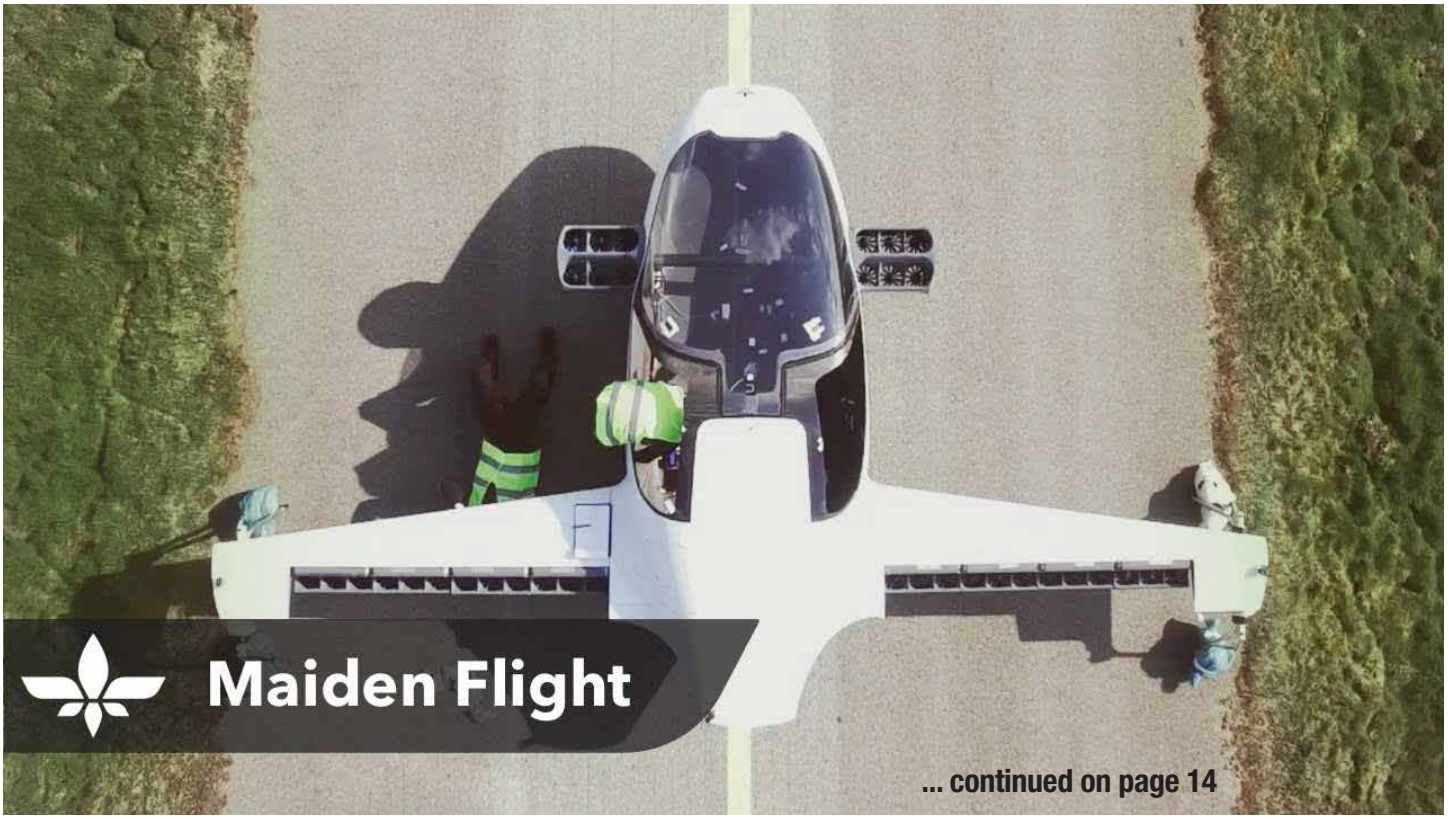
Electric Auto Association

Current EVents

June 2019 Promoting the use of electric vehicles since 1967 Vol. 51 No. 6

The Lilium eVTOL Jet Is A Go!



... continued on page 14

Lilium is still aiming to sell the world's first all-electric jet-powered 5-seat air taxi or electric vertical take-off & landing (eVTOL) vehicle.

New and Old Model S: Compared

... page 22

Owning EVs w/o Home Charging

... page 24

Five Minute Charging Claims

... page 28

Articles

Columns

Electric Auto Association
Current EVents

Current EVents Staff:

Editor: Ron Freund
Associate Editor: Guy Hall
Managing Editor: Dorothy Foglia

Article Submissions:
The deadline for articles is the first of every month for consideration in the next issue of CE. Articles received after this date will be retained for future issues of CE. Send submissions to: CurrentEvents@electricauto.org.

Advertisements:
A full advertiser's information package and Rate Sheet can be sent by E-mail. Please contact CE Staff for details.

National EAA:
Web Site: electricauto.org

Membership/Address Changes:
E-mail: electricauto.org
Mailing: Electric Auto Association
P.O. Box 927090, San Diego, CA 92192

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

Current EVents Back Issues

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

Please visit
http://electricauto.org/ and from the home page, click on "*Documents*" in the top navigation bar. You wll 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.

Follow us on Facebook
https://www.facebook.com/ElectricAutoAssociation
On Twitter: @EAANational https://twitter.com/EAANational

Roadmap 12 – A Feast of News and Views for the EV Industry

By Raejean Fellows

Jeff Allen's FORTH Roadmap 12 [*http://www.roadmapforth.org*] e-Mobility Conference, June 18-19th, was a standout achievement, a dynamic gathering of all major industry stakeholders in the EV community. The two-day feast of EV news and views is a must if you want to keep on top of the ever-changing world of electric vehicles.

The pre-event place to be was the Monday evening event hosted by Women of EV's [*http://www.womenofevs.com*]. One hundred and fifty career women engaged with each other, celebrating the ways in which women advance the expansion of electric vehicles.

If you are willing to get up early with the Dutch (7:30 am) you are educated and inspired by some of the best practices of any country for transformation to sustainable living and the electrification of transportation.

Most notable is the story of Utrecht, Holland, sister city to Portland, OR. Utrecht has plans for 70,000 units of affordable housing including solar on the roofs. One in every three houses get a car, the others participate in a car-sharing program. With 200-300 EVS, there is always a car available. The underground parking garage will host 5,000 chargers where EVs not in use, store energy. The shared EVs all boast bi-directional V2 grid. To promote the project, none less than the King of Netherlands is shown in poster ads.

continued on page 5

(left to right) Jeanette Shaw, Sr. Director, Forth Mobility, www.forthmobility.org
Ellen Hiep, Director, Dutch Electric Vehicle Drivers Association, www.evrijders.nl
Raejean Fellows, President, Electric Auto Association, www.ElectricAuto.org

King Willem-Alexander of The Netherlands enjoying an Electric Vehicle.

Thank you to our Supporting Members

COMMERCIAL AND INDIVIDUAL GIGAWATT DONORS

Clipper Creek, Inc., James Ferris, Ben Sullins, Sven Thesen

HIGH VOLTAGE DONATIONS - $500

Jason France; James Green; Dave Hanson; Tiffany Hinton; Bill Hopkins; Rob Loblaw

SUPERCHARGED PLUS - $240

Karen Casner
Scott Cronce
Bob Dockendorff
Tom Dowling
Ron Freund
Marc Geller
Steve Greenberg
Joe Lervold
Kim Rogers
Dan Vogler
Stuart Williamson

SUPERCHARGED UP - $120

Alan Arrison
Sidney Baum
David Borth
Rick Borth
Stephen Braun
Michael Bussler
Don Clayton
Bill Clem
Keith Comstock
Kyle Cuzzort
James Darnauer
Jay Donnaway
Kevin Douglass
Doug Duke
Jason Ellis
Jeff Finn
Simon Freedman
Gary Graunke
Dennis Griffin
Guy Hall
Christopher Hayden
John Higham
Lawrence Jakobi
Rick Kominowski
Margaret (Peggy) Matarese
August Mathisrud
Cindi McVeigh Wagner
Todd Minnella
Bernard Moret
Rob Neary
Jeff Nisewanger
Norman Pease
Robert Poeschel
Maurillo Sanchez
Mark Schiller
Richard Shipps
Alan Soule
Mark Steffen
Matt Walton

CHARGED UP - $60

Geoffrey Ainscow
Raymond Alden
Ace Allen
Areg Bagdasarian
Kent Bakke
Lon Ballard
Varant Basmajian
Nathalie Belanger
Sean Berry
Jason Bloomberg
Douglas Brentlinger
Tom Bressan
Omar Chatty
Steve Conley
David Crow
Mike Cummings
Joe DiLellio
Stephen Distante
Monica Duncan
Bob Erdman
Larry Emerson
Todd Flax
Brian Flippo
Fabrice Florin
John Gaglione
Wayne Gale
Lee Gasper-Galvin
Steven Gilbert
Jeffrey Gould
Chris Haley
Dean Hancock
Michael Heaney
Phillip Henke
George Hoech
Mark Hughes
Jason Jungreis
Ray Kutz
Raymond Leury
Michael London
Douglas MacDonald
Edward Malkiewicz
Tom McCalmont
Sarah McCann
Robert McCaston
Maria Meyer
Gary Miller
Duff Mitchell
Noel Morin
Robert Neighbour
Stephen Noctor
Paul Olson
Jeff Oring
John Overstreet
Paul Pancella
Dennis Pestka
Robert Powell
Theresa Ramsdell
Bruce Rathbone
Molly Roth
William Rothaus
Mike Sasnett
Ramin Shahidi
Darren Sims
John Sisk
Jim Stack
John Steiner
Robert Stratten
Chuck Swackhammer
Jared Terpak
Michael Thwaite
Joseph Voss
Rusty West
Steven Wypyszczak
Michael Zuteck

Your generous donations are vital to supporting our activities.

President's Message

continued from page 3

The Dutch are known for two things: innovation and their passion for working collaboratively. Holland's culture is very clearly focused on solving the global challenges TOGETHER. For an example of their latest collaboration see below.

There is a strong commitment to EV growth with goals of 100% Zero Emission Vehicles by 2030. Currently, EVs stand at 7% of new car sales, with goals to achieve 10% of new car sales by 2020. With a robust investment in infrastructure, the Dutch will install three million chargers by 2030, which translates into 500 to 1000 chargers installed every day. All this, in a very small country!

Next year, the **Worldwide Electric Vehicle Symposium** will be held in conjunction with FORTH's Roadmap. Save the date, June 14-17, 2020.

Lightyear Unveils Its 'Solar' Electric Car With 450 Miles of Range

By Fred Lambert

The Lightyear One, a new solar-powered electric car developed by several times Solar Challenge winners, has been unveiled today and the startup claims an unbelievable range of 450 miles (725 km) on a single charge.

We have been reporting on Lightyear for a few years now.

The startup first caught our attention because it spun out of Solar Team Eindhoven, a group of engineering students from the Technical University of Eindhoven (Netherlands) who have been competing in the World Solar Challenge with their Stella and Stella Lux, energy positive solar cars – meaning that they can produce more energy than they consume.

Generally, it's almost impossible to add any meaningful power to an EV using solar since there's not enough surface to install solar cells in order to supply the power needed to move vehicles that often weigh over 3,000 lbs.

