, or the common area, such as installing an EV charging station, they will need to follow the procedures in the CC&Rs for obtaining HOA approval. This rule will almost always apply, even when the homeowner wants to make changes to their own parking spaces, because the space is designated as common area.

EV LAWS

California law provides that any provision in a set of CC&Rs that either effectively prohibits, or unreasonably restricts the installation or use of an electric vehicle charging station in an owner's designated space is void. (Ref: Section 4746 California Civil Code). There is language in this code section that recognizes "it is the policy of the state to promote, encourage, and remove obstacles to the use of electric vehicle charging stations."

An HOA may impose "reasonable restrictions" on the installation of electric vehicle charging stations so long as they do not significantly increase the cost of the station or significantly decrease its efficiency or specified performance. If the charging station is to be installed in common area the homeowner is required to first obtain approval of the HOA. The homeowner is also responsible for the cost of installation and must retain a licensed contractor to install the charging station, and is thereafter responsible to maintain the station. The owner must also provide a liability policy of insurance for the equipment that names the HOA as an additional insured. The homeowner will want to insure this equipment in any event, and adding the HOA as an additional insured normally should only involve a call to your broker, and not result in any increased premiums. Of course, the owner is also responsible for the cost of electricity consumed at the charging station. The HOA is authorized under this section to create a new parking space where one did not previously exist to facilitate the installation of an electric vehicle charging station, if the owner's own parking space would make installation of a charging station impossible or unreasonably expensive. Finally, if the HOA is found to have "willfully violated" this section it could face a civil penalty up to $1000, and be responsible for the homeowner's attorney's fees.

Florida law finds that: "the use of electric vehicles conserves and protects the state's environmental resources, provides significant economic savings to drivers, and serves an important public interest. The participation of condominium associations is essential to the state's efforts to conserve and protect the state's environmental resources and provide economic savings to drivers." (ref: Florida Revised Statutes Section 113.8.) This section also states that CC&Rs may not prohibit the installation of EV charging stations in an owner's common area parking space, and has many of the same elements such as the California law-owner is responsible to install and maintain the station, pay for electricity used, use a licensed contractor, obtain HOA approval, and provide additional insured listing.

Laws passed in Oregon and Colorado have many of the same provisions: Oregon Revised Statutes Section 100.627, and Colorado Revised Statutes Section 38-33.3-106.8. The Colorado statute recognizes that the "vast majority of new homes are in common interest communities". That Section goes on to state: "The primary purpose of this section is to ensure that common interest communities provide their residents with at least a meaningful opportunity to take advantage of the availability of plug-in electric vehicles rather than create artificial restrictions on the adoption of this promising technology".

PUTTING THE PIECES TOGETHER

The first thing the condominium owner should do is review their CC&Rs as far as the process required to obtain approval to make changes to their parking space (common area). Filling out the paperwork while having a licensed contractor on hand should make this far more manageable. Dealing with the company that provides EV charging station providers will certainly bring another level of knowledge to the process. In addition, the homeowner may need to work with the local utility.

The homeowner should canvas their fellow residents to see if any of them also have an interest in installing EV charging stations. With numbers comes increased opportunities to have all or some of the installation costs covered by a third party, and possibly quantity discounts. Finally, there may be rebates being offered by your utility, or local or state authority to help defer the cost of installation, as discussed below, and this is certainly worth researching. The big California IOUs (investor owned utility) offer EV rebates and those should not be overlooked either.

continued next page

While the process may sound daunting, it really is not much different than a condominium owner who wants to extend their deck or patio, here you are simply making a different improvement to your common area.

Remember the HOA board is almost certainly comprised of homeowners just like you. Let them know of your plans and explain to them, that just like adding solar panels, installation of EV chargers will add value to the property. If there are other individuals in your development who own EVs, it would make sense to join forces with them. If you live in one of the four states mentioned above let them know of the laws adopted and their strong bias in favor of permitting the installation of EV charging stations.

