

Electric Auto Association



Current **EV** Events

October 2019 Promoting the use of electric vehicles since 1967 Vol. 51 No. 10



Photo Credit: Andrew Batiuk at the Edmonton, AB NDEW Event on Sept. 21, 2019. See Pages 11-15.



Bolt EV Road Trip CA to WA – Less than \$80, RT
... page 18



EV Tow Vehicle Camping
... page 34



The Volvo XC-40
... page 44

Articles

- 1 **NDEW!** — Edmonton, AB NDEW Event 21, 2019
- 3 **NISSAN LEAF . . . FROM SHEET METAL TO GLEAMING, HIGH-TECH, FINISHED EV** — A tour of the Nissan plant in Smyrna, TN
- 4 **THANK YOU TO OUR SUPPORTING MEMBERS**
- 6 **ASSOCIATION NEWS & VIEWS**
- 11 **NINTH ANNUAL NATIONAL DRIVE ELECTRIC WEEK SEPT. 14-22**
- 18 **BOLT EV ROAD TRIP: SANTA CRUZ, CA TO SEATTLE, WA FOR LESS THAN \$80 RT**
- 33 **CAN YOU IMAGINE A WORLD WITHOUT FOSSIL FUELS?** — Caring for the environment
- 34 **EV CAMPING TECH TALK** — A Houston member gives insite into EV tow vehicle camping
- 37 **ENEL X, WASHINGTON STATE UTILITIES TO PROVIDE JUICEBOX SMART CHARGERS—** Enel x continues to expand its smart charging programs. Up to date news in this article
- 39 **DESPITE FALLING BEHIND, TESLA IS HEAVILY ROLLING OUT V3 SUPERCHARGERS**
- 40 **BOLLINGER DEBUTS ELECTRIC SPORT UTILITY TRUCK** — it doesn't seem bollinger is aiming for your mass-market consumer, but they will help build interest
- 42 **AMAZON ORDERS 100,000 ELECTRIC DELIVERY VANS FROM RIVIAN**
- 43 **ANHEUSER-BUSCH AND FRITO-LAY EXPAND ELECTRIC TRUCK PLANS** — Replacing diesel-powered logistics vehicles with electric trucks
- 44 **ALL ELECTRIC 2021 VOLVO XC40 RECHARGE CROSSOVER DEBUTS, AIMS FOR MORE THAN 200 MILES OF RANGE** — Volvo will introduce one fully electric vehicle each year until 2025
- 46 **MERCEDES UNVEILS ITS VISION EQS ELECTRIC SUPER CAR**
- 48 **PORSCHE AND BOEING DEVELOPING "PREMIUM URBAN AIR MOBILITY VEHICLE"** — An EV personal vehicle
- 49 **KITTY HAWK'S NEW FLYING CAR PROMISES A (NEAR) SILENT FLIGHT**
- 55 **DISBANDED AIR POLLUTION PANEL FINDS EPA STANDARDS DON'T PROTECT PUBLIC HEALTH**

Columns

- 3 **PRESIDENT'S COLUMN**
- 6-8 **ASSOCIATION NEWS & VIEWS**
- 46-51 **NOTABLE VIDEOS & ARTICLES**
- 52-53 **EAA MEMBERSHIP FORM**
- 53 **EVENTS & CONFERENCES**
- 54-55 **CHAPTER LISTINGS**



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Editor: Ron Freund
Associate Editor: Guy Hall
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Current Events Back Issues

The EAA has put most of its issues from 2001 to 2019 on its website.

Please visit

<http://electricauto.org/> and from the home page, click on "Documents" in the top navigation bar. You will see the document library. Click on that to reveal 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.

Nissan LEAF . . . from Sheet Metal to Gleaming, High-tech, Finished EV

by Raejean Fellows, EAA President

Aditja Jairaj, Marketing Director — EV Marketing Strategy of Nissan North America, very kindly arranged for a tour of the 1,000,000 square foot Nissan plant in Smyrna, Tennessee. That's right — the plant measures one mile long. After walking through the main plant doors, the sheer size of the plant caused me to step back in awe to take it all in.

In order to tour the plant in one hour, I hopped on a small electric cart, with tour guide Colin Price, who expertly educated me in the manufacturing process from sheet metal through the finished product. Stamping and bending huge pieces of metal; lots of robots are employed for the heavy work involving lifting and assembling.

Four sprays of prep, paint, top coat are applied. Dashboards are inserted in one piece. Monitoring of the robots, monitors, as well as finer finishing and assembly work is done by people.

Small automated floor-guided trolleys bring parts to the workers. They are so finely automated, that the assembler simply turns



around and the next needed part presents itself. The robots recognize when a LEAF is coming along, and switch to loading up the battery pack instead of a gas engine.

The plant was busy, but organized, with the people working in small work groups of 10-15. Their break and lunch room is located nearby to their work area. So, even though the plant totals 10,000 workers, they don't seem overwhelmed by the immenseness of it all. For defect control, Nissan works in a collaborative with Mitsubishi and Renault.

They share best practices in order to fine tune production for continuous improvement. Their defect rate is less than 1%. They proudly pointed out that the Nissan LEAF has never had a thermal incident (fire).

At a production rate of 2,500 cars per day, over 600,000 in a year, this plant is the highest volume auto plant in North America. These days, their biggest LEAF orders come from China, Europe and the U.K., with the U.S. trailing.

The LEAF is a great car — the first real affordable production EV in the modern era of EVs. Now, in its fourth generation, it has been fine-tuned and presents great technology, including pro-assist driving. If you haven't taken a look at the LEAF and you or your friends are in the market, I urge you to include it on your shopping list. Nissan has an incredible capacity to produce EVs. It takes just 20 hours to produce a car. More demand . . . no problem. They can make the cars.

As I write these words, I dream of the day when 100% of the Nissan's daily production at Smyrna, TN will be electric cars.



We acknowledge that Nissan was the lead sponsor for the NDEW activities this year.

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Thank You to our Supporting Members

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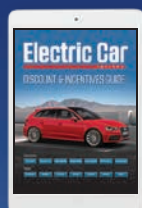
for Individuals, Groups and Organizations

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EV Buyers Guide

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Educational Exhibits

Large scale interactive exhibits for indoor and outdoor events



Electric Car Guest Drive

Test drive the latest EVs and learn from EV owners



EV Navigator

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

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

sales@electric-car-insider.com

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Please Help us go GREEN with our Annual Elections

Some members choose to BLOCK email communication in their member profile. Although we understand members do not wish to be bombarded with emails*, this causes our member-driven organization to not be able to communicate with all of its members digitally – especially critical to our Annual Elections.

We need your help. We are trying to use A FREE service for our on-line elections. This will avoid, not only a ton of administrative work, but a ton of paper and postage in mailing ballots to you by U.S. Mail.

There is a greener, cheaper, easier way in our digital age. With On-line elections, we will simply email you a personal pin, you go to EAA's custom ballot page, review all the candidate and voting information and vote. **It's easy!**

Please help us avoid paper mailing for our elections. If you have previously blocked emails. Go to your profile page/privacy options check "Yes, I want to receive these emails." Please.

*We send out only necessary emails to members and consciously minimize that number.



SAVE THE DATE! Annual Awards, Board of Director Elections and Meeting

Electric Auto Association Annual Meeting,
Saturday, January 25th, 2020
3980 Sherman St., Suite 170 SD, CA 9-2PM RSVP BELOW

https://eaa-1967.clubexpress.com/content.aspx?page_id=4002&club_id=222684&item_id=1085924



The British Are Coming... to Share Their Enthusiasm for EVs!

The team from the sensational **Fully Charged** <https://www.youtube.com/user/fullychargedshow> YouTube channel are crossing the pond to bring Full Charged Live to North America on February 1st & 2nd 2020. The venue is Circuits of the Americas in Austin, Texas. Robert Llewellyn and Jonny Smith are EV celebrities with 582,000 YouTube subscribers and a huge number of followers from around the world.

Recognizing the importance of EV drivers telling their stories and showing their EVs, Fully Charged has invited us to participate. We are looking to build a team from our members (especially those from Texas and the surrounding states) to help make a big impact on, not only the attendees, but all those who stream and watch the recordings. Their event last year in the U.K. had 10,000 attendees!

To get a better idea of what this event will be like checkout the similar event that they held earlier this year in the UK. **FC LIVE 2019** <https://www.youtube.com/watch?v=D2XX3VTYIHl&t=587s> and **Electrifying Sessions** https://fullycharged.show/wp-content/uploads/2019/07/FC-Show-leaflet_NIRO-SHARE2.pdf

Raejean Fellows is inviting all members to a scheduled Zoom meeting.

Topic: Fully Charged Austin.

Date: Nov 7, 2019 **Time:** 05:00 pm PT (US and Canada) Join Zoom Meeting:

<https://zoom.us/j/606782215?pwd=WmVsZTdqSGwwbXNBZG1zOW10Z2dyQT09>

Meeting ID: 606 782 215 **Password:** 323151

Dial by your location:

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Meeting ID: 606 782 215

Find your local number: <https://zoom.us/u/adbbOUz1Rc>



For this year's information and tickets:

<https://fullycharged.show/events/fully-charged-live-north-america/>



Chapter Membership Drive

Grow EAA paid membership . . . win rewards

Make your events stand out with 15-foot feather flags

Electric Auto Association thrives because of both the volunteer and financial support of its members. While not all of a chapter's mailing list members will be EAA national dues payers, **a good rule of thumb is 20%**. If a chapter has a mailing list of 100, we would expect 20 members, 400 on your mailing list -- 80 paid EAA members; you get the idea.

Adding new members not only benefits the electric vehicle owners and enthusiasts who join the EAA, it also benefits your chapter. **(See Membership Benefits)**. Amassing a large number of paid supporters shows **strength in numbers**, which is important when it comes to advocating for favorable EV policies on the federal, state and local levels. It is also important when it comes to recruiting sponsors for events and projects.

To help grow the EAA, we are launching a membership drive . . .with rewards! While we

recognize that chapters have many economic needs, we are choosing to focus rewards on the 15-foot feather flag, as it is a pricey item for chapters to afford. And, you can never have too many feather flags. Their promotional impact is unparalleled in attracting the public from near and far. With the flags shouting out "Drive Electric" there can be no doubt that our cars are electric. With both a stake and a drive over base option, they are used on concrete or grass and are easy to assemble. Multiple flags are helpful as Event Coordinators may live some distance from each other. This way flags can be distributed to multiple Event Coordinators.

For large events, like auto shows, many flags make an impressive statement.

Let's see how much we can grow, helping us to achieve a healthy participation of EAA paid members from all chapters.

Membership starts at only \$35/ year. See membership types [HERE](#).

Contest Dates: October 17th – January 15th

Net Gain Members	Rewards
5	10 EV Educator T-shirts** + 10 “Ask Me” Pins
10	1 Flag + 10 “Ask Me” Pins
15	1 Flag + 15 EV Educator T-shirts**
20	2 Flags + 10 EV Educator T-shirts**
25	2 Flags + 20 “Ask Me” Pins
35	3 Flags + 20 “Ask Me” Pins + 15 EV Educator T-shirts**

*Net Gain New Members = Net increase in paid EAA members as of contest end date at 5 pm

** EV Educator T-shirts have EV EDUCATOR imprinted in navy blue on the back.

How to track your membership numbers? To learn your starting number, email: membership@ElectricAuto.org

To see your numbers grow, go to chapter map, select your state and chapter, click MEMBERS on the pop-up.

Winners Announced
at
2020 EAA Annual Member's Meeting,
January 25, 2020, San Diego, CA
Live streamed and recorded



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Your purchases can benefit the Electric Auto Association!

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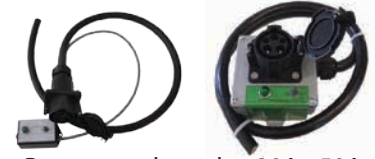
Inlets with and without cord



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- 1m to 10m lengths

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- For Conversions so that they can use Public J1772 EVSE's



- Remote and regular, 30A - 50A

EVE 40A Cord

- Orange Jacket, UL Certified 105 deg C
- Use as EVSE cord or J1772 Extension
- 2 legs of the 12AWG are connected for 40A like the Tesla UMC 40A EVSE

EVE 30A Cord

- Black Jacket, UL Certified 105 deg C
- Use as EVSE cord or J1772 Extension
- 10AWG Power and Ground

Quantity discounts available, for more information and pricing:

www.TucsonEV.com or EV@TucsonEV.com

Feb 2019

Ninth Annual National Drive Electric Week Sept. 14-22

Hundreds of events highlighted significant environmental & consumer benefits of electric vehicles

National Drive Electric Week, a coast-to-coast celebration of electric vehicles (EVs), was held this month September 14-22 to heighten awareness of today's widespread availability of plug-in vehicles and highlight the benefits of all-electric and plug-in hybrid-electric cars, trucks, motorcycles, and more. They are fun to drive, less expensive and more convenient to fuel than gasoline vehicles, are better for the environment, promote local jobs, and reduce our dependence on foreign oil. These events are a great opportunity to talk to owners who have successfully gone electric.

Public interest in EVs has grown across geography and income level. Over 60 percent of prospective car buyers in the U.S. are interested in EVs, according to a recent survey by *Consumer Reports* and the Union of Concerned Scientists.

This year, there were currently over 300 registered NDEW events across the United States, as well as Canada, Australia, Belgium, Mexico and New Zealand. Through test drives, parades, news conferences, and the announcements of new EV policies and programs, NDEW events demonstrated how EVs are more fun to drive, provide clean air for communities

across the nation, reduce greenhouse gases, produce domestic jobs, and save consumers money compared to conventional vehicles.

NDEW is presented annually by national organizers Plug In America (whose Support Program gives current and prospective electric vehicle drivers the opportunity to connect with experts and receive one-on-one, personalized assistance with questions about vehicles, charging, incentives and more). Other presenters of the national events are the Sierra Club, and the Electric Auto Association. This year, Nissan LEAF was the exclusive automotive sponsor of NDEW. ClipperCreek and the Clean Vehicle Rebate Project were silver level sponsors. Enel X was a California regional sponsor and DTE Energy was a bronze level Michigan regional sponsor.