To achieve positive energy output, Solar Team Eindhoven designed the Stella Lux to be extremely aerodynamic and used lightweight materials such as carbon fiber and aluminum.

Read what they are attempting to do with the Lightyear One [URL below].

https://electrek.co/2019/06/25/lightyear-one-solar-electric-car-range/

Do You Shop at Amazon?

Your purchases can benefit the Electric Auto Association!

Amazon will donate 0.5% of the price of your eligible purchases if you start each shopping session at the URL http://smile.amazon.com and designate Electric Auto Association as your preferred charity. Amazon Smile will make the donation as long as you CHECKOUT from their smile.amazon.com domain.

If you like using Amazon's app and put stuff into the cart, it won't work with smile. The solution: after adding items to your cart switch over to smile.amazon.com for checkout.

Visit Your AmazonSmile Impact

EV Educational Resources

for Individuals, Groups and Organizations

Electric Car INSIDER

EV Buyers Guide

Compare electric cars with comprehensive full page profiles

Discount Pricing Guide App

Save thousands of dollars on EV purchases and leases

Educational Exhibits

Large scale interactive exhibits for indoor and outoor events

Electric Car Guest Drive

Test drive the latest EVs and learn from EV owners

EV Navigator

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

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

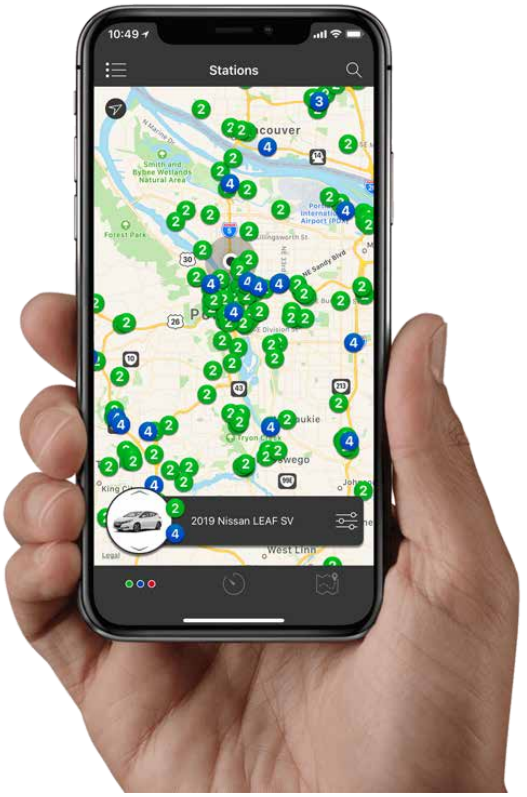
sales@electric-car-insider.com **619-337-4589**

Colors from Chargeway®

The recently announced Chargeway® app bills itself as "a software platform on a mobile app and a communication solution for the electric auto industry, designed to improve the electric car customer experience with their 'electric fuel' "

Using colors and numbers, they have created a simple identity for those charge plugs *and power levels*, thereby offering industry stakeholders and customers *an easier way* to understand how electric cars are charged. Available for smart phones from their respective app stores, it includes a trip planner, timer and mapping functions, something that most modern EVs offer internally.

Such labels could be handy, but first their single labelling system would need to become truly pervasive *and be found everywhere*, on all charging stations plus be identified for all the new market entries. That level of adoption has yet to happen. The concept was introduced at Forth a full year ago, and now there is a nice website with additional sales helper features for dealers. See *http://www.chargeway.net/*

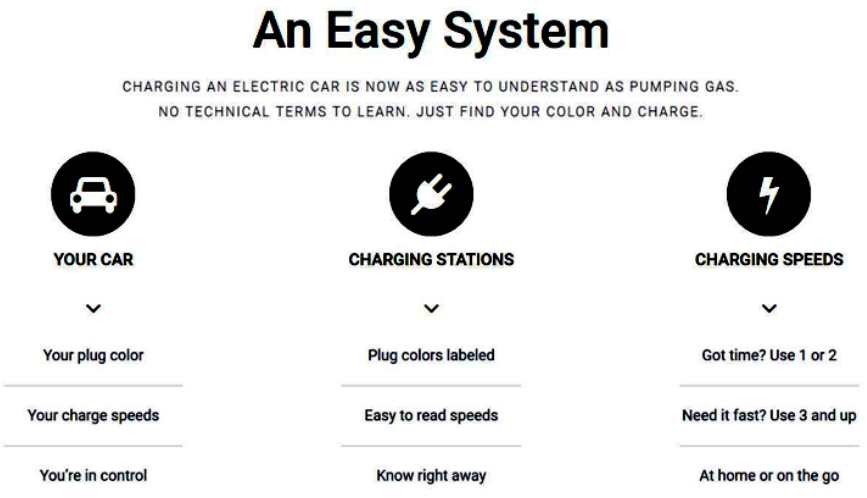


Here is all you need to do. Knowing the kind of car you own, (or will soon own), make one of the three your new favorite color:

- J1772 (AC) and CCS Combo (DC) - Green
- CHAdeMO -Blue
- Tesla - Red

If you have a smart phone, download the app and use it. And tell us what you think, we welcome your opinions!

[Ed: This presumes there is difficulty in understanding the complexity of EV charging so they have proposed a simpler "identity" for charge plugs and power levels. What problem are they solving here? Do we really need a new approach to EV charging standards to rule them all? Any difficulty is ephemeral, and once you got it, "…you won't be fooled again…"]



Plug-in Vehicles in the US Displaced 323 Million Gallons of Gasoline in 2018

FOTW #1081, May 13, 2019

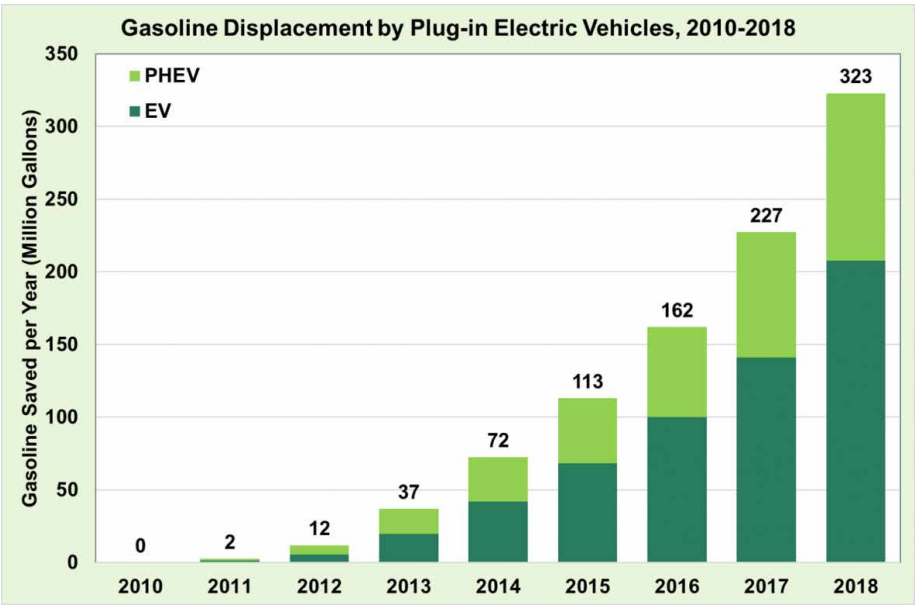
U.S. plug-in vehicles, which include all-electric (EV) and plug-in hybrid electric vehicles (PHEV), have been saving increasing amounts of gasoline. In 2018, plug-in vehicles on the road displaced 323 million gallons of gasoline or about one quarter of a percent of all gasoline used in the United States. Gasoline displacement from plug-in vehicles is about 42% more than it was in 2017 and about twice as much as it was in 2016. The gasoline displacement from EV versus PHEV was split almost evenly in 2012 and 2013 but EV accounted for two-thirds of the gasoline displacement by 2018.

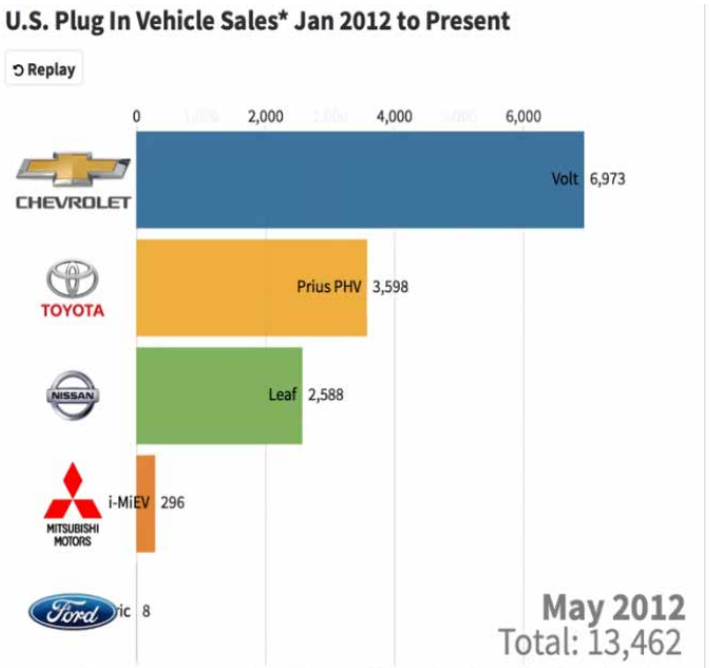
Big oil will soon start to feel the pinch. Then the war will be between the power providers and big oil!

It'll be a fight to the death!

Note: Includes only light-duty vehicles.
Source: Argonne National Laboratory, Assessment of Light-Duty Plug-In Electric Vehicles in the United States, 2010–2018, ANL/ESD-19/2, March 2019.

https://www.energy.gov/eere/vehicles/articles/fotw-1081-may-13-2019-plug-vehicles-united-states-displaced-323-million





Racing Bar Chart Fun!

Creating bar charts for presentations is pretty straightforward, but using a programming free presentation style of racing bar charts adds some much needed 'umph' to boring static data presentations. The fine folks at Flourish have combined the sales of PlugIn Electric Vehicles (which include plug-in hybrids, as well as full electric BEVs) to create an eight year progress chart. Starting in December 2010, and ending in May 2019, it's interesting to watch the race progress.

You will be amazed when you check out the bar chart at the URL below.
Credit Flourish Team, By Mokuzai on 6 Jun 2019

https://public.flourish.studio/visualisation/374245/

The First Tesla Pickup Truck is Here – Sort Of

By Fred Lambert

We are all waiting for an imminent announcement about the unveiling of the Tesla pickup truck later this year, but now a YouTuber has beaten the automaker to create the first functional Tesla pickup truck – sort of…

Simone Giertz, a YouTuber better known for making "shitty robots", wanted an electric pickup truck, especially a Tesla pickup truck, but she didn't want to wait the few more years it will take for the automaker to bring it to market.

Instead, she bought a Model 3 and enlisted a bunch of friends to help her convert the car into a pickup truck.

You might be asking yourself "why not make it out of a Model S or Model X?" which are bigger than the Model 3 and probably more suited as a platform for a pickup truck. They decided to use the Model 3 for its (mainly) steel body, which is easier to modify than the aluminum bodies found on Model S and Model X.

Tesla Pickup

As you can imagine, it's not as simple as cutting the top back half of the Model 3.