Homeowners in these four states have strong arguments against any refusal by the HOA to approve their application. Other homeowners, provided the application is competently completed, should not face undue hurdles. However, no homeowner should simply start the process without first obtaining HOA approval. To proceed without HOA approval is almost certain to invite a negative response from the HOA, and further taint the view of the HOA in future EVSE installation attempts by others.

Board members should view these applications in light of the laws and policies set forth above. Boards should recognize that adding EV charging stations to their development increases property value, and makes their project more appealing to future buyers, as well as increasing access to guests and new owners that drive EVs. Moreover, the Boards of HOAs have a unique opportunity to have multiple EV charging stations installed on the common area, at a third parties' expense.

Can someone else pay?

Electrify America, a subsidiary of VW is investing $2 Billion over the next 10 years in Zero Emissions Vehicle (ZEV) infrastructure in the United States. Greenlots has been selected to administer a portion of those funds. A visit to their website, http://www.greenlots.com indicates that in 8 metropolitan areas Greenlots will work with Apartment and Condo owners to install EV charging infrastructure in a turnkey fashion, design and engineering included, and Electrify America will pay 100 percent of the upfront capital investment including design, installation and maintenance. Those metropolitan areas are: Boston, Seattle, New York City, Los Angeles, San Francisco, Fresno, Sacramento and San Diego. Affected board members should give serious consideration to this proposal.

The author understands that the current program from Greenlots, under the Electrify America arrangement allows for the installation of 4 to 8 chargers, in common area. Typically, level 2 (L2) charging stations provide two ports per charging station, depending on the manufacturer. Thus, the Board would be looking at 2 to 4 charging stations, with each station having two connection points

Greenlots will also provide an 8-year warranty on the hardware. However, the Electrify America program is winding down, having been on line for close to two years. The good news is that other programs are expected to be available through Greenlots that will continue to pay for all or some or the costs of installation of multiple chargers. The 'San Diego Power Your Drive' *https://www.sdge.com/residential/electric-vehicles/power-your-drive* is one such program.

Individual owners would almost certainly need to convince their board to allow Greenlots to install several EV charging

continued on page 30

CONDO CHARGING

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stations. However, this should be viewed as an opportunity by the Board to dramatically improve its common area, add value to the property, all at the expense of a third party.

ChargePoint has a page on their website that discusses numerous rebate programs across the country: *https://www.chargepoint.com/products/station-incentives/* Plug In America has a 50 state compendium of such on their website as well. See https://plugstar.zappyride.com/tools/incentives

Property-Assessed Clean Energy (PACE) financing allows property owners to borrow funds to pay for electric vehicle charging stations as well as other energy improvements. The borrower pays back the loan over a set period of time through a special assessment on the property. Various requirements apply. This is a program available to California residents, while other states may have similar programs.

Even if the EV owner has to pay for their own charging station themselves, the expected savings in fuel and maintenance costs should go a long way towards offsetting that expense. If the owner believes the expense of a new EV and charging station is excessive, the owner may want to consider a used EV. Used EVs have become extremely affordable with cars like the Chevy Volt and Nissan Leaf being available for $10,000 or less. Also, not to be overlooked are lease car turn-ins, usually with low miles and significant depreciation built in. With this low price, and the expected savings in gasoline and maintenance it really does pencil out for potential owners to consider their own charging station along with a used EV purchase.

CONCLUSION

The starting point is a thorough understanding of your associations CC&Rs, and any rules and regulations adopted by the HOA that deal with modifications to the common area, and/or the installation of EV charging stations. Following these documents, and being able to present a competently completed application, with a licensed professional on hand will go a long way towards obtaining HOA approval. The next step would be a review of available programs to see if all or some of the expense of the EV charging station can be paid by someone else.

However, this Article is not intended to offer legal advice and the reader is cautioned to do their own due diligence, review all relevant documents, and when necessary seek their own legal counsel, plus advice from competent contractors. Having said this, we wish all EV owners, and any boards of directors the best of luck going forward with the installation of EV charging stations.