We are including some of the photos of events across the country that were posted online and as space permits. If you wish to see more or all of the event photos go to:

<https://driveelectricweek.org/photos.php?year=2019>



Photo Credit: Erick Pinzon
Huge variety of EV's on display at New Realm Brewing Virginia Beach, VA.



Photo Credit: Jason Yeh
All the riders and drivers gathering for a sunset photo near the river in Taipei, Taiwan. Pictured on far left: David Edward Lane, city captain. 3rd from left: Ken Aoi, designer of AOI.CYCLE. 5th from left: Azizi Tucker of XING Mobility. 7th from left: Kris Lee, city captain.



Photo Credit: Amanda Mazzoni
At the 2019 National Drive Electric Week - Syracuse, NY event, many of the attendees took advantage of ride-alongs to get a better feel for what it is really like to drive electric.



Photo Credit: Sam DiMarco
This was our line-up of ev's with 3 or less of the same make. Wide variety of almost every make were present at Scottsdale, AZ.



Photo Credit: Duane Burnett for SCEVA.org
A small portion of the great turnout for the 5th Annual Sechelt, BC Electric Vehicle Festival.



Photo Credit: Manny de Lizarriturri
Mindy and her cool Smart Car, the only Convertible EV on the road! Pueblo West, CO.

continued on page 12

Photos NDEW

continued from page 11



Photo Credit: Jesse Rudavsky
Jeffrey Mason's Tesla Model X in Plymouth, MA



Photo Credit: Xcel Energy
Xcel Energy Electric Vehicle Test Drive in Minneapolis, MN



Photo Credit: Chance Allmon - Today's Power, Inc.
Little Rock Mayor, Frank Scott Jr., speaks at Little Rock, AR Drive Electric Week 2019. He says, "It's wonderful that Little Rock is a participating city in National Drive Electric Week. As families make decisions that will impact their bottom lines and contribute to a more sustainable society, we're seeing more choose electric vehicles," Mayor Scott said.



Photo Credit: Eric Willadsen
A glance of the 1914 all-electric Baker. Boise, Idaho, Sept. 14, 2019



Photo Credit: City of Inglewood, CA – Video & Social Media Division
(From left to right) Noel Lewis, Catharine Brookes, Inglewood Councilman Eloy Morales and Adam Mohabbat EVgo tagged up with the City of Inglewood during National Drive Electric Week at "Electric Inglewood" to unveil the City of Inglewood's first ever EV Fast Charging stations.



Photo Credit: Jessica Wilcox
View of the EV Showcase at Concord, New Hampshire's National Drive Electric Week Event



Photo Credit: Bern Haggerty
Wyoming electric vehicles at the 2019 Laramie, Wyoming EV Showcase.



Photo Credit: Martin Salamon
Lot of people tried first time electric vehicle. I think, e-scooter was best. Everyone who tried it, smiled like this guy. BTW, that's our photograph :) Roland Soltesz, Kosice, Slovakia



Photo Credit: Sharilyn Fairweather – Flathead Electric Cooperative, Inc.
Flathead Electric Cooperative Inc., Save Your Gas For The Grill - Electric Vehicle Day, Kalispell, Montana



Photo Credit: HEAA
Tesla Model X 75D towing a Casita Camper. The camper weighs 2500 pounds. This rig did 4500 all electric camping miles this summer. The owner lives on the Gulf of Mexico coast near Galveston TX, and they also consider this there hurricane evacuation rig :)



Photo Credit: Exeter Energy cmte
A Zero Moto at the Exeter, NH Event. Fly like Batman!!



Photo Credit: ACUA
Egg Harbor Township, NJ. ACUA's 5th annual NDEW Event featured a wide variety of vehicles, great speakers and lots of opportunities to learn about EVs.

continued next page

NDEW EVENT PHOTOS 2019



Photo Credit: Energy Resources.
Xcel Energy Electric Vehicle Ride & Drive,
Denver, Colorado



Photo Credit: Chris Hall
Drone shot at Dayton, OH NDEW event, Sept.
22, 2019



Photo Credit: Jerry Pohorsky
Cobra EV conversion. Cupertino, CA



Photo Credit: Spencer Darwall
Our EV display in Daley Plaza under the iconic
Chicago, IL Picasso sculpture.



Photo Credit: Drive Electric Columbus (event
photographer Kari)
Attendees wondering the EV Showcase with 2
Zero Motorcycles, Tesla (3, S, X), and the OSU
EcoCar. Columbus, OH



Photo Credit: Alan Buck
Main and Hampton St, Columbia SC, September
21, 2019. Tesla Model S, Tesla Model X, Jaguar
I-PACE, Porsche Cayenne.



Photo Credit: Lourdes M. Dillard
Chattanooga, TN Mayor Andy Berke presenting
a City of Chattanooga Proclamation to Dr. James
W. Dillard, City Captain of Chattanooga Drive
Electric. The proclamation declares September
14-22, 2019 as Chattanooga DEW.



Photo Credit: Andrew Wojton
Charlotte, NC's "Electric Avenue" National
Drive Electric Week event with vehicles and
community organizations.



Photo Credit: Kevin Whited, City of Carmel, IN
This is an image taken at the beginning of the
event. The image is of part of the parking lot
and shows the top and side of two Chevy Bolts
and we are looking upon two new Nissan Leafs
brought from the local Nissan dealership.



Photo Credit: Bethel Energy Committee
Future drivers get familiar with a Tesla in Bethel,
Vermont.

continued on page 14

Photos NDEW

continued from page 13



Photo Credit: Rebecca Milliken, Berkeley, CA
Mark Miner (left) and Beth Molnar (right), City of El Cerrito Environmental Quality Committee Volunteers



Photo Credit: Smart Charge America
Cars getting lined up for the EV Show and Tell. Pictured are 2014 Nissan Leaf, 2018 Nissan Leaf, 2018 Fiat e500, 2018 Chevy Bolt in Austin, Texas



Photo Credit: Julie Smedlund of ACOG Senator, Mary Boren, far left side, white cardigan Arcadia, Oklahoma



Photo Credit: Anne Blair
Tesla Model 3, Nissan LEAF, BMW i3 on display at Augusta University, Augusta, Georgia



Photo Credit: Greg Gorman, Skylands Group-NJ Sierra Club Chapter
Chevy Bolts in Andover, NJ



Photo Credit: Chris Soriano, <http://www.sorianophoto.com>
Volunteer Randy Cox explains the different home EV charging options to two event visitors. Omaha Public Power District has a rebate program for customers who install home EV chargers. Bellevue, NE



Photo Credit: Collin Loewen
2019 Kia Niro EV and two BMW i3 in Evelyn's Park, Bellaire, Texas.



New President, Michelle Pierce
First NDEW Event at Inland Center Mall, San Bernardino, CA.



Drive Electric Long Island Celebrates NDEW!

We wanted to share some exciting things going on with the Coalition as we celebrate National Drive Electric Week!

We've officially launched our new website, <https://driveelectriclongisland.org/> and released our first "State of Electric Vehicles on Long Island" report which takes a comprehensive look at the status of electric vehicle adoption on Long Island.



As you may have read in a recent Newsday article [<https://www.newsday.com/business/electric-vehicles-long-island-1.36465198>], the report reveals that Long Island is the largest market for electric vehicles in New York State and is also the leader in electric vehicle adoption. Among the almost 13,000 registered electric vehicles, plug-in hybrid vehicle models are leading the way. In 2018, sales of the Tesla battery electric vehicles were most popular in Nassau County, while in Suffolk County, sales of the Toyota Prius Prime plug-in hybrid were most numerous. The report also reveals a wide disparity in the number of electric vehicles sold by dealership, even for the same car manufacturer. An analysis of EV charging infrastructure is also included. While there has been a steady increase in the availability of EV charging stations, the report concludes that more EV infrastructure is needed to keep up with the growing number of electric vehicles.

In addition to these findings, the report includes electric vehicle and charging station basics, and information on available rebates and incentives as well as links to a broad range of useful electric vehicle information such as comparing available vehicle models, charging options and charging station locators.

Please visit our new website [<https://driveelectriclongisland.org/>] to download a full copy of the report and find more information on electric vehicles here on Long Island!



Nissan Supports Electric Vehicle Education With NDEW

Nissan is supporting consumer education and support of electric vehicles as the exclusive automotive sponsor of National Drive Electric Week (NDEW) for the eighth-consecutive year. The grassroots program, held the week of Sept. 14-22, includes more than 300 nationwide events presented by Plug In America, Sierra Club and the Electric Auto Association.

"As a global leader in EVs, we strive to help consumers understand the benefits of electric cars in their local markets," said Aditya Jairaj, director, EV sales and marketing, Nissan North America. "Year after year, we connect with thousands of consumers at National Drive Electric Week events, showcasing the advantages of driving and owning an EV."

Since its introduction in 2010, Nissan LEAF stands as the best selling electric vehicle of all time [*Based on cumulative sales data from December 2010 to June 2019*]. With more than 400,000 global and 140,000 U.S. sales, LEAF continues to be a favorite for electric vehicle enthusiasts.

Now in its tenth year, NDEW draws thousands of EV drivers and enthusiasts to local events across the country. With test drives,

parades, news conferences and other EV announcements, the events help spark public enthusiasm for electric vehicles. Fueling sustainable driving and support by providing NDEW event kits to registered organizations nationwide, Nissan LEAF is the centerpiece of the events. Nissan will also be donating a 2019 LEAF to Plug In America for use in their fleet and events across the country.

For 2019, Nissan LEAF offers an EPA range of up to 150 miles, while the Nissan LEAF PLUS offer an EPA range of up to 226-miles. [*Does not apply to all LEAF models. EPA range estimate up to 226 miles for 2019 LEAF PLUS only. 2019 LEAF SL and SV PLUS EPA range estimate up to 215 miles. Actual range will vary within trim levels, options, and driving conditions; see Customer Disclosure Form for details.*]

Both LEAF and LEAF PLUS are available with advanced driver assistance systems like ProPILOT Assist and e-Pedal, along with a suite of advanced safety technologies including Intelligent Lane Intervention, Lane Departure Warning, Intelligent Emergency Braking, Blind Spot Warning, Rear Cross Traffic Alert and Intelligent Around View Monitor with moving object detection.



<https://bit.ly/2kcHc4G>

Our chapters have members traveling around the world, pontificating the EV gospel. Here is an example of North Carolinians in India assisting with e-Bike development.

United Nations LEVA E-Bike Training in India

By Don J. Gerhardt

The United Nations Industrial Development Organization (UNIDO) identified electric bikes and light electric vehicles (LEVs) as a growth industry that can reduce pollution and provide job opportunities in developing countries. The Light Electric Vehicle Association (LEVA) is working with UNIDO in India to train electric bike instructors and technicians. The training is also applicable for the transition to electric scooters and electric rickshaws from gasoline and propane engines.

LEVA recently conducted E-Bike training at the Research and Development Center for Bicycles and Sewing Machines (RDCBSM) (www.bsrindia.org) in Ludhiana India. The RDCBSM has extensive test equipment for testing bicycles and components. It has an onsite campus for training engineers and technical students. RDCBSM is accredited by the National Accreditation Board for Testing and Calibration Laboratories (NABL) as per ISO/IEC 17025 and is also certified by the Bureau of Indian Standards (BIS). Ludhiana is the center for bicycle manufacturing in India. The training was conducted during November 2018 and February 2019. The eight largest bicycle manufactures in India participated in the training in addition to staff members from RDCBSM. There were 33 participants who received E-Bike training and certification. There were 14 instructors trained from RDCBSM and bicycle manufacturers. The training has support from the All India Cycle Manufacturers Association (AICMA) and the United Cycles Parts Manufacturers Association (UCPMA).

Dr. Don J. Gerhardt, Dr. John Martin and Mark Smith MSEE conducted the training. Don Gerhardt developed the original LEVA training course and is the author of the Electric Bike Maintenance Manual ISBN 978-0-9905228-0-5. Dr. John Martin is a faculty member at Appalachian State University (ASU) and teaches

courses on E-Bikes, electric vehicles and batteries which uses the LEVA training material.

LEVA helped RDCBSM conduct Voice of the Customer interviews and develop a five-year strategic plan relative to providing industry support for E-Bikes and LEVs. RDCBSM currently has the ability to test batteries and to conduct testing with data acquisition systems on complete E-Bikes and S-Scooters. RDCBSM will acquire motor and chassis dynamometers for future tests. RDCBSM will also acquire water test equipment to test water resistance of motors, controllers, batteries, displays and wiring connectors.

LEVA and RDCBSM plan to jointly develop test procedures in the following areas. It is the long-term intent that these test procedures will become international ISO standards for E-Bikes and LEVs. The term LEV applies to Light Electric Vehicles that weigh less than 500 Kg empty such as electric road scooters and electric rickshaws. Representatives from industry are welcome to participate in the development of the following test procedures. Contact Don J. Gerhardt at djgerhardt@aol.com if you are interested in participating.

- 1) Performance testing of E-Bikes and LEVs
- 2) Testing of batteries for E-Bikes and LEVs
- 3) Water testing of electric hub motors for E-Bikes and LEVs

RDCBSM and LEVA signed a joint agreement to cooperate in the areas of training and testing of electric bikes and LEVs. A similar joint agreement is being developed between RDCBSM and Appalachian State University (ASU) in the USA. Persons interested in taking training or testing E-Bikes and LEVs in India may contact H. S. Bains, General Manager, RDCBSM at bsmcrd@gmail.com.