The roof is actually an important structural part of the vehicle and they needed to make sure to weld in some new support structure after breaking it down.

For the bed and roof rack, they used parts from older Ford and Chevy trucks.

Also, Tesla vehicles are highly connected and they throw up a bunch of error messages when you remove a lot of parts like this. Fortunately, they had the help of Rich Benoit from Rich Rebuilds who has a lot of experience working with salvaged Tesla vehicles.

continued next page

They managed to make the Tesla pickup truck "fully driveable" and used it for a fake commercial.

See the R-Rated video at this point in the article
https://electrek.co/2019/06/18/tesla-pickup-truck-model-3/

The vehicle looks quite good – at least in the video and press pictures that Giertz sent out – but it's still not done.

It looks like Giertz is serious about making this her main daily driver vehicle and they plan to keep working on it.

The build video of what we could consider to be the first functional Tesla pickup truck appears at this point in the article.

Electrek's Take

That's a super cool project and the video is a ton of fun to watch. We've been huge Simone Giertz fans for a long time now. This quote is gold:

"My goal is to never own a gas car," Giertz said. "I'm a part of a new generation of drivers that will only drive electric. I feel like I should pad this a little bit, but I'm not going to. F*ck oil companies. Seriously, f*ck them."

It leaves me wanting to know a lot more though. I want to know how it changed the weight of the Model 3 and how bad it affects aerodynamic performance – and ultimately the range of the vehicle.

Also, what about Autopilot? It looks like most of the Autopilot sensors are unaffected by the modifications.

In terms of functionality, they would have probably been better off with adding a tow hitch, a trailer, and a roof rack to the Model 3, but that would have been no fun!

I'm jealous. I want a Truckla too now.

Fred is the Editor in Chief and Main Writer at Electrek. He mainly covers electric vehicles, autonomous cars and ride-sharing platforms. You can read his work on Electrek, 9to5mac.com and 9to5google.com

https://electrek.co/2019/06/18/tesla-pickup-truck-model-3/

Electric Pickup Roundup: Rivian Scores Major Partners; Bollinger, Workhorse Look for Funding Hauls

By Ty McMahan

With its concept of pickup and SUV bodies perched upon an electric "skateboard" technology, Rivian may be the buzziest EV startup since Tesla.

The company has been wowing autoshow onlookers and grabbing headlines for major partnerships, tech luminary praise, and novel features of its electric vehicles aimed at adventurers.

A Rivian pickup with a range of about 200 miles will have a starting price of about $70,000.

The company expects to begin delivery next year and has recently lined up an injection of capital and resources to become a strong early entrant in the electric pickup marketplace.

Below is a roundup of some recent developments with Rivian and the latest from other automakers who plan to build electric pickups

Rivian-Amazon partnership

Rivian announced in February a $700 million round of funding led by Amazon which reportedly developed from CEO Jeff Bezos' fascination with emerging trends in the auto industry.

"If you think about the auto industry right now, there's so many things going on with Uber-ization, electrification, the connected car — so it's a fascinating industry. It's going to be something very interesting to watch and participate in, and I'm very excited about that whole industry," Bezos said at a March all-hands meeting, CNBC [*https://www.cnbc.com/2019/05/21/jeff-bezos-to-employees-very-excited-about-auto-industry.html*] reported.

Ford-Rivian partnership

Ford announced [*https://media.ford.com/content/fordmedia/fna/us/en/news/2019/04/24/rivian-500-million-investment-ford.html*] a $500 million investment in Rivian, and a plan for collaboration. Ford will have access to Rivian's electric "skateboard" technology, a rolling chassis that stores the battery pack and can be used for various body configurations.

Ford also said it intends to develop a new vehicle using Rivian's skateboard platform. This is in addition to Ford's existing plans to develop a portfolio of battery electric vehicles. As part of its previously announced $11 billion EV investment, Ford already has confirmed two fully electric vehicles – a Mustang-inspired crossover coming in 2020 and a zero-emissions version of the best-selling F-150 pickup.

With the partnership, Rivian will have access to Ford's engineering and manufacturing resources as it ramps up production of its R1S (SUV) and R1T (truck) at its plant in Normal, IL.

Kitchen in Your Pickup

Rivian announced a very interesting accessory available at launch – a camp kitchen. The unit slides out from a "gear tunnel" located between the cab and the bed and is powered by the truck's 180kWh battery pack.

It features two induction burners, a sink, five gallons of water storage, and "keeps all your cookware and utensils organized while you're out in the wild," Rivian said in a tweet (see phoro at right).

continued next page

GM to electrify a full-size

GM was also reportedly in the hunt to invest in Rivian, but the deal fell apart.

So, the company said in April it plans to build its own range of electrified trucks, including full-size models.

"GM has an industry-leading truck franchise and industry-leading electrification capabilities," Chief Executive Mary Barra said during the automaker's quarterly earnings call. "I assure you we will not cede our leadership on either front. We intend to create an all-electric future that includes a complete range of EVs, including full-size pickups."

Still, there are few details as to the timing of an electric Chevrolet or GMC truck.

Workhorse woes

Workhorse, which builds electric fleet vehicles and a pickup, is reportedly having woes. A New York Times report said the entity, headed by founder Steve Burns, "exists almost entirely on paper," and is "barely hanging on."

The company is hoping to attract a $300 million investment to help it tool a Lordstown, Ohio GM plant to complete assembly of vehicles for UPS, DHL and other customers. UPS ordered 1,000 electric vans. And the company is a finalist for a $6.3 billion contract to build electric delivery trucks for the USPS.

Workhorse has reportedly produced a total of 365 vehicles since its founding in 2007.

Bollinger Seeks Investment

Bollinger Motors is also on the hunt for funding. The company has moved from Hobart, N.Y., to Detroit to bring its all-wheel-drive electric off-road vehicle to production. Founder Robert Bollinger told Automotive News he is looking for $100 million to complete the engineering work and begin production.

"The company has hired engineers, lined up its first vendors, started testing components, shopped for a manufacturing site and worked on the myriad other things it takes to build and sell high-quality vehicles," according to the report.

The company plans to build a boxy sport-utility truck dubbed the B1, and a four-door version known as the B2, at a low volume, which means they'll likely have a high price. Bollinger intends to show off new vehicles in July.

Tesla Pickup

During Tesla's Q4 2018 conference call, Musk said a Tesla-badged pickup truck may be ready for an unveil "this summer."

Some of Musk's Twitter banter has described the pickup as a mini version of the Semi with "crazy torque" and room for six passengers. He has also suggested 400 to 500 miles of range or "maybe higher."

Speaking to Recode in November, Musk said he wants it to be a "futuristic-like cyberpunk, Blade Runner pickup truck" and that he doesn't care if many people want to buy it.

Tesla certainly has a lot on its plate with scaling its current offerings including the Model Y crossover, but hopefully we're just a few months away from seeing the concept of a pickup Musk calls "heart-stopping."

[Interested in an Electric Pickup? More videos about them appear on page 44]

https://teslamotorsclub.com/blog/2019/05/30/electric-pickup-roundup-rivian-scores-major-partners-bollinger-workhorse-look-for-funding-hauls/

Why The Age Of Electric Flight Is Finally Upon Us

Eviation's nine-seater electric aircraft, Alice, was a hit at the Paris Airshow (Eviation)

By Tim Bowler
BBC News

Aerospace firms are joining forces to tackle their industry's growing contribution to greenhouse gas emissions, with electric engines seen as one solution. But will this be enough to offset the growing demand for air travel?

This week's Paris Airshow saw the launch of the world's first commercial all-electric passenger aircraft — albeit in prototype form.

Israeli firm Eviation says the craft - called Alice - will carry nine passengers for up to 650 miles (1,040km) at 10,000ft (3,000m) at 276mph (440km/h). It is expected to enter service in 2022.

Alice is an unconventional-looking craft: powered by three rear-facing pusher-propellers, one in the tail and two counter-rotating props at the wingtips to counter the effects of drag. It also has a flat lower fuselage to aid lift.

- Firms team up on hybrid plane tech
- EasyJet backs plan for electric planes
- The Disruptors - Up, up and away

"This plane looks like this not because we wanted to build a cool plane, but because it is electric," says Eviation's chief executive Omer Bar-Yohay.

"You build a craft around your propulsion system. Electric means we can have lightweight motors; it allows us to open up the design space."

Eviation has already received its first orders. US regional airline Cape Air, which operates a fleet of 90 aircraft, has agreed to buy a "double-digit" number of the aircraft.

The firm is using Siemens and magniX to provide the electric motors, and magniX chief executive Roei Ganzarski says that with two billion air tickets sold each year for flights of under 500 miles, the business potential for small electric passenger aircraft is clear.

Crucially, electricity is much cheaper than conventional fuel.

A small aircraft, like a turbo-prop Cessna Caravan, will use $400 on conventional fuel for a 100-mile flight, says Mr Ganzarski. But with electricity "it'll be between $8-$12, which means much lower costs per flight-hour".

"We're not an environmentalist

continued next page

The plane that can fly 600 miles on batteries alone

Harbour Air is planning to turn its fleet of sea planes electric

company, the reason we're doing this is because it makes business sense."

MagniX is now working with seaplane operator, Vancouver-based Harbour Air, to start converting their existing fleet to electric.

The future also looks reasonably bright when it comes to medium-range flight — a range of up to about 1,500km.

Unlike Alice, aircraft targeting this range would use a mix of conventional and electric power, enabling them to cut CO_2 emissions significantly by switching on the electrical component of their propulsion at the key points in a flight — take-off and landing.

Several demonstration projects are now nearing fruition.

For example, Rolls-Royce, Airbus and Siemens are working on the E-Fan X programme, which will have a two megawatt (2MW) electric motor mounted on a BAE 146 jet. It is set to fly in 2021.

Airbus, Rolls-Royce and Siemens are co-operating on an electric-hybrid aeroplane called the E-Fan X

"There are huge amounts of energy involved here, the engineering is absolutely leading-edge — and our investment in electrification is ramping up rapidly," says Rolls-Royce's chief technology officer Paul Stein.

United Technologies, which includes engine-maker Pratt & Whitney in its portfolio, is working on its Project 804, a hybrid electric demonstrator designed to test a 1MW motor and the sub-systems and components required.

The firm says it should provide fuel savings of at least 30%. It should fly in 2022 and is forecast to be ready for regional airliners by the mid-2020s.

Zunum Aero, backed by Boeing, is using a engine turbine from France's Safran to power an electric motor for a hybrid craft. And low-cost airline EasyJet is working with Wright Electric, saying it will start using electric aircraft in its regular services by 2027. This is likely to be on short-haul flights, such as London to Amsterdam — Europe's second busiest route.

"Electric flying is becoming a reality and we can now foresee a future that is not exclusively dependent on jet fuel," says EasyJet chief executive Johan Lundgren.

It's a statement underscored by a report from investment bank UBS which predicts the aviation sector will quickly switch to hybrid and electric aircraft for regional travel, with an eventual demand for 550 hybrid airliners each year between 2028 and 2040.

But the prospects for electric long-haul flights are not so rosy.

While electrical motors, generators, power distribution and controls have advanced very rapidly, battery technology hasn't.

Even assuming huge advances in battery technology, with batteries that are 30 times more efficient and "energy-dense" than they are today, it would only be possible to fly an A320 airliner for a fifth of its range with just half of its payload, says Airbus's chief technology officer Grazia Vittadini.