China is taking on Tesla's electric car supremacy

Some interesting statistics coming from Bloomberg's Colin Mckerracher, who tweets to followers all around the world that August of 2018 saw China EV sales hit 5% of total vehicles, up from 2.1% in 2017 and ~1% in 2016. We see this as a pretty significant but not necessarily startling statistic, if one recalls the published images of air pollution in large cities there in the past.

Mercedes-Benz Launches the EQC, a Fully Electric SUV to Compete With Tesla

Mercedes-Benz was not known as a leader in the electric car space, emphasizing instead its fleet of hybrids and its progress toward developing more fully autonomous driving. But that could very well change with the EQC, a new fully electric SUV that the company launched on Tuesday with plans to hit showrooms in the United States by 2020.

It's the first vehicle that the European automotive giant has launched under its EQ brand (the "EQ" per a press release, stands for "electric intelligence"). It was formally introduced today at a premier event in Stockholm.

The new EQ is expected to have an estimated range of roughly 200 miles, according to the company, powered by a lithium ion battery with a capacity of 80 kWh. The car will be able to accelerate from zero to 60 mph in under five seconds, though these specs are just early estimates.

Mercedez-Benz's new electric car will boast a range of 200 miles, and will hit the roads some time in 2020.

Will the EQ Be Able to Compete With the Model X?

At first glance, it seems like the EQ is meant to compete with the Tesla Model X, Tesla's SUV which boasts a nearly 300 mile range and can seat up to seven people. In terms of towing capacity in particular, the Model X has turned heads, and it retails for more than $70,000 after accounting for the savings and tax credits. Jaguar's I-Pace sells for $69,500, meaning it's relatively safe to say that the EQ will also retail in the $70,000 range to be competitive.

Most of Tesla's competitors have focused on higher end makes: Porsche recently unveiled the Mission E Cross Turismo at the Geneva Motor Show. Audi has also featured prominently in the electric car race, debuting a prototype of its E-Tron in March. It's expected to have a 311 mile range.

These announcements show how the race to build the fully electric car is heating up, while also shedding light on how audacious Tesla's ambition to develop and begin shipping its mass market Tesla Model 3 by this year really was. The push to ramp up production has taken a toll on the company, particularly CEO Elon Musk, though the company has met the summer's production targets.

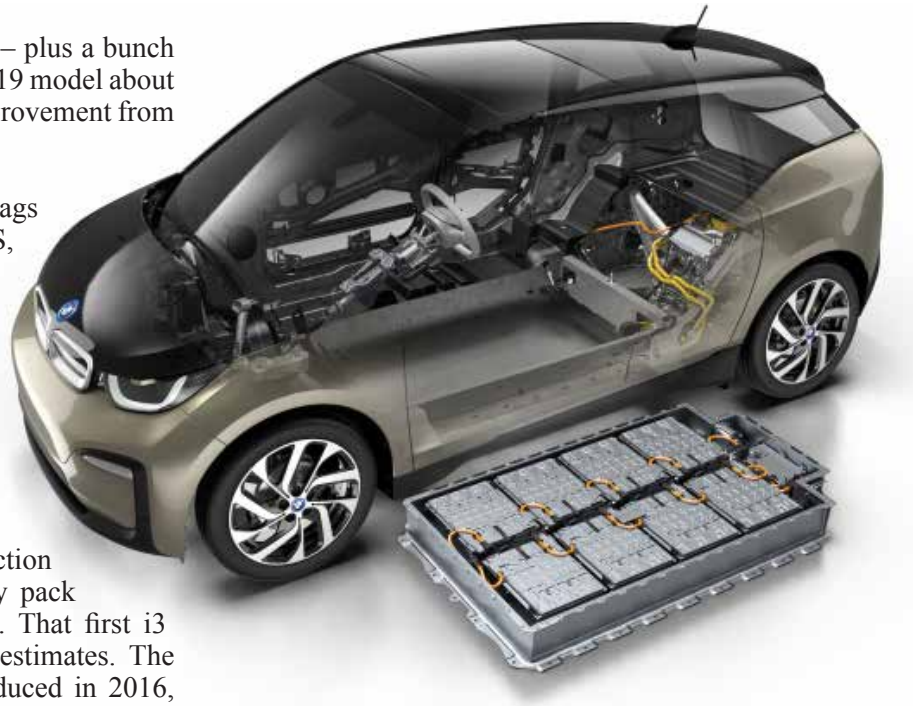
For its part, Mercedes-Benz executives told Bloomberg, it's going "all in" on electric vehicles, with plans to have at least 22 fully electric makes by the year 2022. Audi plans to have 20 electric vehicles and hybrids by the year 2025.