H.S. Bains, Mark Smith, Don Gerhardt, Jack Martin with RDCBSM India Staff



Shraddha Srikant (United Nations), Jack Martin, Mark Smith, Don Gerhardt



Dr. Jack Martin teaching United Nations LEVA Instructor Course

continued next page

CHAPTER EFFORTS EXTEND WORLD WIDE



Mark Smith teaching United Nations LEVA Instructor Course



AVON E-Rickshaw Jack Martin, Mark Smith



AVON E-Truck



Jack Martin testing E-Scooter at Hero Eco test track



Preparing E-Bike battery for test



Preparing E-Bike battery for test



Installing Cycle Analyst data acquisition system on E-Bike for road test



Data logger and current measurement shunt installed for road test



E-Scooter and E-Bike on 7-degree ramp test with data acquisition systems at RDCBSM



E-Scooter test with data acquisition system on RDCBSM test track



Hub motor test stand with Cycle Analyst display, data logger, C-M-T tester and 50-volt DC power supply



CFOSI EXPO INDIA
Cycle, Fitness & Outdoor Sports Expo
E-Bikes and EVs

Bolt EV Road Trip: Santa Cruz, CA to Seattle, WA for Less than \$80 RT

August 15th to September 2nd, 2019

By Will Beckett, CCC EAA

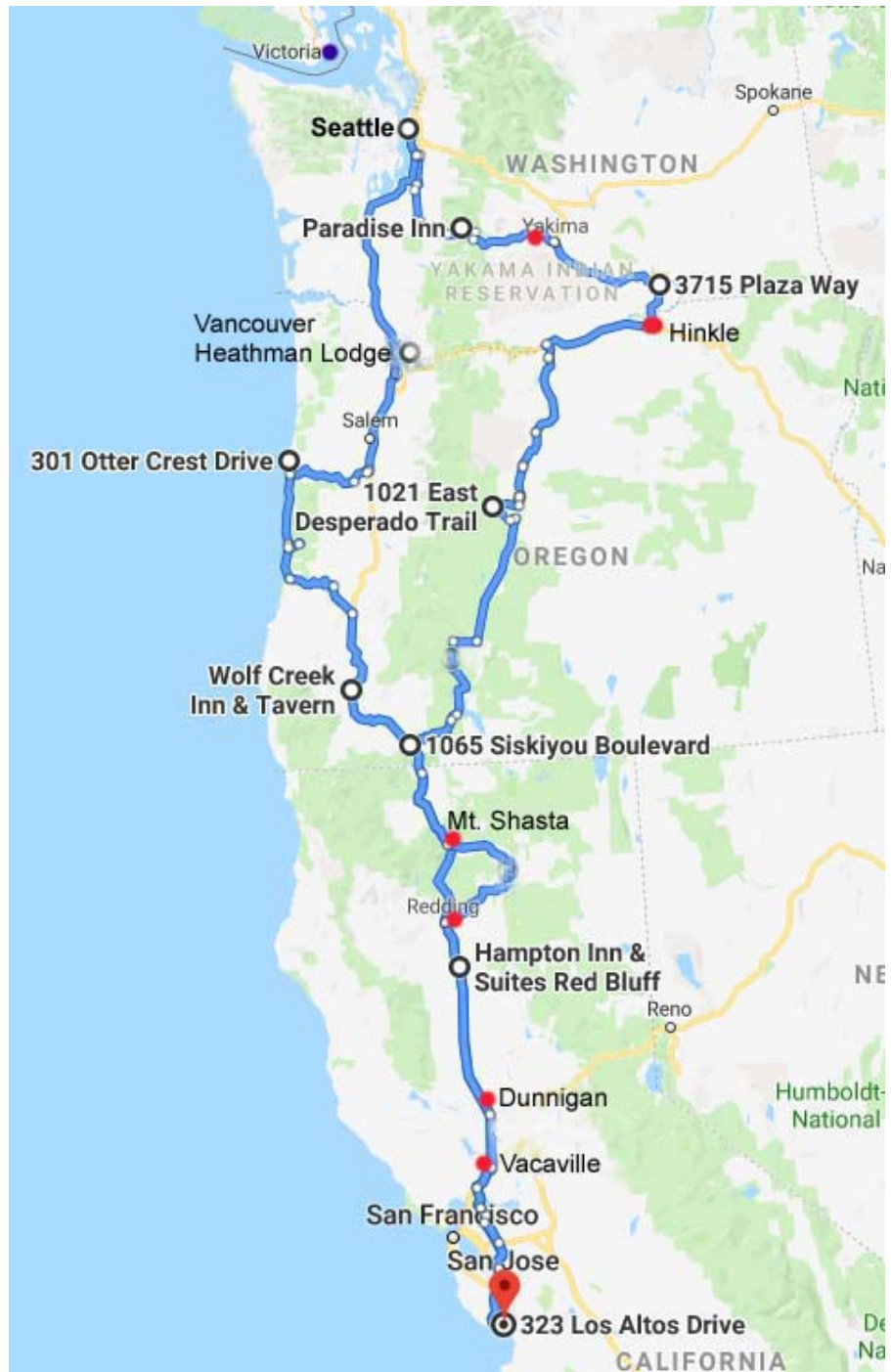
Summary

The initial motivation for this trip was a long overdue visit with good friends in Seattle. However, we can't resist packing in loads of interesting things to do along the way. The basic plan was, first, get into Oregon quickly. So, August 15th we drove from Aptos to our first stop, Ashland, OR, where we spent two days. Next stop was Sisters, OR for the Oregon "free fishing" days. Then on to Kennewick, WA to visit a woman we know who breeds Korat cats. After this we headed up to Mt Rainier for a two day stay in Paradise (oh yeah!). Then on to Seattle for a four-day celebration with our friends. We left the car in Seattle and took a float plane up to Victoria BC, where we spent two nights on a houseboat.

On August 28 we flew back to Seattle, picked up our car, and drove south, staying one night in Vancouver, WA. The next day we headed west to the Oregon coast, staying two days at an Inn overlooking Otter Rock, then Wolf Creek Inn for a one-night. We made a sweep east toward McArthur-Burney Falls Memorial State Park and Lassen Lassen Volcanic National Park before stopping in Red Bluff, CA. This made for an easy trip home the next day (September 2nd).

White circles on the map are day destinations (hotels), red dots are charging stops and blue dot non car stay in Victoria BC. The out of pocket fuel cost for 2400 miles was \$80 at the combined quick charge stations. I included an elevation chart of the route for that perspective.

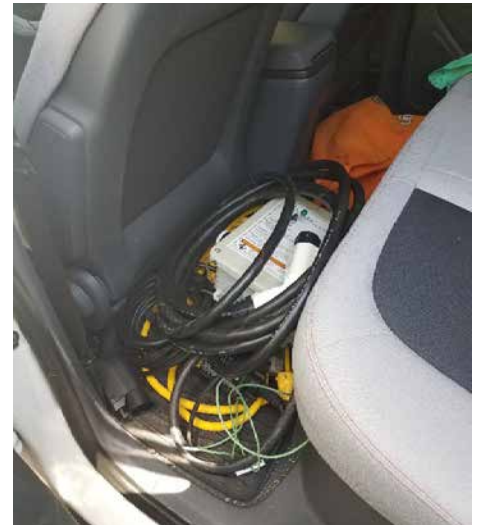
Special thanks for Al LePage of the Eugene, OR Emerald Valley EVA chapter of the EAA for creating a press release in hopes



that one of the papers would pick up the story of the trip and help educate the public about electric vehicles for long range trips. Madeline Shannon, a reporter for the *Newport News Times* did an interview me and Michelle.

(See the elevation chart for the trip on the next page.)

continued next page



First Day

We got the car packed including all the extra charging options and snacks for the road.

I took the first of many power level pictures, showing the total miles on the Bolt at the start. Note that I did not complete the charge so the display did not reset to zero. On the trip to Ashland, these numbers should be subtracted (19.4 kWh and 89.2 miles)



Starting in Aptos, CA

The plan for the first day, is to get the battery below 50% or lower so the quick charger will be quick. Better to stop twice than to try and fully charge, so that is what we did. First stop (marked with a red dot on the map) is Dunnigan, CA. This is a large, updated Motel 6, consisting of several one-story buildings. Each roof supports a large solar array. This is more solar than I have ever seen on a motel before. There are four quick charge stations and although they are 125 kWh, the Bolt EV tops out at 50 kWh. This was my first use of Electrify American charging stations. I had installed the application on my phone because many reviews said charge cards did not work. In fact, the application did accept payments and worked well, once I figured out that I need to start by interacting with the map on my phone, rather than the button selection on the station.



After Mt. Shasta charging

This brand of station has one of the best applications for status on your charge.

Really easy to follow see the screen shot to the (right). Food and shops are extremely limited so we opted just to stretch our legs. We took a pleasant walk around this quiet farming community and saw some local historic features and the broad views of open country.



Union Church, Dunnigan, CA

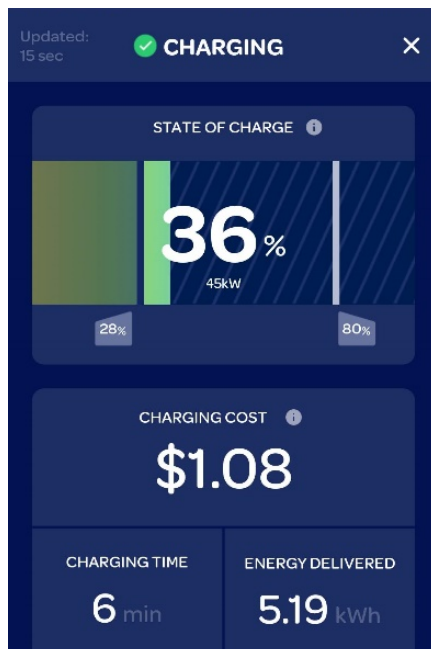
continued on page 20

Santa Cruz to Seattle

continued from page 17

We charged to 82% and headed for the next quick charge station in Redding at the Carl's Jr. Nothing charming here, but the charging was free. Since this is only a 24 kWh station we had an early dinner to ensure we'd get to the Mt Shasta quick charge.

Mt Shasta was such a great station choice that we decided right away to use it on our return route as well. One of the best 'in your face' views of the mountain top, crisp clear air, and handy things nearby: a large well stocked grocery store and the Great Western across the street has a comfy air-conditioned lobby, lounge, and restaurant. This was our last charge before Ashland, and it gave us plenty of juice to get over the mountains



Cell Phone App



After Redding, CA charge



Mt Shasta Before



Redding, CA charge at Carl's Junior. (We ate elsewhere!)



Mt Shasta Before



Ashland at 7:30pm, 12 hours from Aptos, CA



Mt Shasta After

continued next page

This was the longest leg of the trip and we didn't need to do more than one quick charge on any day after this. By far the quick charge in Dunnigan and Mt Shasta, were the best. Mt. Shasta seemed to be faster than Dunnigan but that might have been an illusion due to the slow charge in Redding.

We stayed two nights at Palm Cottages, just a one mile walk from downtown Ashland. A sweet spot with all the amenities: a ClipperCreek charging station for overnight charging; a beautiful saltwater pool for evening relaxation; and extensive garden and picnic areas between the cottages. We had an afternoon wine, cheese, and crackers while I met with the president of the local chapter and board member of EAA, James Stephens, who arrived in his red Tesla Model 3. Right next door to the 'Cottages' is an iconic Ashland eatery, Morning Glory Restaurant. I hadn't visited Ashland since my oldest daughter was working there as an assistant stage manager in the late 90's. We dined here again this time and found it still a worthwhile experience if you're in the area. Only did the (disappointing), Green Show, in Ashland, no time for plays.

We left Ashland via the scenic (if disconcertingly named) "Dead Indian Memorial Road". We charted our route along smaller secondary highways for the views and cut through the western portion of Crater Lake National Park. This is one of my most favorite locations in the world. We enjoyed viewpoints near the lodge, then sampled a couple short hikes as we drove along just the portion of the rim road which lies closest to Wizard Island. This route had the added advantage that no charging stops were required to reach our destination, Five Pines Lodge, in Sisters. (They have two Tesla and one Bosch J-1772 charging station.) I was plugged in for about an hour and received a text message that charging had stopped. Turns out it was just the breaker which might have been due to the heat. It was out for about an hour before they found the electrician to reset the breaker and charging started and completed later that evening.



Ashland, OR



Crater Lake Photos



Sisters is a fun little town and we stayed two nights. We enjoyed walking around and had an exceptional meal at a very unusual and popular restaurant, The Open Door (get reservations!)

Our time in Sisters, coincided with two free fishing days in Oregon. We brought all the gear, visited the Wizard Falls Hatchery, and even walked part of the pathway along the gorgeous Metolius River (next page), but ran out of time without tying on a single fly.

We spent one entire daytrip exploring the stark beauty of OR-242 (open only during warm part of the year) to the west of Sisters. The Dee Wright Observatory (next page)

continued on page 22



Five Pines Lodge at Sisters



Santa Cruz to Seattle

continued from page 21

was the most interesting location. The round building is constructed completely of giant lava 'boulders' and has two stories. Inside the dark lava room there are a number of view holes, reminiscent of "arrowslits" in fortress walls. Looking outward, each one helped spot and identify one of the many peaks surrounding the 'Observatory'. On the roof is a stunning 360 degree panorama. There are paved trails winding through the massive lava flow with rangers and exhibits signs. A lesson in both geology and early life, especially from viewpoint of the original inhabitants, who had to navigate their lives among these incessant and massive flows, living with the possibility of getting surrounded and trapped on a small island of high land.

Two day stops in the place like this make for a great morning run. Did my three miles in the woods.

Next stop was Kennewick, WA where we had the opportunity to visit some friends and their Korats, a very unusual and ancient breed of cats from Thailand. We did a short refueling at another Electrify America, in a gas station in Hermiston, OR (Space Age Fuel). This was only about 35 miles from our destination. As you can see, this would have been close to our max range, so it was good to stop.

We left the Hampton Inn, Richland with a full overnight charge and headed up to Mt Rainier. We'd booked (way in advance) a two-night stay at the historic Paradise Inn. Since there are no charging stations (yet), in the park, I emailed well in advance of the trip to try and talk them into supplying 120 volts to charge my car. The day before I arrived, I receive a message that this would be acceptable to them and they would run an extension cord from the maintenance department at the hotel. Turn out it was a good thing to have this email because I received some resistance when I was



Metolius River Headwaters



Dee Wright Observatory



Metolius River



Hermiston



Hermiston

checking in. They took a picture of the message off my phone and then were happy to have me park in the back of the hotel next to the maintenance department. I plugged in with my 120 volts charging station for two days and almost received a full charge.

Since I wasn't really sure I would be able to do this, I had picked up a quick charge in Yakima at another Electrify America charging site. This one at a Walmart parking lot, where we also picked up some lunch.

continued next page

SC, CA TO SEATTLE WA FOR <\$80, RT!