"Unless there is some radical, yet-to-be invented paradigm shift in energy storage, we are going to rely on hydrocarbon fuels for the foreseeable future," says Paul Eremenko, United Technologies chief technology officer.

The big problem with this is that 80% of the aviation industry's emissions come from passenger flights longer than 1,500km — a distance no electric airliner could yet fly.

Yet the UK has become the first G7 country to accept the goal of net zero carbon emissions by 2050 — a huge challenge for the air travel business with 4.3 billion of us flying this year and eight billion expected to do so by 2037.

Read the rest of the article at the URL below.

https://www.bbc.com/news/business-48630656

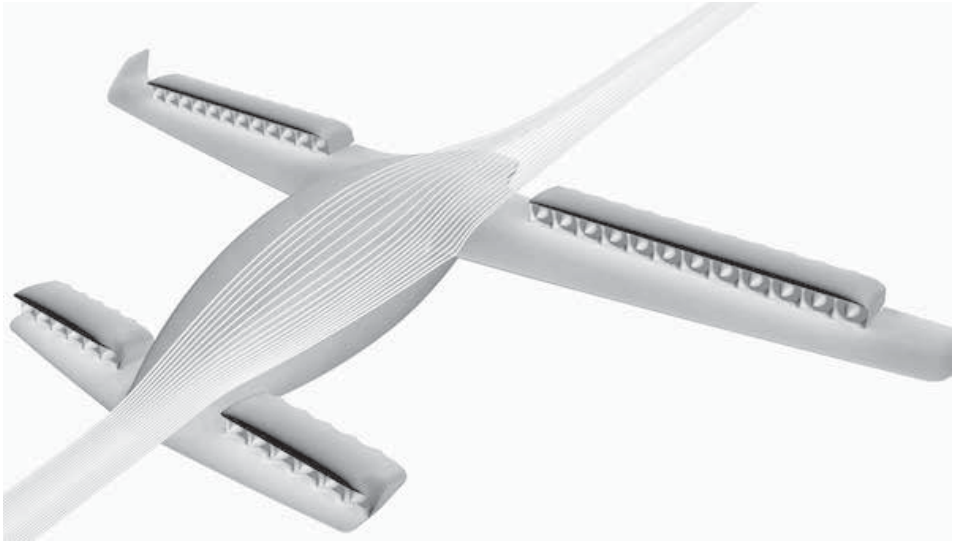
Lilium Reveals Long-Awaited New Air Taxi & Celebrates Maiden Flight In the Same Swoop

By Nicolas Zart

According to Daniel Wiegand, co-founder and CEO:

"Today we are taking another huge step towards making urban air mobility a reality. In less than two years we have been able to design, build and successfully fly an aircraft that will serve as our template for mass production. Moving from two to five seats was always our ambition as it enables us to open up the skies to many more travelers. Whether its friends or families flying together or business travelers ride-sharing into the city, having five seats delivers an economy of scale you just can't achieve with two. The Lilium Jet itself is beautiful and we were thrilled to see it take to the skies for the first time. With the perfect balance of range and speed, our aircraft has the potential to positively impact the way people choose to live and travel, all over the world.

"We dream of a world where anyone can fly wherever they want, whenever they want. We've invested a tremendous amount of thought and care into designing an aircraft and a service that will let us deliver this, meeting society's demands for urban air travel that is quiet, safe and environmentally positive. Getting to this point has meant tackling some of aerospace's greatest challenges, but now we're here we can focus on bringing our vision to life and connecting communities in ways they have never been connected before. Whether it's reducing the need for investment in ground-based infrastructure like road or rail, or opening up new areas to economic opportunities, we believe that urban



continued next page

To Fix or Not To Fix Wings, That Is The Question — Just Not For the Lilium Jet eVTOL

air mobility has the potential to be a remarkable force for good in society and we look forward to working across our sector to achieve this."

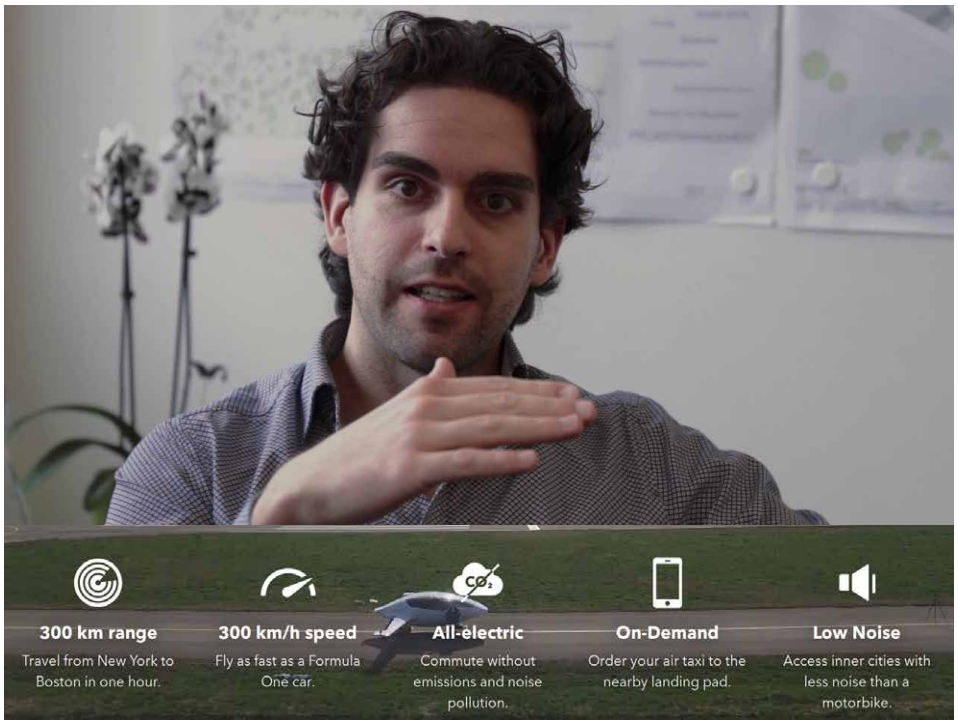
The Lilium Jet's top speed will reach 300 km/h (186 mph).

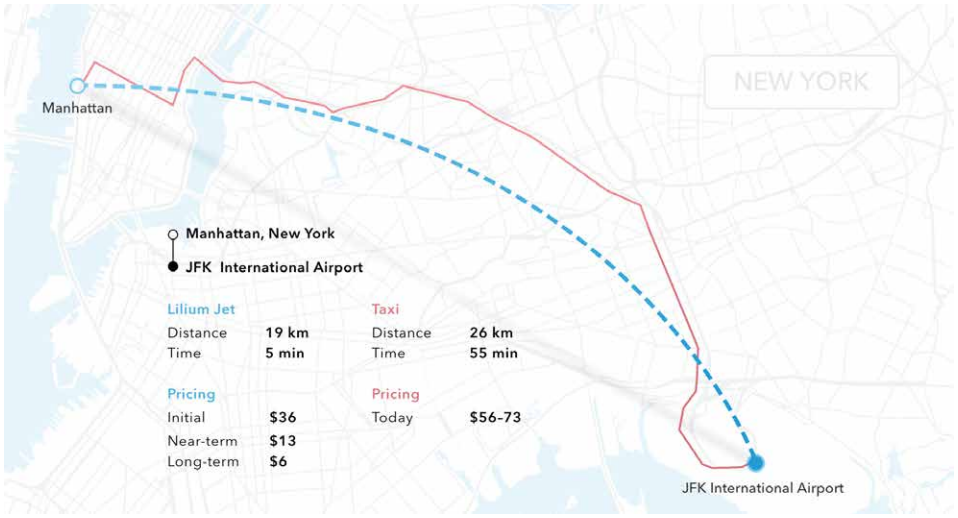
Anyone observing the wild design world of eVTOL aircraft will agree that there are enough UAM design strategies to cover many UAM market segments, even if they don't exist yet. For instance, should an eVTOL have fixed wings or retractable ones? It depends mostly on where, how, and how far the aircraft will travel. Fixed wings are good for longer trips and retractables are practical with the potential of landing almost anywhere.

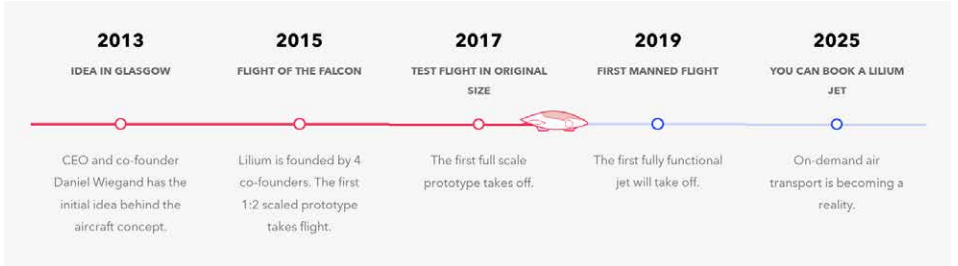
Lilium's fixed-wing design means the Lilium Jet make use of the wings for lift. Lilium estimates the aircraft will use up to 10% of its maximum 2000 hp (1,492 kW) during cruising operation. This gives it the efficiency of a ground electric vehicle (EV) covering the same distance. This is how Lilium plans on connecting suburbs to city centers to airports to main train stations — as a high-speed connection network across entire regions. Think of it as Europe's intercity trains, but much faster.

Leandro Bigarella, Head of Flight Test, said:
"While a maiden flight is always a moment of truth for a business, the Lilium Jet performed exactly as expected and responded well to our inputs. Our flight test program will now continue with increasingly complex maneuvers as we look towards our next big goal of achieving transition flight, which is when the aircraft moves seamlessly from vertical to horizontal flight."

continued on page 18







Lilium Taxi

continued from page 17

Lilium says the user experience will be as easy as pushing of a button. Passengers will choose a destination on Lilium's app from their nearest landing pad. Lilium sees a network of pads across cities and regions where passengers can hop on for the same price as a taxi, but 4× faster.

Lilium wants to be fully operational around the world by 2025 and will start trial services much sooner. In the meantime, it is continuing to test its latest 5-seat Lilium Jet for even more rigorous flight test campaigns to demonstrate a wider range of its capabilities.

Lilium Jet eVTOL Dreaming, But When?

https://cleantechnica.com/files/2017/04/Lilium-Electric-VTOL-Taxi-3.jpg

Forget cars. We need electric airplanes.

The race is on to build batteries big enough for planes to fly on clean electricity.

By Umair Irfan

If we're going to limit climate change this century, we need to electrify everything. That includes air travel, a large and growing source of some of the most potent greenhouse gas emissions. Yes, high-speed rail could displace some flights, but for longer journeys, travelers will clearly still have to take to the skies.

Which means we're going to need electric airplanes. And while it might sound far-fetched, we may actually have a path to them. Norway was optimistic enough to announce last year that the country wants all domestic flights to be electric by 2040.

That's why a recent announcement by a small airline in the Pacific Northwest was so significant. Harbour Air, based in Vancouver, announced in March that it is aiming to operate an all-electric fleet.