https://www.yahoo.com/news/mercedes-benz-launches-eqc-fully-003000233.html

The 2019 BMW i3 Now Has 153 Miles of Range Thanks to a Bigger Battery

By Kirsten Korosec

The BMW i3 is getting an upgraded battery – plus a bunch of other improvements – that will give the 2019 model about 153 miles of range. That's roughly a 30% improvement from the previous model.



The boost in range is noteworthy, yet it still lags behind the Chevy Bolt and the Tesla Model S, Model X and Model 3 vehicles. And it's only a smidge better than the much cheaper Nissan Leaf.

The upshot: it's a steady improvement that expresses some continued investment and interest in the i3 brand. But will it be enough to keep this city car in the EV mix?

When the BMW i3 first went into production in 2013 it had a 22.6-kilowatt hour battery pack containing 60 ampere hours (Ah) batteries. That first i3 had range of 81 miles, according to EPA estimates. The company's second-generation battery, introduced in 2016, grew to 33 kwh of gross energy (94 amp hours) and had a range of about 115 miles under the EPA cycle.

Now the 2019 model, which will comes with 120 Ah batteries in a 42.2-kWh-battery pack, will be able to travel about 153 miles on a single charge, BMW said.

The upgraded battery will be available in both the i3 and the i3s. Pricing was not announced. Previous i3 model year is priced at about $45,000 for the base model.

Power hasn't changed in the new 2019 models, which will go into production this November. The standard i3 comes with a 170-horsepower electric motor that will take it from zero to 60 miles per hour in 7.2 seconds. The sportier i3s will have a 181-horsepower motor that can go from zero to 60 in 6.8 seconds.

The automaker is giving the i3 a few other improvements as well, including a new exterior color called Jucaro Beige metallic and adaptive LED headlights with automatic high beams. The exterior paint finishes Mineral Grey metallic, Imperial Blue metallic, Melbourne Red metallic, Capparis White and Fluid Black are still available.

Wireless charging and a Wi-Fi hotspot that can accommodate up to 10 devices will also be available for the BMW i3 and BMW i3s, the company said.

Customers will also new options for the sports package, which will include black wheel arch surrounds and a suspension with specific dampers, springs and stabilizers, lowered suspension, a widened track and 20-inch light alloy wheels.

https://techcrunch.com/2018/09/29/the-2019-bmw-i3-now-has-153-miles-of-range-thanks-to-a-bigger-battery/?yptr=yahoo

Audi Challenges Tesla in Electric SUV Market

Audi and Amazon.com are sparking a fight with Tesla.

The German car maker introduced its first electric SUV on Sept. 17 in California, where its primary competition, Tesla, is based. Audi also has struck a deal with online retailer Amazon to provide equipment for recharging the new midsize SUV, according to a report by Reuters.

"I want Audi to be the No. 1 electric-vehicle seller in America over the long term," Audi of America President Scott Keogh told Reuters. Audi's e-tron will be available to consumers toward the middle of next year.

Mercedes-Benz, BMW and Volvo also are moving into the electric SUV market. Audi's vehicle will cost $75,795 and include a $7,500 tax credit. The home charging stations sold by Amazon will price around $1,000 each, which includes installation.

(Matthias Schrader/AP)

Not to be outdone, Tesla CEO Elon Musk announced Sept. 17 that his SpaceX space exploration company has booked its first passenger to fly to the moon — Japanese billionaire Yusaku Maezawa in 2023 if all goes according to plan.

Until now, Tesla has dominated the electric automobile market. Its charging units cost $500.