While there many gasoline power vehicles parked in electric vehicle only spaces even though the location wasn't really that close to the store. We talked to the car owners about the restriction and although they were nice enough, but they politely ignored us and didn't move their cars.

Mt Rainier was amazing! We learned it would be raining on our second day, so we set off on a hike right away (forgetting my camera/phone and hiking shoes). On the way up the Alta Vista and Skyline Loop trails. With Mount Rainier Peak looming ahead, we stopped to gasp for air, admiring glaciers and waterfalls. Near the top of our trail we caught a glimpse of Muir Base Camp. Unbelievable views lay on all sides as the trail loop continued through alpine meadows. There we got closely acquainted with unconcerned marmots, squealing pikas, deer, and even a black bear!

Although there was rain on the second day, the visitor center had good food, exhibits and wifi which was not available anywhere else at the site. Later in the day it did clear up enough to make short hikes to Deadhorse Creek and Myrtle Falls.



The next day we easily made it to Seattle on the charge we got at Mt Rainier. (As I occasionally do on these trips, I missed getting the picture of my charge status at this location.) *continued on page 24*



Charging before visiting Mt. Rainier at Yakima



Charging at Mt. Rainier



An EVers universal backup solution pressed into service...

Santa Cruz to Seattle

continued from page 23

Michelle is a UW alumna (go Huskies!). Her university classmates are the friends we stayed with for four days (and charged), Greg and Kit Owen, both artists. Greg has retired from his job with the university, continues to produce remarkably varied artwork and Kit splits her time creating a most unusual garden space and working with a UW educational research project. We did a little canoeing near the stadium, saw the Chittenden/Ballard Locks in action, transferring all sizes of boats between saltwater of the Puget Sound and the freshwater Ship Canal. We also watched returning salmon and a fat seal picking some of them off as they made their way to the fish ladders. Then on to downtown to Pike Place with a chance to dine at The Pink Door (one of Michelle's eternal favorites) and up to the 40th floor of the Columbia building with a Starbucks, for a free viewing location.

Most fun was just being with Kit, Greg and their son, Kevin. He is a brewer in Redmond with a little-known microbrewery Mac and Jack's. Really yum and some truly unusual brews too! If you have time visit their tasting room in Redmond.

<https://www.macandjacks.com/>

We left the Bolt with our friends and took a float plane ride up to Victoria BC. The flight took off from Lake Union right in the middle of Seattle and landed neatly in the Inner Harbor near our next two nights lodging, a houseboat B&B near Fisherman's Wharf.

The first day we walked for miles around Victoria proper. Our favorite place was Beacon Hill Park. It has lots of luscious plantings and water features, but we especially delighted in finding 'surprise' features.

There was a giant watering can sculpture with mysterious large buttons.



Curious Michelle discovered that if you push the wrong/right one, plumes of water erupt and swing about unpredictably, usually drenching the button pusher.



If you happen to take a certain trail you may get to see, deep among shadows, a giant woman sleeping on her side. The Moss Lady is sculpted mostly with living plants. Her size is impressive and as you can see difficult to get in one photograph.





There is an amazing totem pole, said to be the tallest in North America. The aged wood pole arcs a bit as it goes skyward and requires the support of an impressive steel and concrete foundation.

We took an early bus up to Butchart Gardens. Besides the extravagant flowers and fountains we saw many things of interest. A historical carousel is housed in a newer, round, building with "Clear Span" construction. The choice of creatures on which to ride is especially unusual: emus, toads, orcas, pandas, and best of all...giant house cats with a variety of prey squirming in their mouths.

We stopped into the Government building on the way back to the boat house and found it to be much better than one would expect. Re-enactors of Victoria and an Irish laborer filled us in on what to expect when we went inside. Interesting to view the Canadian government details.



Mere steps from our house boat we boarded a comically small round water taxi. Then a short ride across the harbor to the float plane terminal for our return flight. More views of Strait of Juan de Fuca, San Juan Islands, the Olympic mountains, and Kitsap Peninsula, then threading eye-level between the taller buildings of downtown Seattle.

continued on page 26

Santa Cruz to Seattle

continued from page 25

I wish we'd seen the Space Needle sooner to get a better picture as the plane took it's final turn to splash down in Lake Union. One kayaker looked a bit startled to see us land right next to him.

The car was fully charged at our friends' house using 240 volts during our absence. We bid our friends goodbye and drove to the very comfy Heathman Lodge, with overnight charging, in Vancouver, WA, just north of the Columbia River, and Portland.



From there we headed south to Corvallis, dropping in to see Otmar Ebenhoech, my old friend from Palo Alto days. He gave us a grand tour of his property, workshop, many projects, including a "Wreckla" or two (i.e. resurrected Teslas). He had settled in at this location with many local friends and electric vehicle enthusiasts.

had been emailing about plugging into 120 volts at the Inn, is a friend of Otmar. Vince drives a Tesla Model X. I plugged the car in to the outlet outside and didn't move it for two days.



From there we continued to the Oregon coast, staying two nights at Otter Crest Inn, perched above Otter Rock. It's a great spot for tide pools and whale watching. Turns out the head of maintenance, with whom I



continued next page

SC, CA TO SEATTLE WA FOR <\$80, RT!

The highlight of the trip was the Devil's Punch Bowl, just a short beachwalk from our inn. We hiked to the viewpoint above it during midday high tide hoping to see if the devil had spiked the punch. Sadly, it was only half full. Winter storm season is the best time to see the real action. But during an extra low tide at sunset we had plenty of time to enter a low gap and walk around inside the punchbowl, explore the caves, and admire those devilish colors.



We followed the Oregon coast, stopping along the way to see other devilish sites (Devil's Churn, Throe's Well, etc). Thanks to Al Page's recommendation, we followed a most exquisite route by turning inland at Reedsport onto OR-38 to Elkton. Then South on OR-138 to rejoin I-5 at Sutherlin.



continued on page 28

Santa Cruz to Seattle

continued from page 27



This brought us to our next stop, a state Historic Inn at Wolf Creek, Wolf Creek Tavern. Other than the historic building itself and that charging station, there wasn't much going on here.

There was an older EVgo DC-FC onsite with only a Nissan quick charge connection (CHAdeMO) and J-1772, but no CCS for everyone else, which is odd. This scenario will hopefully change in the near future.

On our drive to Red Bluff and planned a return to the same Mt. Shasta charging station we used on the drive north because we wanted enough range to swing over toward McArthur-Burney Falls Memorial State Park and Lassen Volcanic National Park. We met another person charging his car and had a neighborly conversation.



continued next page

SC, CA TO SEATTLE WA FOR <\$80, RT!

He was a local and gave us tips about the difficulty we might have with the big parks on Memorial Day. He suggested a little known alternative and a more scenic route option to approach our next lodging in Red Bluff.



Thanks to this chat, we took CA Hwy 89 over to McCloud Falls. We drove and walked around the park, a gorgeous waterway with three waterfall areas. We ventured further to McArthur-Burney Falls but the entrance was backed up for miles, so we opted out of that visit. Had a lovely drive down CA Hwy 299 and ended up with enough time and charge left to explore some historic sites (Jelly's Ferry and Ball's Ferry), once used to cross the Sacramento. While picnicing in a shady spot the Sacramento River we took a few pictures.



continued on page 30

Santa Cruz to Seattle

continued from page 29



The Hampton Inn at Red Bluff was happy to 'cone' a charging station for us (they had more than a dozen 240 volt NEMA 14-50 outlets). However, after charging for a while I checked and the wires felt hot. (Always good to check the cables during a charge for excessive heat.) The very hospitable staff loaned me a screwdriver to wire my NEMA 14-50 plug directly into the charging station. Michelle helped by bringing me a headlamp when it started getting dark. All worked well without incident and we enjoyed there pool and views.

The car fully charged that evening, was ready for the trip home. Had

a bit over 250 miles to travel, so planned to stop somewhere along the way for a short quick charge. Decided on Vacaville (in the late 1990s it was called Voltageville) and stopped at a shopping center for a snack and cool drink. We stayed a bit longer than required for this 125 kWh charging station (a ChargePoint).

Interesting to note there was a Fiat 500e using the J-1772 plug next to me. I expect it did not have a quick charge port but only has a 24 kWh battery and 7.2 kWh charger, so would only take about three hours for a full charge. As we were just about to leave, a new Nissan Leaf pulled up into the space on the left and plugged into the

continued next page

second quick charge station. It didn't look like a "Plus", so I expect it was the 40 kWh battery, and not the 62 kWh.

Based on the before and after odometer reading, we travelled a total of 2,422 miles. This was 126 miles longer than the Arizona road trip in May of 2017. The total fees for charging on this trip at ChargePoint, EVgo and Electrify America were \$79.29. All other charging was free, so this worked out to about three cents per mile or less than one cent per kilowatt-hour.

The best part about this trip was the variety of places, landscapes, and particularly some of the unplanned explorations. What made it even nicer was that we had no blocked charging stations and they all worked correctly and as planned.

The only issue with the car is that 'OnStar' and the 'MyChevy' App on my smart phone failed somewhere along the western Oregon coast, about the time there was an Android Play update. I am having that repaired now that I am home.

Written by Will Beckett & Michelle Murray



Interpreting the Chevy Bolt EV Displays

By Will Beckett

There are some that just don't understand the relationship of gasoline mileage and electric fuel consumption. Gasoline cars, with their internal combustion engines (ICE), sometimes lovingly referred to as 'infernal combustion engines' by people in the EV world, consume between 20 to 50 miles per gallon of gasoline. That number depends on (among many other factors) the temperature, elevation, wind and the load being carried for a particular car model. Electric vehicles measure fuel consumption in kilowatt-hours (kWh) of energy per mile traveled. A kilowatt-hour is 1000 watt-hours, and is the quantity we pay for on our electric bills. Watts equals the voltage number multiplied by current number, and watt-hours is watts multiplied by the time (in hours).

Electric vehicle "fuel" capacity is based on the kilowatt-hour rating or fill of the battery, just like the number of gallons left in your tank (of certain size) determines the range you drive in an ICE vehicle.

The 2017 Chevy Bolt EV has a 60 kWh battery and its Federal normal miles estimate is 238 miles for the 60 kWh capacity. That works out to 3.97 miles per kilowatt hour (kWh) if you drive like the EPA testing team averaged. Who does that?

- If I drive slowly (or hyper mile) I am able to get more than 3.97 miles per kWh; that means I will get higher range from that particular charge (or fuel fill).
- If I drive fast, do a lot of uphill driving or I am driving with a lot of road resistance (rain, snow), air conditioning or heater on – then I will get less than 3.97 miles per kWh.

All those factors affecting consumption are really the same as in an ICE, except since we have only a small percentage of the available energy in a tankful of gas in our charged battery – these are "felt more" in an EV.

continued onpage 32

Chevy Bolt EV Displays

continued from page 31

The charger, built into the Chevy Bolt, delivers 7.2 kWh when plugged into 240 volts alternating current (240 V AC). If the 60 kWh has been used up, it takes 8.33 hours to fully recover those 60 kWh. 60 divided by 7.2 is 8.33, so 8 hours and 20 minutes. Actually, it's a bit more than that due to losses in the charger and cables. At 120 volts, it would take twice the time because the voltage is half, but the maximum allowable current is less; so now it's 120 times 15 amps or 1.8 kWh.

The charging unit that comes with the Bolt EV limits the current to 12 amps at either 240 Volts or 120 Volts – it functions on both sources, depending on the plug adapter used.

- Charging at 240 Volts with this unit means 240 times 12 or 2.88 kWh or 20.83 hours of charging time for a 60 kWh battery.
- On 120 Volts, with this unit means 120 times 12 or 1.44 kWh or 41.67 hours of charging time. Be sure your Bolt EV is set to 12 amps and not 8 amps.

The display that comes standard in a Chevy Bolt EV shows kWh used and miles driven, since the last full charge. This mileage efficiency corresponds to miles per gallon of gas. But now it's miles per 'kilowatt-hour of electricity'.

IMAGES WORTH A THOUSAND WORDS...

In the first image here (top right), the display letter C represents the kWh consumed and D is miles driven. Manipulating these two numbers to figure the number of kilowatt-hours for just one mile – take the 19.4 kWh and divide it by the 89.2 miles traveled. That shows the car has driven 4.6 miles on just a single kWh of energy. (If it were possible to stay at that excellent efficiency, while depleting all 60 kWh, it would yield 276 miles of range!) And the cost per mile would be 19 cents (put in your local cost in here) divided by 4.6, or less than a nickel! Call it about a penny per mile, excluding speeding tickets and replacement tires. Two of these factors mentioned above affecting consumption for any car are also on this display at B, the current outside temperature and at A, the time of day.

In the next photo, (speedometer display) shows how many miles have been driven (at letter A), how much of the pack has been used: the miles per kilowatt-hour (at letter C), with the current speed and total expected range (in miles) of the Bolt EV (at letter B). This red line circling the area on the left shows the minimum and maximum range that might be achieved assuming the driver maintains the same level of care. (That standard odometer reading coupled with an image timestamp is useful if you take the picture but don't recall where exactly you were on a trip when the picture was taken.)



Usually when I am on a road trip, I use the 'Min' miles and compare it to the Google map display showing the miles to my destination. But this is not an exact measurement.

The total capacity remaining on the battery, shown in green (like a gasoline fuel gage) in the circled area labeled with B. Notice the three little white lines to the right of the red line at 9 o'clock, on the center circle? These mark the quarters of the battery capacity. Assuming the factory spec'd 238-mile range, each quarter is about 60 miles. As your battery capacity is reduced, the Max, Min, and 'expected' range numbers get closer together.

INTERPRETATION

If the number of expected miles to your destination is a greater number when the capacity is in the last quarter, you really should find a charging station before you go the full distance to your destination. *Note that the color of the capacity indicator changes to orange at the last eighth of the capacity.* That's never happened to me because I do careful planning before my road trips.

Note: Extreme high and low temperatures can cause the Chevy Bolt EV computer to reduce the current during charging to prevent damage to the battery. Drivers needn't worry about anything as the computer automatically takes things into consideration.