Pipistrel's Alpha Electro is one of the first production electric aircraft. Electrifying aviation is an important strategy for mitigating climate change. Pipistrel

Harbour Air currently operates 42 seaplanes, or float planes, across 12 routes. The company is now retrofitting some of its existing aircraft with a battery-electric propulsion system from magniX, an electric drivetrain manufacturer. Test flights of these retrofitted planes are scheduled for later this year, and the company expects the first commercial electric flights to take off in 2022.

[Read the rest of this lengthy article below.]

https://www.vox.com/2019/3/1/18241489/electric-batteries-aircraft-climate-change

Electroflight | Fully Charged

This is an older (2016) video of an excellent explanation for the lay person on electric propeller planes.
https://www.youtube.com/watch?v=Xe1g1JrRRkY

It's Robert Llewelyn who asks questions as he discusses the motivation and the critical design thoughts behind electric flight with Chris Turner of Electroflight (some other Brits, busy doing it). The discussion also covers the process of propeller construction (also an eye opener) and finally at 12:45, they put two counter-rotating props on instrumentation so that ouput power can be examined, and ideal positioning can be determined. These critical design elements are what e-plane designers concern themselves with.

At approximately 16:50, Turner states what's happening prophetically: it allows the "big boy plane developers" to radically rethink large aircraft configurations with new airframes. And today we see multi-motor wing mounted, ducted fan assemblies making significant progress. The power density of electric motors, along with the energy density of batteries is significantly better than what ICE technology has brought us in the past. The future for short range multiple passenger electric flight is looking very exciting indeed!

[Ed: Breaking news: Siemens (the German giant) has sold it's electric aircraft propulsion business to Rolls Royce (part of Bentley Motors Limited subsidiary of Volkswagen AG). See *https://www.eenewspower.com/news/siemens-sells-electric-aircraft-propulsion-business-rolls-royce*]

Just three years ago, Siemens demonstrated this as shown in this short German video (with English subtitles) In a big leap for the electrification of aviation, an Extra Aircraft aerobatic plane performed its maiden flight with an electric powertrain.
https://www.youtube.com/watch?v=fiu8TFnXYFY

Part 1 *https://www.youtube.com/watch?v=ljbhGfnUchA*

First Solo Flight in Alpha Electro - part 1 (Take-off)

Part 2 *https://www.youtube.com/watch?v=1o6WWQQQot0*

First Solo Flight in Alpha Electro - part 2

Part 3 *https://www.youtube.com/watch?v=1URqmuJ2Tbg*

First Solo Flight in Alpha Electro - part 3

Part 4 (landing) *https://www.youtube.com/watch?v=GPoXSItKELQ*

First Solo Flight in Alpha Electro - part 4 (Landing)

Buick Velite 6 MAV is the Brand's First All-Electric Vehicle

This wagon-like Vehicle Debuted at the Shanghai Motor Show

This wagon-like vehicle debuted at the Shanghai Motor Show.Buick is making a big splash at the 2019 Shanghai Motor Show. It debuted the brand's first all-electric vehicle, dubbed the Velite 6 MAV, which is a production version of the concept we saw a year ago (*https://www.autoblog.com/2018/04/18/buick-velite-6-phev-electric-china/#slide-7308595*). The vehicle is reportedly built on a new platform GM developed with China's SAIC and will be sold in China. This platform uses a "new-generation pure electric drive system," but **it's not** based on the new electric vehicle platform (*https://www.autoblog.com/2019/01/11/cadillac-ev-gm-leading-electric-brand/*) GM said is going to underpin new electric cars in the U.S. starting in 2021.

Consumers may not want it here anyways. The electric motor makes 114 horsepower and 188 pound-feet of torque. It has a "city" electric driving range of 187 miles, but Buick doesn't quote any numbers as they would pertain to our EPA rating system. That's plenty of range for most folks, but the lack of power would be a tough sell here.

Buick calls this thing an MAV, which stands for multi-activity vehicle. It's tough to put a car type on it, because it borrows elements from several different styles. We'll just distill it to a mash-up between a wagon and a crossover, sort of like the Subaru Outback. At least it appears utilitarian.

Buick says that it costs about $25,000 after all the Chinese government subsidies for an electric vehicle have been applied. The goal here is to give the Buick-hungry Chinese market an electric option, and this doesn't look half bad. GM is even entering into a car-sharing venture to deploy 5,000 Velite 6s with EVCARD (car sharing company) into strategic areas. Those will reportedly be put into operation on April 28 this year.

https://www.engadget.com/2019/04/16/buick-velite-6-mav/

Opel Goes All-electric for 6th Gen Corsa

By Paul Ridden

Opel's not one for rushing into releasing new models of its popular Corsa family runabout – the 5th generation was announced in 2014, and the gen before that was launched in 2006. For its just-revealed 6th gen, the German auto maker has decided to embrace the battery-electric future with the Corsa-e.

With the launch of the Corsa-e, Opel says that it plans to "finally bring electric mobility out of its niche existence." And it seems to have selected the right car for the job, ICE versions of the Corsa having racked up 13.6 million sales units since the first car premiered in 1982.

The five seat Corsa-e is being claimed good for 330 km (205 mi) of per charge range, which is offered as a WLTP provisional figure. The 50 kWh battery pack will be able to fast-charge to 80 percent capacity in 30 minutes, and is covered by an eight year warranty. Drivers will be able to keep tabs on remaining battery life via the myOpel mobile app.

The 100 kW motor will drive the all-electric car to 100 km/h (62 mph) in 8.1 seconds, with 260 Nm (191.7 lb.ft) of torque on tap and three driving modes to choose from. Eco mode will naturally get the most out of the battery, while selecting Sport is reported to increase responsiveness and driving dynamics (in exchange for a "moderate loss of driving range").

The Corsa-e is about the same size as its engine-packing ancestor, though the roofline is now 48 mm (1.8 in) lower without impacting on headroom within – the driver now sits 28 mm lower.

For the first time in the small car segment, Opel has included IntelliLux LED matrix headlamps that make use of a high-resolution camera at the front to adapt the light beam so that oncoming drivers don't get dazzled. That camera can also read traffic signs, as well as detecting such things as LED signs. Other safety features include radar-supported adaptive speed control, sensor-based flank guard and side blind-spot assist.

Inside, Opel has treated the new car to a full digital cockpit with either a 7- or a 10-inch touchscreen infotainment panel with live navigation.

Drivers will be able to order the Corsa-e soon. Pricing has not been revealed at this time.

https://newatlas.com/opel-corsa-electric/59839/

2019 Tesla Model S Long Range vs 2013 Model S 85: How Do They Compare in Value?

2013 Tesla Model S electric sport sedan on delivery day, with owner David Noland

By David Noland

When I bought my first Tesla Model S back in 2013, it had already been named that year's Green Car Reports' Best Car to Buy, and Consumer Reports had just declared it the best-scoring car they'd ever tested, noting that it broke their rating scale.

The Model S was an extraordinary car, and—at about the same sticker price as comparable ICE luxury cars like the Audi A7—a great value for the money.

On Tuesday, Tesla slashed prices for the Model S by $3,000, ramping up the value, and leading us to assess: In terms of bang-for-the-buck, how does this current Long Range version stack up against my "golden oldie" original Model S?

It's basically the same car, with no major platform or body changes since its introduction in 2012. Most car models get major redesigns every 4-6 years, but Tesla has let its flagship sail on for seven years now, with no hint of a redesign coming any time soon. In the interim, Porsche, Audi, BMW, Mercedes and others have all announced new state-of-the-art (their art, at least) electric luxury cars aimed squarely at Tesla.

Is the venerable Model S finally starting to approach obsolescence?

A quick look at the current car's numbers and features on the Tesla website configurator provides a clear answer: No freakin' way. The current Model S Long Range is a dramatically better car than the 2012 best-car-ever-tested S85, and a far better value for the money.

Let us count the ways:

40 percent longer range. My old 85-kwh Model S had an EPA range of 265 miles. The new one, with a bigger battery and more efficient drivetrain, is rated at a stunning 370 miles.

I always found the 265-mile number to be mostly good enough. Occasionally on long trips, though, if the temperature dipped below 30, or if a headwind kicked up, I wished for a bit more. (And I got it when I upgraded to a 2017 Model S 100D, EPA rated at 330 miles.)

But 370 miles is just crazy. It's almost too much range—the point at which the extra miles might not be worth the extra cost and weight of the required battery capacity. The current Model S Long Range, combined with the Supercharger V3 network that's on the way, puts a final, emphatic stake through the heart of "Range Anxiety."

2013 Tesla Model S in Florida, during New York to Florida road trip (photo: David Noland)

27 percent more efficient. The old 85 used 38 kwh of out-of-the-wall electricity to drive 100 miles, according to the EPA. Thanks to more efficient motors, inverters, and chargers, the

continued next page

2013 Tesla Model S in winter, Hudson Valley, NY (David Noland)

current car uses just 30 kwh. And in terms of equivalent miles per gallon, the EPA lists 93 MPGe for the old 85, and 111 MPGe for the new Long Range.

41 percent quicker to 60 mph. The old 85 had a 0-60 time of 5.2 seconds, which made me and my passenger buddies giddy. Its smooth, instantaneous acceleration became Tesla's hallmark, the thing that truly set it apart from all other cars. Yet the current Model S Long Range blows the old 85 away, with a 0-60 time of just 3.7 seconds—faster than the P85 Performance version of the original car.

Autopilot. The original car had no Autopilot, of course, and cannot be upgraded. The current car has as standard equipment a basic version of Autopilot, which enables the car to steer, accelerate and brake automatically for other vehicles and pedestrians within its lane.

Full self-driving. Tesla has already enabled lane-changing, off-ramps, auto-parking, and a "summon" feature for those who've chosen its future-leaning Full Self-Driving option, not available on the earlier Model S. More capabilities are expected for the FSD system later this year, and beyond.

2019 Tesla Model S

All-wheel drive. My old 85 had rear-wheel drive, and I found that winter traction was mediocre with all-season tires. A couple of times I had problems getting out of my long snow-covered upstate New York driveway. The current Model S Long Range's AWD system is vastly superior. My 100D, which has basically the same system, has always handled my driveway—and every other winter situation I've encountered—with aplomb.

Convenience items. My original car was a surprisingly spartan affair when compared to other luxury sedans in its price range. The current Long Range has mostly taken care of that inadequacy. It now includes full turn-by-turn navigation, expanded keyless entry with walk-away locking, a center console, parking sensors, LED headlamps, a panoramic glass roof, and better (heated) seats.

Bang for the buck. Astonishingly, in constant dollars, the current car, for all its advantages, actually costs less than the old one.

My 2013 car, with a 85-kwh battery, green metallic paint, leather seats, and air suspension, listed for $82,320 back in the day. Adjusted for inflation, that's $90,836 in today's dollars.

A new Model S Long Range, with all the aforementioned standard features and the metallic paint option, today lists at $86,500 (not including the mandatory $1,200 destination and documents fee).

Standard Range comparison

Even Tesla's current entry-level Model S, the Standard Range car, easily beats the old 85—for $14,000 less in today's money.

Range is 20 miles better, at 285 miles. Acceleration to 60 mph, at 4.0 seconds, is more than a second quicker. Although the EPA has yet to publish an efficiency number, I would expect it to also be about 27 percent better than the old 85. And it has all the other advantages—basic Autopilot, AWD, and about as many convenience features as the Model S Long Range.