Polestar unveils first production EV with aim to overtake Tesla

Polestar's Drivetrain – are you interested?
Read about it at:
https://techcrunch.com/2018/09/21/polestar-unveils-first-production-ev-with-aim-to-overtake-tesla/?yptr=yahoo

2019 Jaguar I-Pace Gets Official Range, MPGe Ratings

2019 Second Edition Jaguar I-Pace, ready for its 3 day test drive, Mount Kisco, NY

By Eric C. Evarts

Now that it has finally delivered the first retail example of its I-Pace, Jaguar has released official range and MPGe estimates for this new luxurious electric crossover.

As we reported on Monday, the I-Pace is rated at 234 miles of range, a little short of the 240 that Jaguar indicated it was aiming for in earlier press drives.

For comparison, the base Tesla Model X, the closest competitor to the Jaguar I-Pace (though somewhat larger), has a similar range of 238 miles.

It's not exactly apples-to-apples, though, as the Jaguar has a significantly larger battery pack than the base Model X—90 kilowatt-hours, versus 75 kwh for the base Model X. Generally speaking, smaller battery packs tend to contribute to better efficiency, because of reduced resistance-related losses within the pack; but that's clearly not always the case.

The Model X 100D, with a battery somewhat larger but closer to the Jaguar's size, is rated at 295 miles of range.

The smaller Hyundai Kona electric is estimated to get 258 miles of range from a much smaller 64-kwh battery.

Range isn't the only place the I-Pace falls a little short. To be delivered to retail customers, the I-Pace has to have official "fuel economy" ratings from the EPA as well. Electric cars are rated in MPGe, or the distance the car can travel on the amount of energy equivalent to one gallon of gasoline.

In that score, too, the I-Pace lags. Its ratings of 80 MPGe city, 72 highway, and 76 combined look great compared

continued next page

to a gas car; but the base Model X is rated at 91 city, 95 highway, and 93 MPGe overall. Measured in the equivalent of miles per gallon, the energy saved at these high efficiency levels is minuscule, however. At the national average of 12 cents per kwh, (since it's impossible to account for every user in every place and rate plan), the extra cost to drive an I-Pace over a Model X could amount to $146 a year. Jaguar claims acceleration from the I-Pace is a little faster than the Model X, at 4.5 seconds from 0 to 60, versus 4.9 seconds for the base Model X (note both are manufacturer claims and not verified by us]. The Jaguar is also lighter than the lightest Model X.

Above and below: 2019 Jaguar I-Pace first edition

It's not clear why the I-Pace posts so much lower efficiency and range numbers than the larger, heavier Tesla with a smaller battery. It is worth noting that when we spent three days driving an I-Pace, the estimated range was remarkably inconsistent—more so than for other electric vehicles we've driven. Whether that's a hint or not, we'll likely find out as we learn more about the I-Pace.

https://www.greencarreports.com/news/1119431_2019-jaguar-i-pace-gets-official-range-mpge-ratings

Photos and more about the I-Pace at: *https://www.greencarreports.com/news/1119011_2019-jaguar-i-pace-real-world-review-3-days-with-the-sexy-electric-crossover#image=100672474*

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CONNECTICUT INTERNATIONAL AUTO SHOW 11/16/18 - 11/18/18

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WASHINGTON AUTO SHOW
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WASHINGTON AUTO SHOW
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NEW YORK INTERNATIONAL AUTO SHOW 04/19/19 - 04/28/19

NEW YORK INTERNATIONAL AUTO SHOW 04/19/19 - 04/28/19

continued next page

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JANUARY 17-21, 2019
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https://www.bostonautoshow.com/

12/27/18 - 12/30/18

https://visitsandiego.com/2018/10/san-diego-convention-center-wins-best-west

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

BMW i3s vs Mini with a long name Fully Charged

In this episode of Fully Charged, Jonny Smith does a comparative test of of the Mini Countryman Cooper S All4 E PHEV, which has evolved from the early days, and the BMW i3s (the latest Sport version). Many of our readers were involved in the early testing of the BMW e-Mini before the Active-E and then the release of the i3 four years ago. He quickly recaps the features, if you're in the market for purchasing a lease turn-in — this might be of interest to you. *https://www.youtube.com/watch?v=8NGeM_rdeSU*