Can You Imagine a World Without Fossil Fuels?



By Dave Hrivnak, Knoxville EVA

As someone who cares deeply about the environment, but also really likes traveling, air conditioning and keeping our home warm in the winter, I had serious doubts, we could make such drastic reductions in fossil fuel use. Several scientists have said we need to cut our fossil fuel habit by 80% or more, and as an engineer that studied our energy systems, I thought such a drastic cut would be not just hard, but impossible. But as the climate crisis continued to worsen, I figured I had to give it my best shot to see what one could do. To my surprise over a relatively short period of 8 years we cut our fossil fuel use, and emissions by 85%. This journey opened by eyes to two other truths. First the journey ended up saving us a good bit of money. And most importantly, rather than being a sacrifice, life in most ways was actually better. During my journey I was able to connect with others who have shown me that an 85% reduction is really just a start, and I could do better.



I met the Erb's who managed a 97% reduction in their fossil fuel use. They took a 1955 home and made it very energy efficient with additional insulation, heat pump water heater and a geothermal heat pump. Then with solar and electric vehicles, they now use virtually no fossil fuels. In Dave's spare time he works with college students building and racing electric vehicle conversions.

The Norby's managed a 120% reduction in their carbon footprint, going carbon negative. They did this first by bringing their personal fossil fuel use and carbon footprint to near 0. They accomplished this with a passive solar home, rooftop solar, and driving electric BMW I3s. Then as a way to take their efforts to the next level, they donated a solar system to a local non-profit, saving six additional tons of CO₂. This effectively brought their personal carbon footprint below 0.



Steve Stevens, at the Golden Oldie Cyclery, has eliminated his fossil fuel use and has managed a 130% reduction in his carbon footprint. His solar system puts out 30% more power than he uses in his home, that doubles as a bicycle museum, and the electric vehicles he and his staff use. He super super-insulated his 1970's era house with most surfaces exceeding R-100. He then added many eye-pleasing additions and airlocks to the house to eliminate all drafts and give his museum more usable space, including gardening space where they grow much of their own produce. The museum now shows more people what can be done now, to drastically cut our emissions, than vintage bicycles.



These are just four subsets of stories in "Driving to Net 0 – Stories of Hope for a Carbon Free Future". The book covers fifteen households from across the USA and Canada who have made dramatic cuts in emissions, and like I, found life is better and cheaper after the transition. The book is filled with over 230 full color pictures to

help you clearly visualize a clean future that is compelling rather than to be feared. As you might imagine electric vehicles are a big part of the journey, but when one marries the benefits of EV's with home solar and energy efficiency, we end up with whole being far better than the sum of the individual parts. The book is available from Amazon at <https://www.amazon.com/Driving-Net-Stories-Carbon-Future-ebook/dp/B07HGJWBD3>



EV Camping Tech Talk



Rig on display at IKEA during National EV week, showing camper bottom in Tesla wake, curved side door, and top with only small rooftop fan disturbing airflow.

By Michael Zuteck, Houston, EAA

The goal of this piece is to provide data driven insight into EV tow vehicle camping, its potential and limitations, with currently available options. The tow vehicle is a 2018 Tesla X100D, and the camper is a 16' Casita fiberglass shell camper, chosen for its light 2,165 lb dry weight and aerodynamically favorable rounded external shape. The X is the big SUV Tesla model, but its low 0.24 drag coefficient means its wake is minimized, and only the lower part of the camper gets a wake benefit - the whole top is exposed to full speed airflow, and adds a lot of aerodynamic drag.

In selecting the Casita, we considered pop-up and A-frame camper designs, which would lie more fully within the Tesla wake, giving greater range. For us, it was more important to have minimum set-up time, which is really nice when arriving at a site late, or in bad weather. We wanted full features, including internal head/shower, frig, stove, sink, A/C, table, bed and so on, so accepted higher energy use to get it. Note however that the design does include a curved flush door that lessens drag, and avoids the large roof top heat pump that is so common, but precludes good airflow on

the camper top, so it's a pretty good design as fixed shell campers go.

Before purchasing the Casita, I made a spreadsheet model estimating the rolling and air resistance of the Tesla and various campers to help the selection process. Good data for the Tesla was available via EPA filings, but I had to make estimates for the campers. Fortunately my last four decades have been spent as a designer/researcher in wind turbine rotors, so the low speed aerodynamics background needed for that task was already well established. Measured energy use data over a two month road trip with 3,805 miles of towing have now been used to calibrate the initial estimates closer to reality. The rig as shown, with visible wheel well skirts and hard to see aft vortex generators (VGs) (for more info see <http://airtab.com>) is good for about 1.8 mi/kWh at 60 mph with no wind, based on those best values from 3,805 miles of towing. Calculated values of drag and range when combined with the Tesla X, and for the Casita alone, follow on the *next page*. If anyone has access to better values for any of the data, I'd sure like to get it.

One frequently asked question was whether they weren't on backward — shouldn't the pointy end face into the wind? To understand why not requires an explanation of how they work. Their function is to scoop away airflow slowed by trailer surface disturbance, so it gets replaced by faster moving air from outside what is called the "boundary layer". Of course it creates some drag to do this, so that raises a further question, of how that lowers drag? The answer is that the faster moving flow sticks to the curve of the afterbody more strongly, follows the curve further, and results in a smaller vehicle wake. Making the wake smaller is like fooling the air into thinking the trailer was smaller, and that reduces drag a lot more than the VGs add, so you can come out a few percent ahead overall, though with a curved afterbody like the Casita it can be more. VGs in a line also create what's known as a "vortex sheet" that better separates the free stream airflow from the vehicle wake, allowing it to extend a little further aft, which reduces drag from turbulent mixing across the boundary — the

continued next page

EV TOW VEHICLE CAMPING

Tesla X Weight	5570	lbs	Note: 6000 lbs is test weight in EPA filing
Occupants & Gear	600	lbs	
Tire Constant Coefficient	0.01		
Tire Linear Coefficient	2E-05	per mph	
Effective Frontal Area	6.69	ft^2	
Headwind	headwind (+)	0 mph	
Inclination	uphill (+)	0 %	
Rolling Drag	69.1	lbs	
Rolling Power	8.2	kW	Check Calc
Aerodynamic Drag	61.6	lbs	Drag = 1/2 ρ Cd * A * V^2
Aerodynamic Power	7.4	kW	274 Newtons
Inclination Drag	0.0	lbs	61.6 Lbs (at 60 mph)
Inclination Power	0.0	watts	
Total Power consumed	15.6	kW	Casita Tesla Wake Recovery = 0.8
	20.91	HP	Battery to Wheel Efficiency = 0.87
Speed	60.0	mph	Range Estimates include Above
	Input is Green		
For 60 mph	Tesla X	Casita 16 DLX	Casita 16 DLX Range @ 80% Battery Use
Power kW	15.6	12.0	Speed Cd=0.4 Cd=0.3
80% Range	268	151	70 106 124
100% Range	335	189	60 131 150
With VGs & Casita Cd= 0.35			50 163 184
VG Area reduction = 2 sqft			without VGs
	530	Wh/mi	

Tesla X and combined rig drag and energy consumption estimates.

Trailer 1 Weight	2165	lbs
Stowed Gear	600	lbs
Tire Constant Coefficient	0.01	
Tire Linear Coefficient	2E-05	per mph
Effective Frontal Area	14.95	ft^2
VG Wake Area Reduction	2	ft^3
Headwind	0	mph
Inclination	0	%
Rolling Drag	31.0	lbs
Rolling Power	3.7	kW
Aerodynamic Drag	119.2	lbs
Tesla Wake Recovery	0.80	
Aero Drag w Wake Recovery	69.9	lbs
Aerodynamic Power	8.3	kW
Inclination Drag	0.0	lbs
Inclination Power	0.0	watts
Total Power consumed	12.0	kW
	16.14	HP
Speed	60.00	mph

Casita Camper towing drag and energy consumption estimates.

continued page 36

Camping Tech Talk

continued from page 35

net effect is like a small afterbody extension, which also reduces drag. This is why VGs can work even on squared of trailer backs.

The photo right, shows flow indicating streamers, that were used before departure to see how well the VGs were working. The photo below right was taken from a trailing EV, and shows that they are working well across the camper top, but poorly along the sides.

Across the top, the streamers are stuck to the curved surfaces, showing excellent wake size reduction, while along the sides, many of them are disturbed. The ones behind the side windows are shown to be a particular problem, not surprising since the airflow must come up over the molding, then pass across a depression, since the aft part of the window is inset to slide open inside the front part. I've now added an acrylic pane to bridge the depression, and mounted VGs on it so they protrude into the flow to see if that can fix the difficulty.

The bad news is some aspects of drag reduction are hard, but the good news is that more reduction is possible, including things like underbody and wheel fairings, and aft sunshade that's also a fairing and solar panel mounting area, and if the sides are otherwise intractable, side mounted deflector vanes. Such things may be topics for another time, after testing.



Michael Zuteck has degrees in physics from MIT and Univ. of Illinois and is a veteran of all the Apollo lunar landings, which he terms “wonderful years”. Currently, he is President of two small sister wind companies “WindTellect” <http://www.windtellect.biz/> and “WINDprove” <http://windprove.com/> which provide expert services to the wind industry. We are pleased that he is a member of our Houston chapter, and hope you’ll enjoy his short article.

Enel X, Washington State Utilities to Provide JuiceBox Smart Chargers

Enel X continues to expand its smart charging programs. Up to date news in this article.



- The multi-year contracts will inform future smart charging programs in an effort to broaden EV adoption and meet the state's ambitious decarbonization goals of achieving carbon-neutral electricity by 2030 and 100% clean electricity by 2045
- This is Enel X's third utility partnership announcement in the last month, adding to its growing portfolio

of more than 20 utility partners across the US.

By: Tom Moloughney

Many of the readers here are familiar with eMotorWerks name, as they are the company that brought us the popular line of JuiceBox smart EV chargers.

Two years ago Tom reported that eMotorWerks was acquired by Enel, a multinational utility based in Italy. However, they kept the eMotorWerks name until a couple of months ago, when eMotorWerks officially transitioned to "Enel X".

While they now have a new name, they are still based in San Carlos, California, and retained much of the same staff that has run eMotorWerks for many years now.

It appears that they are also still continuing to forge partnerships with utilities to provide smart EV charging stations to local residents, while also increasing grid flexibility and reliability through Enel X advanced smart charging JuiceNet solution.

"This year, Washington state passed two key climate policies, which chart a path to 100 percent clean electricity by 2045 and add new incentives for electric vehicles and charging infrastructure to support its decarbonization strategy," said Preston Roper, Head of Enel X e-Mobility, North America.

"As Washington and other states embrace aggressive renewable energy portfolio standards for electric transportation, we expect smart charging to provide dual-benefits to the utility and all of its customers – not just the residents driving EVs."

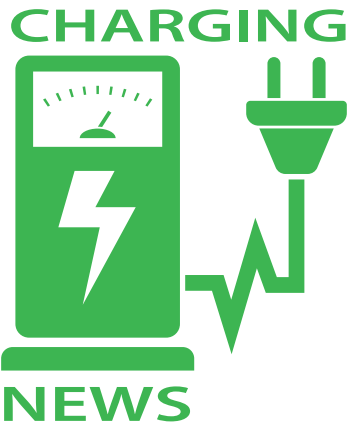
- Enel X together with Puget Sound Energy and Seattle City Light launch two new home smart charging programs for electric vehicles drivers

By shifting when and how much electricity EVs draw from the grid, these smart charging programs help utilities and grid operators reduce electricity costs, ease grid congestion, and maximize the use of solar and wind power. This makes electric vehicles less expensive to own, and reduces the impact they have on the environment.

It's important to realize that EVs, while cleaner than conventionally-powered vehicles, are still only as clean as the source of energy used to charge them. Partnerships like this between industry stakeholders will help accelerate EV adoption across the globe.



EVgo and Electrify America Team Up to Make Chargers More Accessible



By Eric C Evarts

Finding a fast charger in the U.S. recently got a lot easier for a lot of EV drivers.

Two of America's largest fast-charging networks announced an agreement to allow each other's users to charge at their charging sites without signing up for new memberships or payment plans.

Electrify America and EVgo agreed to a roaming partnership that will allow members of either service to charge at any EVgo or Electrify America charging station.

Each of the networks already has individual agreements with the nation's other largest networks, ChargePoint and Greenlots.

Together they make up at least 42 percent of the DC fast chargers in the U.S. and 60 percent of the total fast-charging locations, according to data from the Department of Energy's Alternative Fuels Data Center. The others are split among Tesla (with 52 percent of the total fast chargers in 22 percent of locations), and six smaller networks.

That means that drivers of EVs other than Teslas have a widespread network in many ways on par with Tesla's Superchargers that they can use to top off their batteries.



Electrify America DC fast chargers in Gulfport, Mississippi

Unlike Tesla's Supercharger network, however, EVgo chargers are concentrated in and around cities—where EVgo points out that most EVs drive—rather than along highways between cities where the chargers could allow drivers to make longer trips between cities, as Tesla's Superchargers do. Electrify America, a division of Volkswagen, was founded under the settlement agreement over Volkswagen's diesel emissions cheating, and is required to install such highway charging stations. So far, however, it has only completed the

first of four phases of a 10-year rollout plan.

Roaming “interoperability” agreements are becoming more common, making it easier for electric car-drivers to use a wider variety of chargers.

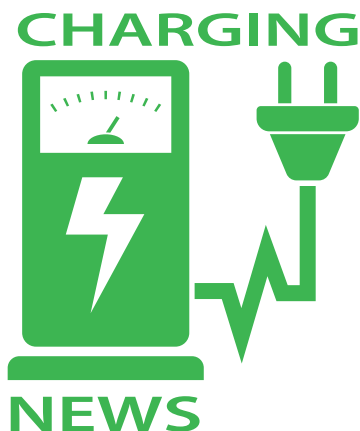
This has led to a spate of recent announcements—many using the “One-Step Plug & Charge” label—including between Greenlots and Electrify America and ChargePoint and Blink.



Electrify America 350 kWh chargers at Home Depot in Chicopee, MA.

https://www.greencarreports.com/news/1124689_evgo-and-electrify-america-team-up-to-make-chargers-more-accessible?