With the metallic paint option, it costs $76,500. That's nearly $5,000 cheaper than the 2013 sticker price of the old 85. In inflation-adjusted dollars, it's an 18-percent price reduction.

Simply put, the Model S keeps getting better and cheaper. At this rate, will we be able to buy a 2026 version with Level 5 automated driving, a 518-mile range, 2.6-second base 0-60 time, and a 132 MPGe efficiency rating—all for $82,400 in today's dollars?

I can hardly wait.

https://www.greencarreports.com/news/1123209_2019-tesla-model-s-long-range-vs-2013-model-s-85-how-do-they-compare-in-value

Can You Own an EV Without a Home Charger?

This undated photo provided by Edmunds shows a 2017 Tesla Model 3 at one of the many supercharger stations across the country. Tesla vehicles have a slight edge on public chargers, compared to other EVs, due to their widespread availability and faster charge speeds. (Ronald Montoya/Edmunds via AP)

By Ronald Montoya

A popular selling point for electric vehicles is the notion that you never have to stop for gas. Your "gas station" is in your garage—simply plug in your vehicle to charge it overnight.

But what if you live in an apartment? Or park somewhere without a plug? How practical is it to own an electric vehicle if you can't charge it at home?

I set out to answer these questions by driving two electric vehicles in the Edmunds test fleet without relying on a home- or office-based charger. I spent one week in a Chevrolet Bolt and another in a Tesla Model 3. The Bolt has an estimated driving range of 238 miles on a full charge, and the Model 3 Long Range can go an EPA-estimated 310 miles. Here are a few lessons I learned along the way.

FIND A STATION AND ROUTINE THAT WORKS FOR YOU

Without a home charger, you'll need to rely on public stations. But locating them can be challenging, even when you know the exact address. Some are located in shopping mall parking lots, while others might be at hotels or car dealerships. Sometimes, you'll have to pay for parking.

Based on my 40-mile commute and weekend mileage in the Los Angeles area, I knew I'd need to charge the Bolt every two or three days for about three hours, which meant finding a charge station near whatever I planned on doing. One night I went to see a movie and used the charging station in a mall parking lot. It was reasonably convenient. But on another day, the closest charger was a 0.75-mile walk from the barbecue I was attending.

Recharging was easier with the Tesla Model 3. Its greater range meant I could drive longer before needing to stop to recharge. Also, Telsa's exclusive Supercharger stations were in more obvious locations, and their fast charging speeds meant less downtime.

HAVE A BACKUP CHARGING STATION IN MIND

For EVs other than a Tesla, you'll have to set up an account with one or more of the major charge station companies such as ChargePoint, Blink or EVgo. Their respective smartphone apps do an excellent job of helping you locate the charging stations in your area, along with showing how many spaces are currently in use. [Ed. There is always Plugshare.com] The trouble is, by the time you get there, the spaces might be occupied sometimes even by a non-EV

continued next page

This undated photo provided by Edmunds shows a 2017 Chevrolet Bolt at a charging station in a shopping mall parking lot. You'll want to coordinate your charges with other activities to help pass the time. (Ronald Montoya/Edmunds via AP)

owner who wasn't paying attention to the signs. At that point, you can either wait – which can take anywhere from a few minutes to a few hours, depending on the charger and vehicle – or try another nearby station.

It's much less of an issue for a Tesla Supercharger station, which can typically accommodate a dozen cars at once.

KEEP BATTERY TOPPED OFF

Let's say you get lazy or have a busy week and don't have time to charge on your normal schedule. If you run the battery low in the Bolt, for example, you're looking at an estimated eight- to nine-hour charge at a Level 2 charger to fill it back to 100%.

Charging times aren't much of an issue on the Model 3 provided you have access to a Supercharger station. These stations can quickly recharge a nearly depleted battery to about 80% capacity, which is good for more than 200 miles of driving, in about 20-30 minutes.

The Supercharger equivalent for non-Teslas is a Level 3 charger, or DC Fast Charger. However, there's less consistency—some stations might not always be that fast. I learned this when I visited a Level 3 station in the Bolt with a nearly drained battery. After 30 minutes, I only had gained 34 miles of range.

BE PREPARED FOR VARYING ELECTRICITY COSTS

Sometimes, you'll be able to find a free public-access charger. But for the most part, you'll have to pay to recharge. And just like with gas stations, the price varies. A kilowatt-hour of electricity is based on the utility rates in that city and the price the station owner set for that machine. For example, a 3 1/2-hour charge (good for about 120 miles of range) in the Bolt cost $3.54 in one place and $6.52 at a different location I used later in the week.

Pricing for Level 3 chargers can be even more expensive. Tesla's Supercharger network has a fixed cost of 28 cents per kilowatt-hour, allowing you to better plan for recharging expenses.

EDMUNDS SAYS: *It is possible to own an EV without a home charger.* But it depends on how much you drive daily and how comfortable you are with sticking to a routine of public charging, which is easier with Tesla's supercharging network. However, the barrier of entry for Teslas is higher given that they are more expensive than the average EV.

https://phys.org/news/2019-05-electric-car-home-charger.html

Electric Vehicles: A New Model to Reduce Time Wasted at Charging Points

By European Commission, Joint Research Centre (JRC)

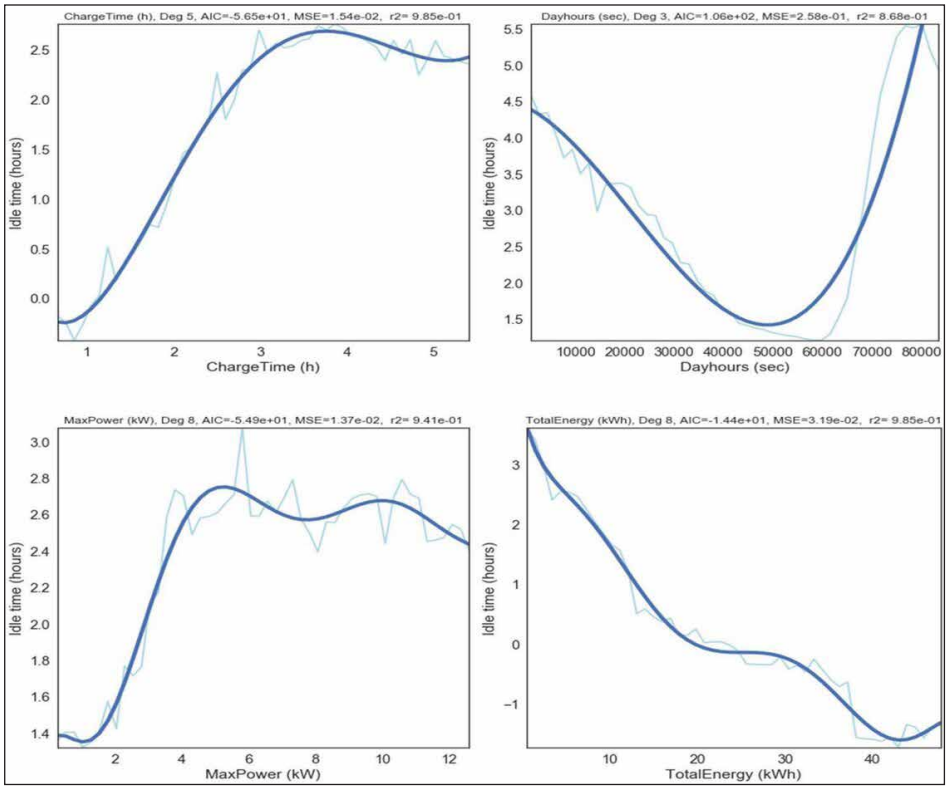
Over half the time (61.4 percent) that electric vehicles spend connected to public charging stations, they're idly occupying a space that another car could use, according to a JRC-led study of e-vehicle charging times in the Netherlands.

This 'idle time' occurs when the car has been fully charged but is left plugged in. High idle time obviously reduces the availability of chargers, but it also provides an opportunity for grid operators to balance the grid.

Using data from 1.8 million e-vehicle charging observations in the Netherlands over a 6-year period, the study analyses the factors affecting idle time, providing a methodology to plan effective future charging infrastructures. The study authors also recommend building new charging points in the centre and at the outskirts of the cities that they looked at.

Based on the factors identified, the study provides a model that can estimate, at the beginning of its charging session, how long an e-vehicle is likely to be left idle after charging is completed.

As the number of e-vehicles on the road increases and puts pressure on existing charging infrastructure, there's a danger that drivers might struggle to find a free charging spot before their car runs out of juice. At the same time, fully charged but plugged-in vehicles could be used to feed the wider power grid with energy at times when demand is high. And charging stations can be managed to take advantage of this idle time by shifting charging to a time when demand is higher.



Factors influencing idle time included charge time, max power, total energy, and hour of the day the car is first plugged in. Credit: European Commission, Joint Research Centre (JRC)

All of this of course depends on a solid understanding of the factors that affect idle time. For the study, JRC scientists partnered with ElaadNL, the Netherlands' knowledge and innovation centre for charging infrastructure, to identify these factors and investigate their impact.

The factors influencing idle times

The three factors found to have the highest influence are:

- The time of day that the car is first plugged in: while there is no single 'peak moment' in terms of number of cars idling, the scientists found that cars that start charging first thing in the morning or late in the evening tend to have higher idle times. This could be because people leave their car to charge before going to work and picking it up at the end of the day, or after leaving the office before going home to sleep and picking it up again in the morning;
- The amount of energy supplied to the vehicle during the charging period: the less charge left in the battery before it is plugged in, the higher the idle time after it has finished charging. Those that allow their car battery to run lower before plugging in are more likely to leave the car idling for a longer period than those who do a quick top up of their car battery. This is also

continued next page

reflected in the positive correlation between total charging time and level of idle time after the car is finished charging;

- The maximum power supplied to the electric vehicle. Each vehicle has a maximum charge power which affects its ability to be recharged at a certain speed. The scientists found the highest idling time for cars with a maximum charging power between four and six kilowatts, which roughly corresponds to the average slow charge power of e-cars currently on the market.

The scientists also made some more specific observations. For example, while taxi drivers are among the highest users of public charging points, they also tend to leave their vehicles idling for less time.

Infrastructure strategies and behavioural change

The transition to a low-carbon economy is a key political priority for the EU. To make this a reality, one of the ambitions is the widespread take-up of low- and zero-emission vehicles over the next decade. A big challenge for future planning is to have a correct ratio of chargers available for these vehicles: drivers must be confident they will be able to charge their car when needed. The scientists recommend using their methodology to plan deployment of future chargers based on areas with 'high vulnerability scores'– those areas where there's likely to be a higher demand for charging points than what is available.

Several municipalities in the Netherlands have adopted policies granting EV-users the right to have public chargers installed near their homes such that these 'public' chargers become semi-private chargers. This has a major impact on the idle time of these chargers.

Looking beyond the study, the scientists also recognise that charging station owners can take actions to influence behaviour: they could start charging a fee for parking time once the vehicle is fully charged, for example. An app could also give drivers an estimation of the time until their car will be fully charged, sending them an alert when this is nearly finished. Users could also possibly find out through the app when an occupied charger will next be free, with the option to 'reserve' the charger for a set period.

Background

Public policies are taken at both regional and city levels targeting both electric vehicle adoption and charging infrastructure management. Over the years, idle time (the time an electric vehicle is connected without charging) is increasing, with direct impacts for the sizing of the infrastructure, its cost and its availability.