Tesla Model 3 (2018) Side Pole Crash Test

For the purposes of safety evaluation testing, the Tesla Model 3 was supplied to the NHTSA New Car Assessment Program (NCAP) to perform among others, the 'Single Pole Crash Test'. It includes slow motion repeats, inside views — just over 1 minute duration. *https://youtu.be/ABEznFFbmJw*

Above is a series of three videos. The other two are in the next column

Tesla Model 3 (2018) Frontal Crash Test

This is the frontal crash impact test, again just over 1 1/3 minutes long, with slow motion repeats. There are even views from underneath the car, front and back — starting at 0:44. *https://youtu.be/tnpE55qmTSM*

Tesla Model 3 (2018) Side Crash Test

This is the Side Moving Deformable Barrier Impact: which represents an intersection-type collision by having a 3,015 pound (1367kg) barrier moving at 38.5 mph (62km/h) into a standing vehicle. The moving barrier is covered with material that is crushable to replicate the front of a vehicle.

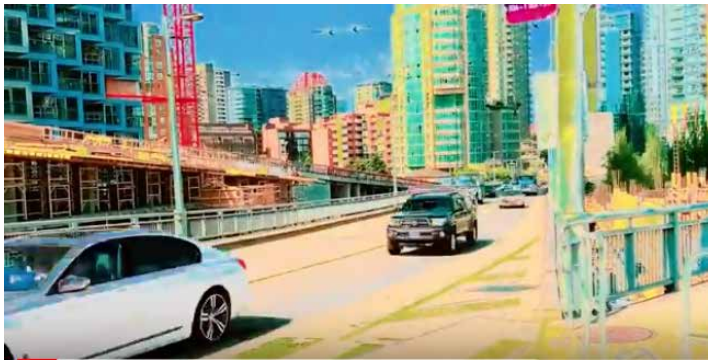
Bottom line from the three videos: after all was said and done, the new 2018 Model 3 earned the 5 star safety rating, as did its brethren, the Model S and X. *https://youtu.be/zDhSdKFhfjk*

More Videos of Interest (cont.)

All new 2019 I-PACE HSE FIRST EDITION HOT LAP at Laguna Seca

Years ago, many of us dreamed about driving with reckless abandon in a sleek Jaguar, pulling strongly into curves, turning heads all along the way. In the 21st century that dream comes true: the new electric i-Pace doing that on a track in Northern California, running remarkably well, despite a old "surfer music" tune about dead man's curve' still ringing in our ears.
https://www.youtube.com/watch?v=SHLLyQ4yIq4

Gasoline, Gasoline (The World's Aflame) [Music Video]