Despite Falling Behind, Tesla Is Heavily Rolling Out V3 Superchargers



By Steven Loveday

With a lot on its plate, new Tesla Superchargers have taken a back seat until now.



Tesla has many goals, and while it may not always achieve them on time, most of them actually do come true. Moreover, CEO Elon Musk has a multitude of grand plans. While he's often in over his head and regularly behind on his hopeful timelines, he almost always comes through.

To be honest, when it comes to the Tesla Supercharger network, some may argue that Tesla has gone well above and beyond expectations. There's really nothing that says an automaker must build out its own charging network.

The Supercharger situation is truly one of the primary reasons Tesla is so successful, in addition to one of the main reasons it's not showing a profit. Charging infrastructure is damn expensive for sure.

Tesla has continued to work hard to build future cars and future networks that no other automaker is willing to build. Why? Because legacy

automakers know that if they switched to EV production and built out charging networks, they'd lose a wealth of money. C'mon, they can just look at Tesla's situation to see that.

With all of this being said, Tesla's Supercharger expansion efforts are behind schedule. However, we're happy to report that, despite finances, challenges, and plenty of adversity, many new Superchargers are already on the way.

In fact, according to a report by Electrek, the Silicon Valley all-electric automaker is launching some 40 new Superchargers (potentially more that we don't have information about yet) and at least a whopping 10 of them will offer new V3 Superchargers. New locations are as follows:

Clearwater, FL
Davidson, SK
Dryden, ON, Canada
Lynchburg, VA

Madison, CT
Meriden, CT
Santa Rosa, CA
Sault Ste Marie, ON, Canada
Stockton, CA
Vienna, VA

This is not only big news for Tesla owners but also just another way to push OEMs to get with the program. In the old days, there was no push for automakers to build out their own individual network of gas stations. C'mon!

Still, with EVs coming into play now, charging networks are paramount. Still, regardless of the fact that all-electric Tesla is doing it doesn't mean others are forced in any way. We can only hope that non-Tesla charging infrastructure grows exponentially in the coming years.

This article originally appeared on *Inside EVs*.



<https://teslamotorsclub.com/blog/2019/09/26/tesla-rolling-out-many-new-superchargers/>

Bollinger Debuts Electric Sport Utility Truck



By Ty McMahan

One of the first companies to create chatter about an electric pickup truck was Bollinger Motors.

The public received its first glimpse Bollinger's "sport-utility truck" concept at a press event in New York in September 2017. Two years later, the company has moved its headquarters from Hobart, NY to near Detroit for final engineering and is ready to debut the vehicle in its final form.

"From the ground up, the dream was to build something that didn't exist," reads the company's mission on its website. "We've taken our time and not over-promised anything. We're engineers making an electric 4x4 truck – clean and simple, built to last. Nothing frivolous, nothing unnecessary. All electric. All aluminum. All wheel drive. And we're building them right here in Detroit."

Robert Bollinger is the company's founder. He had no automotive experience prior to starting the company, rather he spent 15

years in executive positions at a hair and skin care company. But, while working on his upstate New York ranch he recognized an opportunity to build a tough, capable EV that could be used as high-quality work truck. So, he tracked down a small team with automotive, design, and electric powertrain experience and hired them to help build his dream.

The company presented B1 and B2 vehicles on September 26.

B1 (Above)

The B1 attracted some good attention when its design was first shown. It's boxy, utilitarian, and stripped down with analog gauges and a simple interior.

"If you could take everything you love about a classic truck and combine it with the most refined essentials of a modern truck, redesign it with the highest quality materials and components available, oh and make it an electric vehicle – you'd have the basics for the Bollinger B1 electric sport utility truck," the company says on its

website. "There is nothing on the planet like it. Every touch point, every seam and every surface has been thought out for the ultimate utilitarian purpose. This is our baby. The one we've put every ounce of research and development and time into. The one we scrapped and started over for getting too complicated. The one we love the most. This is the all-electric truck that didn't exist until our truck-obsessed engineers built it from scratch."

B2 (Next Page)

The B2 electric pickup truck is the big brother of the B1. "Same everything inside and out, except the long bed mullet haircut."

It's capable of carrying 16-foot cargo through a patented full-length pass-through. With the rear seats out, you can transport a stack of 4x8s with the tailgate closed.

Specs

Both the B1 and B2 have all-aluminum bodies, all-wheel drive, and powertrains offering 614 horsepower and an estimated

continued next page



EPA range of 200 miles from a 120 kWh battery pack. Both seat four.

Bollinger claims the trucks will go from zero to 60 mph in 4.5 seconds and have a top speed of 100 mph.

The vehicles have 15 inches of ground clearance, 10 inches of tire travel, a 5,201 pound payload capacity, a 7,500 pound towing capacity.

Customization

People seem to love the utilitarian simplicity of Bollinger vehicles, with comparisons to beloved off-road machines like the Land Rover Defender and Jeep Wrangler. It's designed for people who intend to get the vehicle dirty, who might need 15 inches of ground clearance and capability to haul 5,000 pounds.

Just because the vehicles are intended to be minimalist doesn't mean they have to be boring. The top and doors are removable for off-roading in the open air. Bollinger has plans for additional add-ons that appeal the off-roader. Renderings shared by the company show the B1 and B2 with the original doors replaced with tube-frame

doors. They also the trucks with roof racks stacked with lighting mounts, headlight grilles, fender flares, and a sturdy winch.

Bollinger didn't say when the accessories

How would you customize your Bollinger Motors electric truck? These renderings are based on requests, comments, and conversations with our online and social media community. Thanks for all the awesome feedback! Reserve your truck at bollingermotors.com/reserve



will be available, but it's clear the Bollinger vehicles will be an interesting platform for customization.

Price

It's cool and capable, but what does it cost? We don't know yet.

Pricing seems like a real challenge for Bollinger.

Many industry watchers have speculated that the price tag could range from \$60,000 to \$100,000. Obviously that kind of money buys well-optioned Ford, Chevy, and Ram trucks. But, Bollinger's potential buyer

wants an EV, so they'll have to compete with other new entrants like Rivian and Tesla. Elon Musk has said Tesla's upcoming pickup could cost \$50,000.

EV Pickup Momentum

It's amazing how frequently you see electric cars on roadways today. Tesla plans to deliver up to 400,000 Model 3s this year alone. You can spot them everywhere.

The same can happen for an electric pickup. And, there seems to be enough momentum with several companies – both startups and traditional automakers – aiming to get electric trucks on the road in the next few years.

It doesn't seem Bollinger is aiming for your mass-market consumer, but they will help build interest. It will be exciting to see what the company has to show off in a few weeks and hear an updated timeline on delivery.



Amazon Orders 100,000 Electric Delivery Vans from Rivian



By Charles Morris

Amazon CEO Jeff Bezos has announced a far-reaching plan to reduce his company's environmental footprint. Amazon's "Climate Pledge" calls for the retail behemoth to zero out its carbon emissions by 2030. Bezos also challenged other companies to join Amazon in meeting the goals of the Paris climate agreement 10 years ahead of schedule.

As part of the plan, Amazon has agreed to buy 100,000 electric delivery vans from EV startup Rivian. Bezos said the first EVs will be on the road by 2021, and hopes to deploy all 100,000 vehicles by 2024. Amazon led a \$700-million investment round for Rivian in Feb., and has invested some \$440 million in the company to date.

Bezos's dramatic announcement was a bit of a surprise, as Rivian has not previously announced any plans to build commercial EVs. Rivian has turned heads in the EV world with compelling prototypes of an electric pickup truck and SUV, which it plans to bring to production late next year. Bezos did not offer any details of the deal.

Amazon may be getting into the electrification game a bit late –

other delivery giants such as UPS have been testing EVs for years – but it's jumping right into the deep end. The company's order of 100,000 vehicles apparently represents the largest single order of EVs in history (although in China, orders of electric buses in the thousands are not unusual), and it's interesting that Bezos doesn't seem to see the need for the years-long pilots that other companies insist on. It will be a challenge for a startup manufacturer to deliver that many vehicles in the specified timeframe, but at least capital doesn't seem to be a problem.

"We want to use our scale and our scope to lead the way," Bezos said in his announcement at the National Press Club. "One of the things we know about Amazon as a role model for this is that it's a difficult challenge for us because we have deep, large physical infrastructure. So, if we can do this, anyone can do this."

[Large photo: Electrek, small photos: Rivian, Amazon]

<https://chargedevs.com/newswire/amazon-orders-100000-electric-delivery-vans-from-rivian/>

Anheuser-Busch and Frito-Lay Expand Electric Truck Plans



By Byron Hurd

Your beer and chips just got greener—and no, it's not St. Patrick's Day. That's the case in California, at least, where Anheuser-Busch and Frito-Lay both announced plans this week to replace diesel-powered logistics vehicles with electric trucks.

A-B will introduce 21 new battery-powered trucks to its California fleet from its partner, BYD. The A-B project was made possible by grants from CARB to the Center for Transportation and the Environment. CTE will oversee the A-B project, provide technical support and handle logistical issues such as permitting and charging station plans. The equipment will be second-generation 8TT Class 8 electric trucks from BYD.

“At Anheuser-Busch, we are committed to leading our industry towards a more

sustainable future by reducing our carbon emissions across our value chain by 25 percent by 2025,” said A-B's Angie Slaughter. “The transport industry is one that is prime for innovative solutions and we are excited to continue driving progress towards a zero-emission fleet through this partnership.”

Frito-Lay will replace all of its existing diesel-powered freight equipment at its Modesto, Calif., manufacturing facility. Frito-Lay says the result will be “an industry-leading showcase for environmentally sustainable manufacturing, warehousing and distribution.”

The snack maker partnered with the San Joaquin Valley Air Pollution Control District, and the result is a far more comprehensive project, targeting not just fleet vehicles, but infrastructure, energy

generation and energy storage too.

“Frito-Lay is continuously looking for ways to reduce our environmental impact,” said Michael O'Connell of Frito-Lay parent company PepsiCo. “The Modesto project is indicative of our commitment to sustainable business practices that lead to innovation, increased productivity, operational excellence and business growth.”

A-B's truck deployment will be complete by 2021; Frito-Lay's initiative is part of a much larger sustainability program which will not be fully realized until well into the next decade.

Photo: *Green Car Reports*



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https://www.greencarreports.com/news/1125391_anheuser-busch-and-frito-lay-expand-electric-truck-plans

All Electric 2021 Volvo XC40 Recharge Crossover Debuts, Aims for More than 200 Miles of Range



By Aaron Cole

The first all-electric Volvo is also the first Volvo that will continue to improve, the automaker said recently.

Volvo rolled out the all-electric XC40 Recharge compact crossover in Los Angeles and said the electric vehicle will have two 150 kWh electric motors, one on each axle, that combine to make 402 net horsepower and will be powered by a 78 kWh lithium-ion battery pack. That battery will manage 248 miles of range, measured on the more optimistic WLTP standard. Volvo said we should expect more than 200 miles in the U.S., though EPA estimates aren't yet available. On a fast-charger, Volvo says the XC40 Recharge will replenish its battery from zero to 80 percent in about 40 minutes.



The XC40 Recharge will arrive in the U.S. by the end of 2020 and cost less than \$48,000, which includes a federal tax credit of up to \$7,500.

Volvo said the XC40 Recharge will receive over-the-air updates, the first Volvo with the technology, and Volvo Chief Technology Officer Henrik Green claimed the updates will give buyers better, fresher vehicles throughout their car's life cycle.

"The best XC40 won't be the one you drive on the first day," he said.

continued next page

VOLVO XC40



Teaser for Electric Volvo XC40 debuting on October 16, 2019.

The XC40 Recharge also will be the first application for Volvo's Android-based infotainment system that updates Sensus to a more-modern architecture. Although Google Voice Assistant and other Google applications will be baked into the new infotainment system, including a new driver interface, Volvo has said the XC40 Recharge will be compatible with Apple CarPlay.

Volvo didn't specify many battery details beyond the XC40 Recharge's 78 kWh capacity. The XC40 Recharge leads the way for Volvo's Recharge line of electrified vehicles—plug-in hybrid and battery electric. Green said Volvo will introduce one fully electric vehicle each year until 2025 and by then, Volvo expects half of its sales to be of fully electric vehicles. Volvo says it will reduce its carbon footprint by 40 percent by 2025 too, eventually becoming



carbon-neutral by 2040. When it arrives, the 2021 Volvo XC40 Recharge will compete with other small electric crossovers such as the Hyundai Kona EV, Kia Soul EV, and BMW iX3. (See the video on page 48.)



https://www.greencarreports.com/news/1125559_all-electric-2021-volvo-xc40-recharge-crossover-debuts-more-than-200-miles-of-range-one-year-of-charging-free

Don't Miss These ... Articles

Mercedes Unveils Its Vision EQS Electric Super Car

The Vision EQS appears to have the design, luxury, and driving range to match anything in the electric space



Photo: Mercedes

By Lawrence Ulrich

Mercedes-Benz has apparently seen the light on electric vehicles, including a vow to create an entirely carbon-neutral fleet of new cars by 2040. And EV fans will definitely see the light of its new Vision EQS, a concept sedan whose groundbreaking “Digital Light” headlamps are an integral part of its networked safety systems.

The Vision EQS appears to have the design, luxury, and driving range to match anything in the electric space—along with the coolest light show since Pink Floyd and its lasers.

A 350 kilowatt ultra-fast charging system, similar to the Porsche’s, allows an 80-percent charge in 20 minutes or less.

With roughly 100 kilowatt-hours of batteries packaged underfloor, and electric motors at both axles, the EQS can vary all-wheel-drive power between front or rear wheels. Mercedes pegs output at roughly 350 kWh (469 horsepower), with 759 Newton-meters (560 pound-feet) of torque—good for a 0 to 100 km/h (0-60 mph) surge in less than 4.5 seconds.

Mercedes unveiled the Vision EQS Tuesday at the Frankfurt Motor Show. It’s a dramatically styled sedan with an equally dramatic driving-range claim: Up to 700 kilometers (435 miles), based on lab testing under Europe’s new WLPT test cycle, which is designed to generate more-realistic estimates of real-world EV efficiency.