This study applies supervised machine learning to a dataset on idle time from the Netherlands, identifying the main influencing parameters on idle time and the most accurate algorithm to use to estimate the time that an electric vehicle will remain parked after charging. The model developed provides useful information for electric vehicle users and policy makers—as well as to network owners, who can improve network management by targeting specific variables.

https://phys.org/news/2019-05-electric-vehicles.html

ABB Unveils EV Charger, Can Add 200 Km of Range in Eight Minutes

ABB made an announcement this month that its new charger makes it worth more talk involving the kinds of infrastructure being readied for electric vehicles (Credit ABB). *https://techxplore.com/news/2018-05-abb-unveils-ev-charger-km.html*

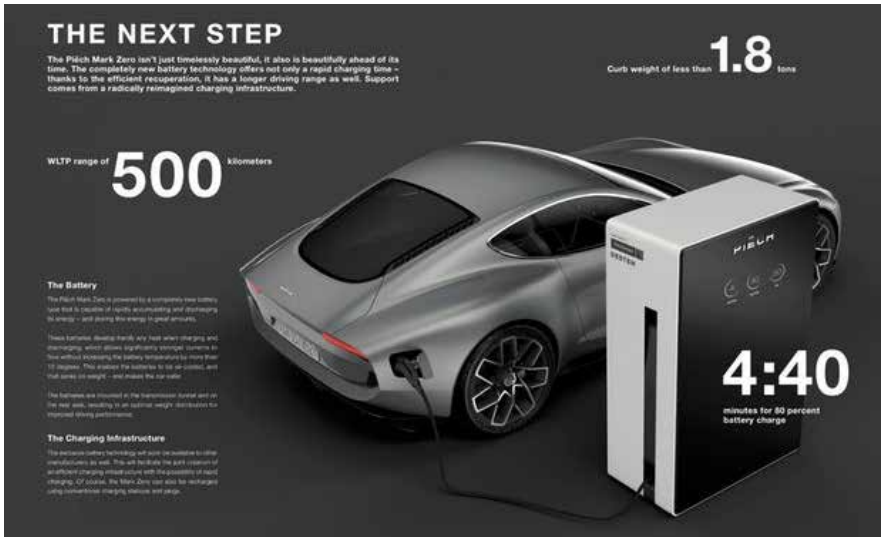
Piëch Doubles Down On Its Outrageous Sub-5-Minute EV Charging Claims

The Piëch Mark Zero looks gorgeous in red, but the real story is its next-gen, ultra fast charging battery technology (Credit: Piëch)

By Loz Blain

People will stop complaining about EV range the minute fast charging is a reality, and new startup Piëch reckons it's got the goods to deliver an 80 percent charge on a 311-mile (500 km) range battery in four minutes, 40 seconds, which is vastly quicker than anything else on the market. Why not just launch the battery, then?

While the Piëch Mark Zero, due for prototype testing next year, looks like a terrific electric sports car, the car itself pales into insignificance behind the claims these guys are making about their ultra-fast charging setup, which, as astute commenters on our original piece pointed out, would require some pretty fearsome megawatt-pushing technology at the charge station as well as some uniquely amazing battery properties.



Desten's Ultra-Fast Charging Battery Claims

Today, a little more information trickled out about the batteries, from Chinese/German concern Desten, and the chargers, from another Chinese/German company called TGOOD – as well as Piëch announcing two new variants of its sporty EV platform.

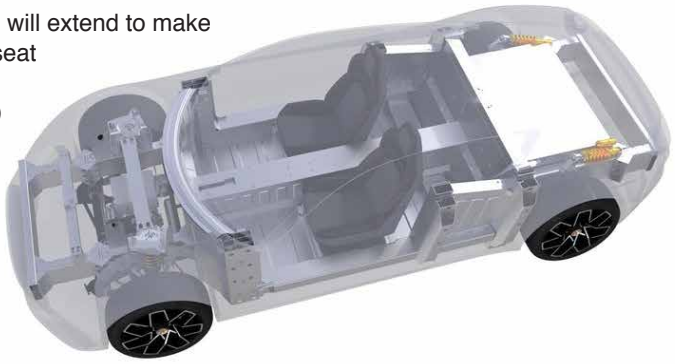
From Desten's COO Andrew Whitworth came this slightly cryptic screed: "Due to the ongoing patent process, we cannot comment more detailed information about our lithium ion cells at the moment. This much I can reveal: we were able to construct the inner workings of the cell in such a way that significantly stronger currents can flow, hardly any heat develops during charging and discharging, and the entire recuperation can be made much more efficient."

He goes on to flash some testing credentials: "The whole thing works: TÜV Süd, along with renowned system supplier Hofer Powertrain, which works for well-known car manufacturers, and the University of Esslingen have tested and certified our cells. We are concentrating on the series production of our cells and batteries." And to add some credibility, he attaches some poorly done scans of the test results:

continued next page

Piëch, for its part, says that the batteries deal with heat so well under both input and output power loads that they need no cooling system. The entire Mark Zero powertrain will be air-cooled despite its 300-kilowatt (402-hp) twin-motor AWD setup and 3.3-second 0-100 km/h (0-62 mph) acceleration time. That saves about 200 kg (441 lb) of weight, assisting both performance and range, and that'll be another benefit other car companies will appreciate if and when they get access to the battery tech.

Piëch's head of engineering Klaus Schmidt has apparently been to China to test drive a trial vehicle equipped with the Desten batteries, and is suitably pleased, saying: "I'm already looking forward to when we launch the Piëch Mark Zero onto the market with this innovative technology in three years' time. Besides the short charging time, the innovative thermal management of the batteries also gives them the highest level of stability, and fast laps on the Nürburgring Nordschleife should not be a problem with the first roadworthy prototype of our Piëch Mark Zero in the spring of next year."



The platform will extend to make way for a 4-seat coupe
(Credit: Piëch)

Piëch says it might do a hybrid version that looks something like this
(Credit: Piëch)

TGOOD'S Ultra-Fast Chargers – Soon to Be Available at Home

Jolly good then. As to TGOOD and its ultra-fast chargers, Piëch is now saying that these monstrous charging speeds will be available from a home garage wall box that TGOOD will make.

"The wall box charging station not only ensures that the new Piëch Mark Zero is charged to 80 percent of its battery capacity in 4:40 minutes," reads the press release, "it can also be used as a modular storage unit."

Storage unit? For energy? Is this thing going to be a Tesla Powerwall on steroids, some kind of megawatt-pumping supercapacitor capable of flash-charging somewhere around 100 kilowatt-hours' worth of energy in a matter of minutes? It'd make sense for these things to sip energy slowly from the grid, save it up and blast it in only when required – that'd make them much easier to install without needing a gigantic pipe that could handle instantaneous megawatt draws from the grid.

Piëch seems to think so, saying they're "suitable for both automotive and industrial solutions. In larger applications, they can thus serve to protect the power grid – eg. for rapid load balancing or emergency power supply. In general, applications that rely on the rapid delivery of great amounts of power will also benefit commercially as, in most cases, storage size and hence cost can be reduced." Color us intrigued once more.

Piëch Outlines Range Plans

While the battery and charging tech could be significant to the entire EV industry, Piëch's cars will likely price themselves into exclusivity – hence why we address them last, and go light on detail. The Mark Zero concept is best explained as a preview of the Piëch GT-2 two-seater sports car.

The same platform will be extended into a four-seater GT-4 sports coupe, and Piëch will build upwards as well, for a GT-X SUV. The GT-2 is expected to be on sale in about three years, followed by the GT-X SUV and the GT-4 at a later stage.

The company is also looking at hybrid and fuel cell powertrain options, although with a battery setup like it says it'll be premiering, you have to wonder why it'd bother. Indeed, you have to wonder about Desten's choices as well – why the company is choosing to debut such a (potentially) radically transformative battery technology in a small, short-run startup's first car. Will the expense be prohibitive? Is volume production going to be a problem? Or is Desten just most comfortable starting out at very low volumes?

The whole thing is a fascinating mystery for the time being, and one we'll be keeping an eye on.

https://newatlas.com/piech-4-minute-40-ev-charging/59597/

EVs in the Hoosier Heartland

By Paul Gipe

As a former Hoosier and as an Electric Vehicle advocate I keep an eye on EV development in the state of Indiana. Yes, Indiana is the home of the arch-conservative vice president and former governor Mike Pence, but the red state's role in the automotive industry, and potentially in EVs, shouldn't be dismissed.

Columbus, Indiana is the home of Cummins Diesel, who has been testing an all-electric heavy truck that could rival Tesla's entry into the marketplace. And there has been a host of EV startups located in "business-friendly" Indiana where GM, Navistar, Subaru, Chrysler and Toyota all operate plants. BorgWarner, once a powerhouse gearbox manufacturer, now pushes its electric drive trains.

One of those ambitious startups is Workhorse, which currently builds electric utility vehicles at its plant in Union City, a small Hoosier town on the border with Ohio. Workhorse made waves in early May when it announced discussions with GM to use its closed Lordstown, Ohio plant to build EVs.

Despite all the EV business activity in the state, there are few EVs on the road. There are no incentives or subsidies and few DC Fast Chargers and the results reflect that. There are only 6,000 EVs registered in Indiana, one-sixth of those in California, relative to population. Seeing an EV on the road in the state is still a noteworthy event.

Nonetheless, there are encouraging signs.

The EV Capital of Indiana?

So, I was pleasantly surprised—while touring some of the state's historic sites. We stopped in New Harmony, Indiana. The erstwhile utopian settlement is off the beaten path in more ways than one. You're as likely to get run over by an errant golf cart in New Harmony as you are by a gasser. Golf carts are everywhere. The sole hotel in town rents them. It seems that every other house in the sleepy town of 800 has a golf cart.

One writer calls New Harmony a golf-cart utopia. In 2006, the town passed a golf-cart ordinance requiring the vehicles register with the city, and have taillights and headlights. By registering, golf carts have the run of the town. The local museum, the Richard Meier-designed Atheneum, uses golf carts to ferry visitors to various sites around town.

Not knowing better, my knee-jerk reaction was to label New Harmony the EV Capital of Indiana. Not so, says Richard Steiner, president of the Hoosier Electric Vehicle Association.

For one, Steiner doesn't consider golf carts EVs. Moreover, says Steiner, Blue Indy alone operates 190 EVs in the state's bustling capital, Indianapolis. The car-share company maintains 93 stations with 450 Level 2 charge ports across the city, including five stations at the airport and some at Indiana University's local campus in the far southern suburbs.

Limited Fast-Charging Network

Indianapolis is also home to the bulk of non-Tesla, DC fast-charging stations. There are a dozen DCFC stations in the Indy metro area, a city that bills itself as the crossroads of America. Many are operated by convenience store chain Ricker's. [See small map next page]

Outside of Indy, there are few DCFC stations and few charging stations of any kind. There are no fast chargers in east-central Indiana where I am from, and the few Chevy dealers who have low-power "fast" charge stations, such as the one in Fort Wayne, have made them nearly inaccessible.

continued next page

Surprisingly, Indiana has more DCFC stations per capita than liberal bastion New York State. But Indiana is a laggard otherwise. The state has only 3.7 DCFC stations per million inhabitants. Compare that with North American leader Oregon, with 25 stations per million people. [Note the map far right above and the chart below it.]