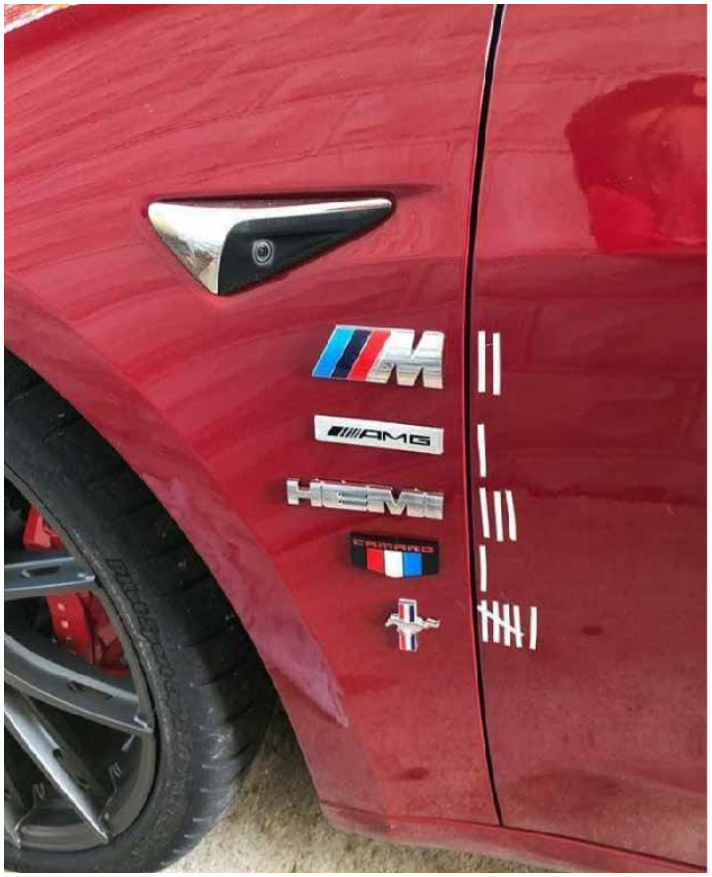


Listen to the music:
The love affair with gasoline is ending
Soaring costs... forcing drivers
Abandon gas-powered, gas-powered
No matter where you live, gasoline prices are going up

A really good video.
https://youtu.be/09txc4YaT3M

First production Solo three-wheel EV rolls on the assembly line

Electra Meccanica has boosted the production of its high-speed three-wheel electric vehicle. It only has a set of specifications that make it quite attractive as an urban vehicle. With negligible fuel and service costs, and a price tag, this small number meets many requirements for people interested in getting an economical EV as a second car, or an exclusive car for a lifestyle with little footprint.
https://www.youtube.com/watch?v=TaSBH32_5IY



This image was 'liberated' from the Seattle Area Tesla Group by Tony Williams on facebook.

Welcome to Membership in The Electric Auto Association!

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Electric Auto Association (EAA) is *the* oldest and largest electric vehicle non-profit. EAA has a network of chapters across the United States and the globe. Our members promote and support electric vehicle acquisition and ownership to create a better future.

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High Voltage: $500	Polo Shirt, "Current EVents" listing as a High Voltage Personal or Business Supporter (three issues), "Who Killed the Electric Car" movie

Electric Auto Association is a 501 3(c) non-profit organization.

Join Today!

www.electricauto.org

Don't Miss These (cont.)

Breaking Even: When Will An Ev Owner Start Winning, Compared To A Gas Car Owner?

If you compare a $50,000 Tesla Model 3 to a $50,000 BMW 3 Series – the Tesla owner breaks even starting on day one. But how?

Start by putting the price of gas and the price of electricity in the same units. First calculate how much fuel it cost to drive 1 mile. In a Tesla this is in kilo Watt hours (kWh). A Tesla Model 3 battery today holds about 75 kWh and can drive for 316 respectively. A typical example shows Fuel/Miles = .237 kWh/mile. For the BMW we know it can get 33 miles per gallon on the highway. Next, we want to see how much it costs for every mile for electricity and for gasoline.

Electric prices vary wildly across the country. Using the rates found at "Electricity Rates by State in 2017"
https://www.chooseenergy.com/electricity-rates-by-state/
For discussion's sake let's use a high rate state, like Massachusetts @ $0.2063 per kWh and Arkansas @ $0.098 cent per kWh.

For gas prices we find numbers from "US Average Gas Prices" *https://www.gasbuddy.com/USA*. We see there that Massachusetts is $2.853 and Arkansas is $2.631 per gallon. (Note that BMW recommends only premium gas be used in their cars. Premium gas average in Massachusetts is $3.297 per gallon.)

From that we can divine the price per mile:
Massachusetts Electric .2063 * .237 =4.9 cent per mile
Massachusetts gas 2.853 /33 = 8.6 cent per mile

A Tesla saves 43% per mile

Arkansas Electric .098 * .237 = 2.3 cent per mile
Arkansas gas 2.631 / 33 = 7.9 cent per mile

A Tesla saves 71%

It is easy to see: electricity is cheaper than gas resulting in savings from the first day of ownership. If there is a Time of Use program enforced in a location (where the electricity prices change throughout the day, then charging during peak time 6pm - 9pm will cost the full price in Massachusetts; however, if you charge after 9pm the price can be 1/3rd the price. Owning a Tesla and knowing these new pricing models, one can be programmed to *only charge during off peak times.* One can bring their cost per kWh down even further by adding solar to their home.