If Mercedes can speed a production version of the EQS to market, that 700 km would make it the marathon champ of current EV’s, topping the 595 km of the Tesla Model S and Model X Long Range versions. It would also be a significant, 250-km range advantage over the 2020 Porsche Taycan, which has posted a 450-km WLPT estimate. The EQS’s range would put it more than 350 km beyond the demands of stricter U.S. EPA measures.

The first all-electric Mercedes, the EQC crossover SUV, is already on sale in Europe, and arrives in America next year as a 2021 model. This Vision EQS, being an auto-show concept, is designed as both a showstopper and as an intriguing teaser for Mercedes’ latest designs and technology. The body previews the brand’s streamlined “One Bow” design language that will influence several upcoming models. Inside, a series of projection displays form an unbroken, floating sculpture for the dashboard that recalls the cockpit of a luxury yacht. Maple wood trim combines with sustainable materials, including microfiber made from recycled

continued next page



Photo: Mercedes

PET bottles; and a roof liner whose textile includes recycled plastic from ocean waste.

Mercedes claims a world's first for the Digital Grille, a black-panel light matrix whose 188 individual LED's create a 3D effect of free-floating stars and pixels. At the rear, 229 individual, illuminated stars nod to the Mercedes' logo, part of a 360-degree "Lightbelt" that surrounds the car, offering a wealth of possibilities for future Mercedes lighting designs.



Photo: Mercedes

Mercedes says the Vision EQS is capable of Level 3 semi-autonomous driving—allowing generous periods hands-off driving—with a modular sensor system that could deliver fully autonomous capability in the future.

That sensor suite of radar and cameras is networked with what Mercedes is pitching as a revolution in vehicle lighting. Its Digital Light system combines software algorithms with holographic

HD lenses. Each lens contains more than 1 million micromirrors, which allows individual control over each point of light. The result is precise control over the brightness and direction of beams, and the ability to "mask" oncoming traffic from light to avoid dazzling other drivers. Onboard cameras and radar detect vehicles, people, or objects on the road, and combine that data with digital navigation maps.

The most intriguing bit? The system can project symbols, letters and other graphical information onto the pavement in HD quality. The headlamps can "fill in" missing lane markers, project a guideline of the car's width—great for squeezing through narrow spaces—or beam arrows to point out pedestrians or animals near the roadway. Navigation data, such as directional arrows, can be displayed on the pavement instead, so drivers don't have to take eyes off the road even for an instant. Other potential warnings include lane-keeping, blind-spot and speed limit data, and symbols for slippery road surfaces, upcoming construction sites, and impending rear-end collisions.

The Benz concept opens up other possibilities, including the ability to communicate with other drivers or pedestrians. (But no flipping the digital bird, thank you). The lights can flash familiar "zebra stripes" on the street to cue pedestrians that it's safe to cross, or a stop sign to warn them when it's not. All told, the Vision EQS appears to have the design, luxury, and driving range to match anything in the electric space—along with the coolest light show since Pink Floyd and its lasers.

In accordance with Title 17 U.S.C. Section 107, this material is distributed without profit to those who have expressed a prior interest in receiving the included information for research and educational purposes.

<https://spectrum.ieee.org/cars-that-think/transportation/advanced-cars/mercedes-unveils-vision-eqs-electric-super-car>

Porsche and Boeing Developing “Premium Urban Air Mobility Vehicle”



By Byron Hurd

Porsche and Boeing signed a memorandum of understanding to explore the developing of flying cars, the companies announced Thursday.

The notion of a “premium personal urban air mobility vehicle” may sound vague, the new joint venture, Aurora Flight Sciences, is tasked with building a “fully electric vertical takeoff and landing vehicle,” which would put them in the running with other firms that are working toward similar offerings intended for urban ride-sharing.

What sets Aurora apart is the premium angle. While the announcement is thick with mentions of urban mobility, there’s no suggestion that the final product would be intended for sharing or taxi services. It seems clear that Porsche and Boeing are exploring the mobility market from a private-ownership perspective, or, at the very least, exclusivity.

Porsche has experience in both developing fast-charging EV systems—some of the most tech-advanced ones, with the Taycan

electric sport sedan’s 800-volt system—and operating higher-end concierge services. Boeing’s expertise is aerospace, and the company has already built prototype VTOL drones capable of autonomous cargo delivery.

The future of urban mobility may rely on solutions outside of the traditional automotive space. As a recent study suggests, electrification alone may not be enough to meet future energy consumption and emissions goals. Even in cities with 100 percent electric vehicle traffic, the gridlock from increased rides could potentially result in an overall increase in energy consumption.

With that specter on the horizon, adding a third dimension to urban transportation makes a great deal of sense. While there are still technological barriers to opening up city skies to fleets of drones, the more significant hurdles may actually be regulatory.

Even small drone fleets are only now starting to obtain certification for flights operating outside of line-of-sight, and the regulations governing drone flights over populated areas don’t even exist yet.

Photo: Porsche



https://www.greencarreports.com/news/1125486_porsche-and-boeing-developing-premium-urban-air-mobility-vehicle

Kitty Hawk's New Flying Car Promises a (Near) Silent Flight

Larry Page's aviation outfit, helmed by Sebastian Thrun, built the Heaviside with eight motors and a big wing to help generate lift.



Kitty Hawk's Heaviside uses its eight motors—six on the wings and two on a forward canard—to generate vertical lift, with the propellers angled downward, and horizontal thrust when they're facing the rear. PHOTOGRAPH: KITTY HAWK

Kitty Hawk, Larry Page's air taxi outfit, on Thursday showed off its latest concept—an eight-motor prototype that uses an unconventional forward-swept wing, and is **purportedly 100 times quieter than a conventional helicopter**. The Mountain View, California-based company calls it Heaviside, after noted physicist and electrical engineer Oliver Heaviside, who advanced a variety of theories and innovations in mathematics, electronics, and communications in the early 20th century.

The new aircraft has been in development for nearly two years, according to TechCrunch, which first reported on the prototype. Based on the altitude and flight characteristics demonstrated in a short video, Kitty Hawk appears to be relatively far along with the aircraft, compared with other electric vertical-lift aircraft (aka

flying car) efforts, many of which have showed concepts and prototypes but haven't flown much. A company spokesperson says all of Heaviside's flights so far have been remotely controlled.

This is the third aircraft Kitty Hawk has shown publicly. The single-seat Flyer, which can hover between 3 and 10 feet above the ground, is meant for recreational use. The larger Cora, which Kitty Hawk is testing in New Zealand, uses 10 rotors and is targeted toward the kind of air taxi market championed by Uber. Kitty Hawk has said little about its goals for Heaviside, but it appears closer to a final candidate for urban mobility, with a refined shape and what appears to be a more developed noise-control strategy.

Photo: Kitty Hawk

Read more at the URL below.

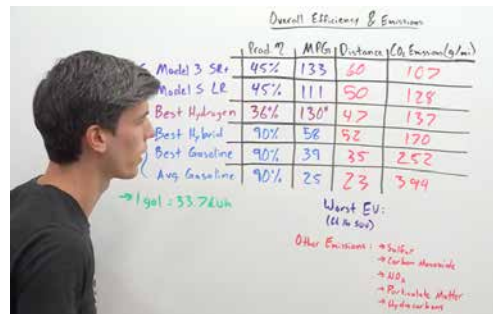
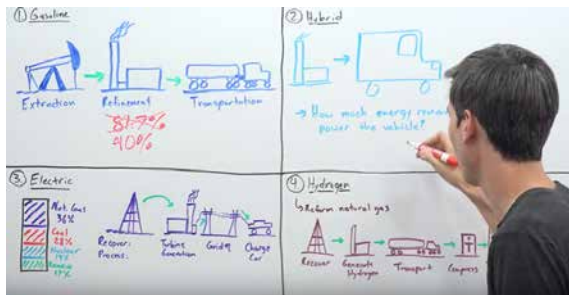
<https://www.wired.com/story/kitty-hawk-heaviside-larry-page-flying-car/>



Don't Miss These Videos...

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.

Are Teslas Actually Better For The Environment?



Have you encountered someone who recently was exposed to EVs for the first time yet has a lot of misconceptions surrounding their emissions, produced by various mobility fuels and the overall fuel economy/efficiency? Maybe you can't gather the facts quickly enough to make the case and your opportunity disappears? In this video, the various fuels and powertrains are compared and with

tabular data clearly presented, while a strong case is made for full electric power. Most of your lingering questions should be addressed and you'll be able to factually converse with virtually anyone about the goodness of the EV cause!

<https://www.youtube.com/watch?v=2rywz73vwKw>

KCRT's NewsBytes: National Electric Car Event in Richmond CA



Recorded September 19, 2019, highlights of the Electric Car Event in Richmond, California. Highlights of more NDEW events begin on page 9.
https://www.youtube.com/watch?v=V14shoEUB_c&feature=youtu.be

Why Volkswagen is Betting on EVs



VW has a share of the huge worldwide automotive market. This is a brief high level overview of just what this organization has done. Out of the heady peaks and depressing valleys, the scandal that was revealed about five years ago – comes the 'Electrify America' project to gain footing in that EV market. But with their commitment now to electrification, there is understandable skepticism in Europe and the investment world.

Every year, Volkswagen Group is a top contender for the title of the world's largest automaker. The company sell cars, commercial vehicles and even motorcycles. It operates 133 manufacturing plants around the world and sells cars in 153 countries. The company is now trying to forge a new future for itself by going electric.

<https://www.youtube.com/watch?v=zqqt4cQpVx4>

Don't Miss These (cont.)

Volvo XC40 Recharge Electric Car: Here's What You Need To Know



Volvo has unveiled a promising all electric car with a large (78 kWh) pack and many features for an enticing price. The Geely underpinnings are apparent as this EV enters the growing ring of competition. Several intriguing features are revealed in this short overview. Have a look. <https://youtu.be/6HCvN7SF6KI>

Exclusive Look at Rivian's ELECTRIC Truck & SUV + Chatting with CEO



Two new electric cars, both driving in a new direction are what Rivian will offer customers: a truck set up for a rugged outdoors lifestyle, and an alternative to Tesla's falcon-wing door SUV at the high end (much in the same vein as the Mercedes G-series or a Range Rover.) Here is a short interview with a prospective owner and the CEO of the company at a private event recently held away from the factory to introduce the product line to customers.

https://youtu.be/di_PyPTYKGg

What is the Lucid Air? How does it fit in alongside Rivian & Tesla? - Fully Charged



Veteran EV commentator and communicator Chelsea Sexton (featured in the documentary film "Who Killed the Electric Car?") speaks about the stealth startup Lucid Motors (Newark, CA) and their "Air" vehicle. Their CEO and CTO is Peter Rawlinson (who at one point worked for Tesla, when we saw him describing the Model S structure before it was released in mid-2012) is up first. She asks some probing questions and learns a bit of the posturing that is standard fare for startups from Derek Jenkins, VP of Design, who rightfully identifies a "boundary for innovation and change" with established OEMs. With many revealing images – the live (in-vehicle) sounds are also noteworthy! They want to establish themselves as a luxury player, with the goal of a 400 mile range with excellent efficiency (4 to 5 miles per kilowatt-hour). Beverly Hills will be their first store. With vehicle release planned for next year, and the move into Europe in 2021, with China on the horizon thereafter as well.

<https://youtu.be/k-mb9PNnUMk>

The Arcimoto FUV Electric Vehicle Is Here. Will It Revolutionize City Travel?



Now priced at \$19,900, Arcimoto's volume production is now beginning at long last (CEO Mark Frohnmayer began his venture in 2007). This is a simple product shipped from Eugene, OR that will fill the "every day go-getter" vehicle needs, getting over 100 miles per charge (on the Federal city testing cycle). This is not a NEV and can go on all public roads, without those limitations. Its 20 kWh pack will come down in price over time; Mark sees "the driveway of the future" having both a Tesla and a FUV. The firm is traded NASDAQ market (FUV). <https://www.youtube.com/watch?v=2ptl4IEAILM&feature=youtu.be>



Welcome to Membership in The Electric Auto Association!

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movie

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

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www.electricaauto.org



Keep Up on all Auto Shows & EV Related Conferences

US and International Events

National Drive Electric Week (NDEW) is Sept 14-22. See <https://driveelectricweek.org/>

TOKYO MOTOR SHOW
10/24/19 - 11/04/19

INDIANAPOLIS AUTO SHOW
12/26/19 - 01/01/20

CHICAGO AUTO SHOW
02/08/20 - 02/17/20

SEMA PUBLIC DATES: N/A
EDMUNDS.COM COVERAGE DATES:
11/05/19 - 11/08/19

**HAMPTON ROADS INTERNATIONAL
AUTO SHOW** 01/10/20 - 01/12/20

**NORTH CAROLINA INTERNATIONAL
AUTO EXPO** 02/13/20 - 02/16/20

DUBAI INTERNATIONAL MOTOR SHOW
11/14/19 - 11/18/19

**SOUTH CAROLINA INTERNATIONAL
AUTO SHOW** 01/10/20 - 01/12/20

VIRGINIA INTERNATIONAL AUTO SHOW
PUBLIC DATES: 02/14/20 - 02/16/20

CENTRAL CALIFORNIA AUTO SHOW
11/15/19 - 11/17/19

**MONTREAL INTERNATIONAL AUTO
SHOW** 01/17/20 - 01/26/20

**CANADIAN INTERNATIONAL AUTO
SHOW** 02/14/20 - 02/23/20

**TAMPA BAY INTERNATIONAL AUTO
SHOW** 11/15/19 - 11/17/19

UTAH INTERNATIONAL AUTO EXPO
01/17/20 - 01/20/20

**PORTLAND INTERNATIONAL AUTO
SHOW** 02/20/20 - 02/23/20

EDMUNDS.COM COVERAGE DATES:
11/18/19 - 11/21/19

**WEST VIRGINIA INTERNATIONAL
AUTO SHOW** 01/17/20 - 01/19/20

GREATER MILWAUKEE AUTO SHOW
02/22/20 - 03/01/20

**CHARLOTTE INTERNATIONAL AUTO
SHOW** 11/21/19 - 11/24/19

HOUSTON AUTO SHOW
01/22/20 - 01/26/20

THE WORK TRUCK SHOW
03/03/20 - 03/06/20

ARIZONA INTERNATIONAL AUTO SHOW
11/28/19 - 12/01/19

ST. LOUIS AUTO SHOW
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GENEVA MOTOR SHOW
03/05/20 - 03/15/20

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02/05/20 - 02/09/20

**AMELIA ISLAND CONCOURS
D'ELEGANCE** 03/12/20 - 03/15/20

LOS ANGELES AUTO SHOW
11/22/19 - 12/01/19

QUAD CITY REGIONAL AUTO SHOW
02/07/20 - 02/09/20

ZAGREB AUTO SHOW
PUBLIC DATES: 03/31/20 - 04/05/20



International CANADA

EV COUNCIL OF OTTAWA

Web Site: www.evco.ca
Contact: Darryl McMahon
info@evco.ca

VANCOUVER EVA

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

MEXICO

EVA of SONORA (AVES)

Web Site: Diadelautoelectrico.org
Contact: Oscar Vidal
662-105-6551

TAIWAN

TEVA | Taiwan Electric Vehicles Association

FaceBook: www.facebook.com
TaiwanElectricVehiclesAssociation
Contact: Mr. David Lane
Phone: 011 866 987 526 892

VIRGIN ISLANDS

US Virgin Island Chapter

Contact: Robert Upson
St. Thomas, VI 00802
email: upsonr@outlook.com
1 340 776-1600

United States

NEDRA National Electric Drag Racing Association

Web Site: www.nedra.com
Contact: John Metric, 979-665-5621

PLUG IN AMERICA

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

ALASKA

JUNEAU EVA

Contact: Duff Mitchell, 907-723-2481

ARIZONA

PHOENIX EAA

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

TUCSON TEVA

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

CALIFORNIA

CENTRAL COAST (CCEAA)

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

CHICO EAA

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

EVA OF SAN DIEGO (EVAOSD)

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

EVA OF SOUTHERN CALIFORNIA (EVAOSC)

Web Site: www.evaosc.org
Contact: Leo Galcher 949-492-8115

GOLDEN GATE EVA

Web Site: www.ggeva.org
Contact: Dale Miller, 415-472-0378

MAMMOTH LAKES EASTERN SIERRA ELECTRIC VEHICLE ASSOCIATION (ESEVA)

Contact: Don Condon, President
EasternSierraEVA@gmail.com
Cell: 510-414-9948

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

SACRAMENTO EVA (SacEV)

Contact: Guy Hall, 916-717-9158

SAN BERNADINO INLAND EMPIRE EVA

Web Site: inlandempireEVA.org
Contact: Michelle Pierce, 909-238-9052

SAN JOSE EAA

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

SILICON VALLEY EAA

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

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DENVER ELECTRIC VEHICLE COUNCIL (DEVCC)

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

CONNECTICUT

NEW ENGLAND EAA

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

DELAWARE

COASTAL CAROLINA WILMINGTON

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

FLORIDA

CENTRAL FLORIDA EVA (CFEVA)

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

GOLD COAST EAA (GCEAA)

Contact: David Kerzel, 954-785-2184

NORTHWEST FLORIDA EAA

Contact: Nathan Kercher
850-472-0341

SUN COAST EAA

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

TALLAHASSEE AREA EVA

Web Site: www.taeva.org
Contact: Gillian Smith
954-829-1125

GEORGIA

EV CLUB OF THE SOUTH

Web Site: www.evclubsouth.org
Contact: Anne Blair 404-849-7929

HAWAII

BIG ISLAND EVA

Web Site: BigIslandEV.org
Contact: Noel Morin 808-987-7428
nmorin99@yahoo.com

IOWA

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Web Site: www.evohinc.com
Contact: Jeff Hove 515-250-2966

IDAHO

PANHANDLE EV ASSOCIATION PEVA

Website: www.panhandleev.org
Contact: Gordy Ormesher
208-660-8539

ILLINOIS

FOX VALLEY EAA

Web Site: www.fveaa.org
Contact: Michael Willuweit
contactfveaa@fveaa.org

INDIANA

HOOSIER EVA

Web Site: HoosierEVA.org
Contact: Richard Steiner,
317-987-4890

KANSAS

MID AMERICA CHAPTER

Contact: Al Pugsley Jr, 913-381-1091

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EvolveKY

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

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

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Web Site: pveaa.org
Contact: Karen Jones

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MICHIGAN EAA

Web Site: michiganEAA.org
Contact: Larry Tuttle, 734-995-9904
eea.mich@gmail.com

MINNESOTA

MINNESOTA EAA

Web Site: www.mneaa.com
Contact: Tom Helin, 651-246-5730

MISSISSIPPI

MISSISSIPPI EAA (MSEAA)

Contact: Luke Lundemo
601-981-6925

MISSOURI

GATEWAY EV (GEVA)

Web Site: gatewayev.org
Contact: Wayne Garver, 314-359-9626

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EAA NORTHERN NEVADA

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

LAS VEGAS EVA

Web Site: www.lveva.org
Contact: Lloyd Reece, 702-524-3233

NEW JERSEY

EASTERN ELECTRIC VEHICLE CLUB

Contact: Oliver H. Perry, 609-268-0944

NEW JERSEY EAA (NJEEA)

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

NEW MEXICO

NEW MEXICO EVA (NNMEV)

Contact: Richard Dunn, 505-672-1095

NEW YORK

GREATER HUDSON VALLEY EAA

Contact: Seth Leitman, 914-703-0311

GREATER NY EAA

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

NORTH CAROLINA

BLUE RIDGE EV CLUB

Contact: Joe Baum, 828-645-1412

CHARLOTTE EAA

Contact: Jess Montgomery
704-302-4156

TRIAD EVA

Web Site: www.tevaNC.org
Contact: Jack Martin, 336-213-5225

TRIANGLE EAA

Web Site: www.rtpnet.org/teaa
Contact: Deanne Mott, 919-783-8439

OHIO

CENTRAL OHIO EV ASSOCIATION (COEVA)

Contact: George Anderson
614-487-9671

EAA OF NORTHWEST OHIO

Contact: Michael Hall 419-691-1569

GREATER DAYTON EV ASSOCIATION (GDEVA)

Web Site: CleanFuelsOhio.org
Contact: Tim Benford 937-604-3158
tbenford@me.com

OKLAHOMA

EAA OF OKLAHOMA (TULSA)

Contact: Doug Duke, PE
918-260-8350

OREGON

EMERALD VALLEY ELECTRIC VEHICLE ASSOCIATION

Contact: Phil Barnhart phil@barnhart.us
541-912-5412

OREGON EVA

Web Site: oeva.org
Contact: John Christian 503-524-0873

OREGON SOHEVA

Web Site: soheva.net
Contact: James Stephens
541-552-9393

PENNSYLVANIA

THREE RIVERS EVA

Web Site: www.threeriverseva.org
Contact: Jonathan Belak
724-387-8210

TENNESSEE

CHATTANOOGA EVA

Contact: Randy Whorton, 423-822-1840

KNOXVILLE EVA

Web Site: www.knoxev.org
Contact: Gary Bulmer
gpbulmer@gmail.com

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TEXAS**ALAMO CITY EAA**Web Site: www.aceaa.org

Contact: Craig Egan, 210-542-7707

AUSTIN AAEAAWeb Site: www.austinev.org

Contact: Aaron Choate, 512-453-2710

HOUSTON EAAWeb Site: www.heaa.org

Contact: Kevin Douglass, 713-927-6997

houstonxeaa@gmail.com**NORTH TEXAS EAA**Web Site: www.nteea.org

Contact: Ron Swanson, 214-352-8180

UTAH**WASATCH EVA**Web Site: www.wasatcheva.org

Contact: Brian Flock, 760-271-8761

brian@flockgroup.com**VIRGINIA****DRIVE ELECTRIC RVA**

Contact: Charles Gerena, 804-560-3471

RENEWABLE ENERGY & EVA, DIY PROJECT CLUBWeb Site: www.reevadiy.org

Contact: Mark Hanson, 540-473-1248

WASHINGTON**MID-COLUMBIA EVA**

Contact: Garrett Brown, 509-713-0806

NORTH SOUND EVAWeb Site: www.northsoundeva.org

Contact: Jason Thompson,

360-920-0287

SAN JUAN ISLANDS EVA

Contact: Bruce Nyden, 707-494-6693

SEATTLE EVA (SEVA)Web Site: SeattleEVA.org

Contact: Jay Donnaway

President@seattleeva.org**TACOMA EVA (TACEVA)**

Contact: Jeff Finn, 425-643-4694

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

Contact: Jack Anderson, 509-784-1747

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

Contact: Ron Kaltenbaugh

240-586-0014

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

Contact: Marty Weirick, 304 610-1617

WISCONSIN**WISCONSIN EAA**

Contact: Benjamin J. Nelson

262-567-9348



Disbanded Air Pollution Panel Finds EPA Standards Don't Protect Public Health

By Gretchen Goldman

The Independent Particulate Matter Review Panel has released their consensus recommendations to the EPA administrator on the National Ambient Air Quality Standards for Particulate Matter. The group of 20 independent experts, that were disbanded by Administrator Wheeler last October and reconvened last week, hosted by the **Union of Concerned Scientists**, has now made clear that the current particulate pollution standards don't protect public health and welfare.

The Clean Air Scientific Advisory Committee (CASAC) — the

remaining seven-person committee that is providing science advice to the EPA on the particulate matter standards — meets this week to discuss their recommendations on whether the current standards are adequate.



Pixabay / Pexels

The Fine Particulate Matter Standards Don't Protect Public Health

The standards of greatest interest are the primary PM_{2.5} standards. These are the standards for particulate matter less than 2.5 micrometers (fine particulate matter) that are designed to protect public health. The panel supported the preliminary conclusions of a Draft EPA Policy Assessment that the current standards aren't requisite to protect public health.

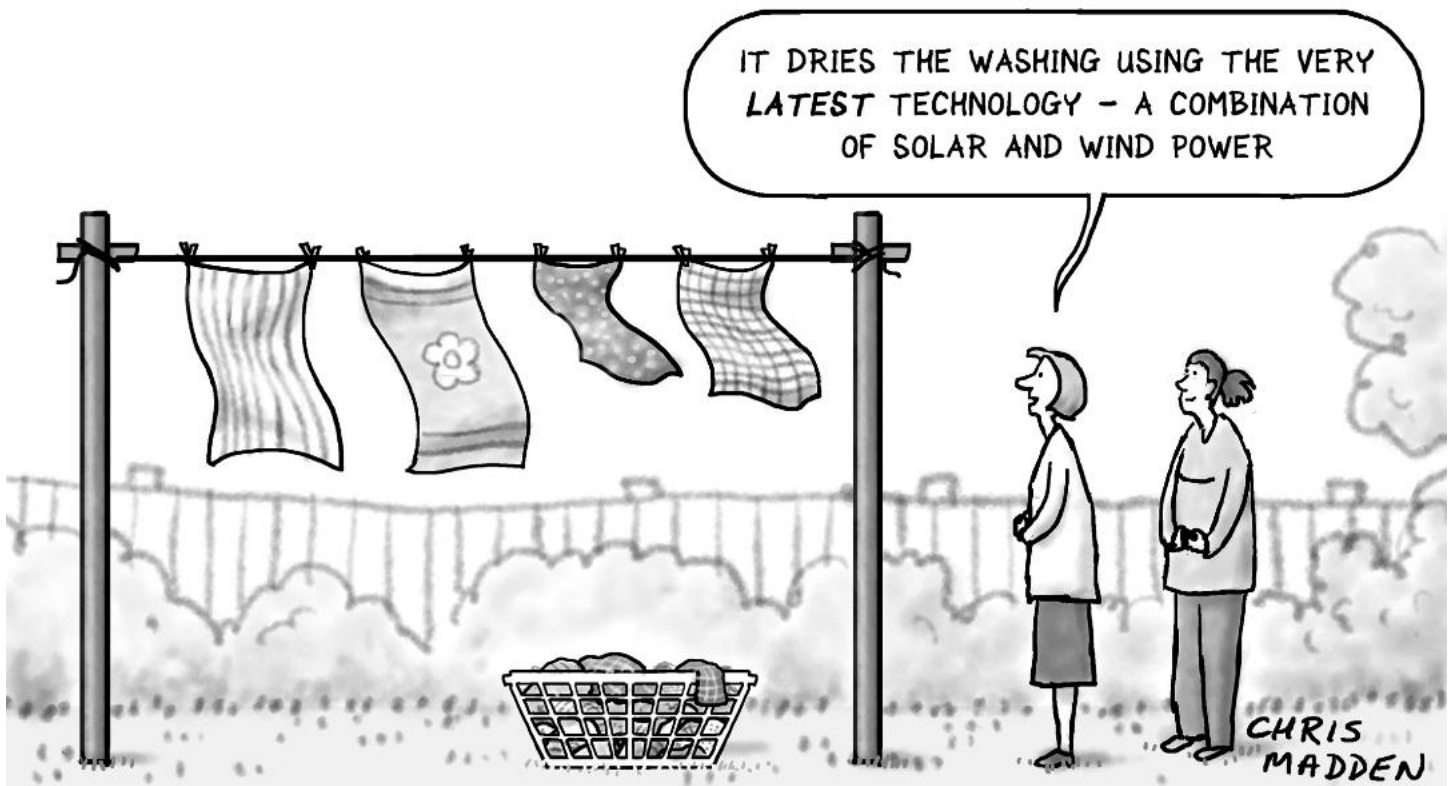
The letter cited new and consistent epidemiological findings, supported by human and animal studies and other studies with natural experiments, as providing "clear and compelling scientific evidence" for tighter standards. Since the last particulate matter review, several new large-scale epidemiological studies provide powerful evidence that particulate matter is causing adverse health outcomes (such as early death, heart attacks, and respiratory stress) at locations and during time periods with concentrations at or below the level of the current standards.

This article is an excerpt from ECOWatch website. To read the rest of it go to the URL below:.

<https://www.ecowatch.com/scientists-air-pollution-panel-epa-standards-2641067502>



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