SOLAR IS NOT FREE

Solar is not free and it has different pay off periods. You can find an average of them here: How Long Does It Take Solar To Pay Itself Back?
https://www.solarpowerrocks.com/affordable-solar/how-long-does-it-take-solar-to-pay-itself-back/
A solar system in Massachusetts will pay for itself in 4 years. After that you can call it free power. However, a solar system in Arkansas payback period is 18 years which is only 7 years less then the typical 25 year warranty of the system.

TRADE-IN VALUES

Now Tesla states that the car most often traded-in for Model 3 is the Honda Accord. These customers will be moving from a $35,000 car at the highest trim level to a $50,000 luxury car. The average number of miles driven in the US is 13,476. The Honda gets 29 city 35 highway but let's assume the same 33 mpg as the BMW

Massachusetts Electric 13,476 * 4.9c = $660.324
Massachusetts Gas 13,476 * 8.64c = $1164.32

Break-even point 30 years

Arkansas Electric 13,476 * 2.3c = $309.948
Arkansas Gas 13,476 * 7.97c = $1074

Break Even point 19.6 years.

What these calculations reveal is that one does not upgrade to a Tesla to save money. You would upgrade to a luxury car because you want one. When the $35,000 Tesla is released next year, the savings calculation between a top trim Honda Accord would be the same as the BMW, with savings also beginning from day one.

Note: not included are things requiring maintenance. There are no oil changes, oil filters, fuel filters, coolant changes, or transmission fluids. During the extended life of an ICE car there will be water pumps, fuel pumps, O2 sensors, spark plugs, thermostats, etc., to replace. Brakes are replaced every 200,000 miles vs every 50,000 in a legacy auto. In a worst-case scenario, a battery replacement would be required, but based on current data the first battery change will be needed after about 20 years of regular usage.

Based on a Quora posting by Carroll Lee, a Network Engineer at District Computers

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Book Review

Driving to Net 0: Stories of Hope for a Carbon Free Future Paperback – September 15, 2018

by David J Hrivnak (Author)

7 customer reviews

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The book highlights the journeys of 15 households from across the USA and Canada, on the how and why they moved to a low carbon lifestyle. The book features homes from 700 to 10,000 sq. ft., from bicycle commuters to electric vehicle evangelists, from extensive remodels to new construction using the latest technology, and from meat eaters to vegans. Some stories feature full families, and others are empty nesters or couples just starting out. But all have managed to make drastic cuts in their energy emissions of 75% or more. And they show how they are saving anywhere from $225 to $750/month on energy costs.

Each chapter focuses on a different household and is interspersed with many full color photographs and charts, more than 230 of them, to help give a clear picture of how life can be better, not worse by reducing their carbon footprint.
review image

Many inspirational real-world examples of changes that can be made to reduce our carbon footprints, often with net financial savings and improved quality of life. The book sets out the alternative paths that fifteen families have followed in personal efforts to address the most pressing issue facing our generation.

This colorful book demonstrates that it's both practical and fun to live fossil fuel free. With 15 in-depth stories from families across the USA and Canada, the book shows a wide variety of ways to live and travel without a carbon footprint. Each story is filled with the writers' enthusiasm for creating a better future for our children and grandchildren without fossil fuels polluting our planet.

Eye opening book filled with great stories that will help you find ways to reduce your carbon impact and also inspire. Overall, well written with a lot of neat pictures. If you are a fan of non-fiction and the future of our planet this would be a great pick for you!

This book ANSWERS THE QUESTION: "But WHAT CAN I DO" for folks who are concerned about the Climate Change Problem with its consequential threats to stable societies over the next 20 - 50 years. Individuals can address their carbon footprints with dramatic effects. It is a HOPEFUL set of HOPEFUL stories. Thanks Dave for pulling them together!

https://www.amazon.com/Driving-Net-Stories-Carbon-Future/dp/0692143831/

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