In this regard, VW's Diesel-gate has been beneficial to the state. Electrify America has installed five stations in or near Indiana in its first cycle. EA's station in Indianapolis has a whopping eight kiosks.

If you live in Indy and drive electric, you can travel to most destinations in the state now that EA's stations are live. Most destinations are less than 200 miles. The exception, Lansing, would require an intermediate charge along the way.

Indiana Trip Distinces from Indianapolis	
	Miles
Lansing	250
Chicago	180
South Bend	150
Dayton	120
Louisville	115
Cincinnati	110
Terre Haute	80
Lafayette	65

Not Clear on the Concept

Some institutions in Indiana are unclear on the concept of how to promote or simply enable the use of EVs. For example, there may be more Level 2 charge stations in the state than shown on PlugShare.

Ball State University in Muncie, Indiana has half a dozen Level 2 stations on the campus but only one station shows up on PlugShare. And that station is shown as restricted, even though it is in a pay-as-you-go parking garage open to the public. If you have your PlugShare filters set to exclude private-use-only restricted stations, you would never know about this public charger.

Ball State commuters will only know about the Level 2 stations on campus if they study a busy pdf on the university's website or if they stumble across the stations as they're trying to find a place to park.

In contrast, Purdue University in Lafayette, Indiana, has eight Level 2 stations on or near campus, and all are listed as public stations on PlugShare.

Selected Non-Tesla DC Fast Charging Station Density 2019 CHAdeMO & CCS					
	Population Millions	Stations	Stations/Million People	Ports	Ports/Million People
Oregon	4.2	105	25.0	175	41.7
Quebec	8.4	181	21.5	222	26.4
British Columbia	5	95	19.0	149	29.8
California	39.6	576	14.5	1,527	38.6
Ontario	14.5	197	13.6	260	17.9
Washington	7.5	98	13.1	210	28.0
Georgia	10.5	112	10.7	219	20.9
Virginia	8.5	63	7.4	125	14.7
Massachusetts	6.9	51	7.4	117	17.0
North Carolina	10.4	69	6.6	132	12.7
Ohio	11.7	56	4.8	113	9.7
Illinois	12.7	52	4.1	104	8.2
Indiana	6.7	25	3.7	56	8.4
New York	19.5	63	3.2	140	7.2
Alternative Fuels Data Center, Electric Vehicle Charging Station Locations https://www.afdc.energy.gov/fuels/electricity_locations.html#/analyze?region=CA-ON&fuel=ELEC&ev_connectors=CHADEMO&ev_connectors=J1772COMBO&ev_levels=dc_fast					

Indiana University, like BSU, has only one restricted station on campus. They may, like BSU, have more stations, but a commuter will have to study the campus map to find them.

Worse yet, BSU makes a point on its website of emphasizing that they are using "electric cars" on campus as part of their "sustainability" plan. Well and good. BSU has made great strides on their sustainability plan by heating and cooling 43 campus buildings with North America's largest ground-source heat pump system that's an engineering marvel. But when I queried campus leaders about their experience with EVs, the response I got was unexpected. "Yes, we had one—once." The implication was that they'd been there, done that, and needn't take another look at it—despite the very clear statements on the university's website.

In an age where politicians—some notably from Indiana—maintain that truth is what they say it is and nothing more, it behooves academic institutions to hew to a higher standard. Otherwise, universities can use high-sounding words to falsely wrap themselves in a green cloak when the actuality is just more false posturing to deceive students, the public, and their donors.

Although Indiana has more EV development activity than most states outside California, it has a long way to go before it's EV-friendly. The Hoosier Electric Vehicle Association has its work cut out for it.

http://www.wind-works.org/cms/index.php?id=84&tx_ttnews%5Btt_news%5D=5421&cHash=ebf1f349377fb61d811d804cde6b7a3c

Bridgestone's New Tire Makes Driving Electric as Quiet as It Should Be

By Nick Stockton

IT'S SUMMER. You have a car, a soul, and a desire to crank some Boston*. But, as you step on the gas and raise the volume to sun's out classics like "Amanda," you encounter the evil, unavoidable *whirrrsssshhhhhh.*

The sound of tires rolling over tarmac isn't just the rare force known to diminish the power of Tom Shulz's fretwork. It's a leading contributor to noise pollution, which has been linked to public health impacts like hypertension, stress, hearing loss, and faster onset of dementia. Europe (of course) has even considered taxing noisy tires.

To that end, Bridgestone recently debuted the Turanza QuietTrack, a tire engineered to mute the cement symphony. Thanks to redesigned treads that rethink how the rubber interacts with the road, Bridgestone engineers say the tire will make it easier for people—especially those in electric vehicles—to relax, chat, and let everyone enjoy some "Peace of Mind."

Before getting into the specifics of this rubber donut, let's go over the problems it's made to solve. Your vehicle's sound profile comes from three sources: the roaring engine, the humming tires, and the rushing wind. As explained in the US Department of Transportation's *Little Book of Quieter Pavements,* engine noise (which includes the transmission) dominates at low speeds, up to about 20 mph. Wind becomes the major factor once you're clocking Nascar speeds. Everywhere in between, tire noise is the problem. The faster you go, the louder it gets, until not even closed windows can protect your ear drums.

Among other tricks, Bridgestone molded millimeter-high serrations into the trough of each channel to break up the high frequency sounds that result when the tire rolls down the road.

"Tire noise" is a catchall term encompassing roughly nine types of sound, according to the DOT's *Little Book*, like the tiny thud of individual treads on the pavement and the tinny vibrations of the tire's sidewall. The loudest, and thus most important, ones are called cavity noise and pattern noise. Cavity noise is what's known as a resonance phenomenon, a fancy way of saying the air is bouncing around inside the tire. As the tire rolls, this air compresses against the wheel, generating a low hum that sounds like a downtuned lightsaber. Cavity noise has a low frequency relative to other tire racket, and its long wavelengths make it good at moving through solid objects—like your car— and into the cabin. Most noise-reducing tires have strips of foam lining their inner circumference, which dampens the problem. But it's the higher frequencies that are dangerous to human health and happiness.

Higher frequencies like what you get from pattern noise: As the tire rolls,

continued next page

Bridgestone's new Turanza QuietTrack tire is made to dampen the annoying noise that comes with driving—an especially big concern as more drivers get into electric cars whose lack of revving engines makes the rubber's sound more noticeable.BRIDGESTONE

tiny bubbles of air are compressed between the tread and ground. The tire keeps rolling, the air gets released, making a little pop as it decompresses. This happens thousands of times each second, across four tires, resulting in a Niagara-like roar. Their relatively high frequency tends to be around the range of human speech. "This makes it aggravating to communicate in vehicles," says Dale Harrigle, Bridgestone's chief engineer of replacement tire (as opposed to tires made for specific car models) development—replacement tires being tires that don't come on standard on brand new cars.

So Harrigle and his team didn't bother with strips of foam. Instead, they targeted the treads themselves. Barring eliminating the treads altogether—which might mean spinning out on a misting of morning dew—the best move is to make sure the treads don't trap air. So the Bridgestone engineers encircled the tire with a few thin, longitudinal channels, and lots of short, diagonal grooves leading to the tire's shoulder. The orientation of these lateral grooves is crucial. The ones along the shoulder allow air to escape as it rolls, so it doesn't get compressed. And, the grooves come in three different widths, measured so they interfere with one another's whish-ing. This interference pattern reduces noise along those frequencies—the ones that humans tend to speak at—Harrigle wanted to avoid.

Finally, Harrigle and his team found that by molding millimeter high serrations into the trough of each channel, they could break up the high frequency sounds that occurred as the tire interacted with the road. (That came with the unexpected benefit of improving traction in the snow.) Bridgestone tested these innovations digitally using software that models the complicated interactions between solids and fluid mediums like air. They also developed a new rubber compound—with an emphasis on wear performance—for where the tread meets the pavement. "The average tire has about 30 rubber compounds," Harrigle says.

Bundled together, Bridgestone calls these noise-reducing features QuietTrack, and on March 31 rolled them out (sorry) on the latest iteration of its Turanza touring tire. At $133 a pop, that's $532 to outfit your ride ($798 if you're driving a Tyrrell P34).

Eliminating that high frequency noise is more important than ever, Harrigle says, as more drivers get into electric cars and realize how bad tire noise really is when you don't have an internal combustion engine to mask it. Another impetus: the ongoing discussion in Europe over whether to impose taxes or other restrictions on tires that exceed certain decibel limits.

Americans may not be so worried about noise pollution, but we do love to rock while we roll. And if anything could pressure our society to push for quieter rides, it will be the promise of hearing "More Than a Feeling," unblemished by the roar of the road.

**The one and only Band of Summer.*

https://www.wired.com/story/bridgestone-turanza-quiettrack-tire/

Michelin Rolls Out an Airless Tire That Will Be "Puncture-Proof"

By Sebastian Blanco
From *Car and Driver*

- Michelin has introduced a prototype of a "puncture-proof tire system" that has no traditional sidewall and carries the vehicle's load courtesy of a newly developed fiberglass material.
- The tires, known as Uptis (for Unique Puncture-Proof Tire System), will be tested first on the Chevrolet Bolt EV on roads in Michigan.
- The tires could be available commercially on passenger vehicles as early as 2024, Michelin said.

Photo: Sebastian Blanco

Read the article at the URL below:

https://www.yahoo.com/news/michelin-rolls-airless-tire-puncture-210000141.html

GM and Michelin Will Bring Airless Tires to Passenger Cars by 2024

Another perspective on Michelin. They'll test the tires on Bolt EVs later in 2019.

Steve Fecht for General Motors

By Jon Fingas

Airless tires for everyday cars might soon be far more practical. GM and Michelin have unveiled a prototype of Uptis (Unique Puncture-proof Tire System), a Michelin-made tire intended for passenger cars. It looks like Tweel and other air-free concepts of years past, but its mix of composite rubber and resin embedded fiberglass lets it operate at highway speeds -- earlier options tend to work only when you're slowly putting around. It's not as visually appealing as conventional tires, but Michelin claims it's just as comfortable.

More importantly, there's a tangible roadmap. GM will start testing the Uptis in Michigan later in 2019 on a fleet of Chevy Bolts, and expects the finished version to reach production cars as soon as 2024. The automaker hasn't named specific car models that will use the new tires.

The Uptis should have immediate financial and safety benefits. While it won't be completely invulnerable, blowouts, flat tires and irregular wear would be things of the past. However, GM and Michelin see this as particularly important for a future where electric and self-driving cars are commonplace. Airless tech reduces the need for environmentally harmful tire production, and eliminates the need for a spare tire that adds weight and shrinks fuel economy. They'd also help autonomous vehicles drive around the clock without fear that a stray nail will ruin a trip. Don't be shocked if this becomes the norm, if just because the expectations for cars themselves will have changed.

Don't miss the video in the article

https://www.engadget.com/2019/06/04/gm-and-michelin-airless-tires/

Cabless, Self-Driving T-Pod Trundles on Public Roads for the First Time

By Paul Ridden

Sweden's Einride unveiled the first prototype T-pod truck in 2017, followed by an appearance at the Goodwood Festival of Speed last year for a logging variant called the T-log. The transport company also inked a partnership agreement in 2018 with global logistics company DB Schenker to test the T-pod, and now the autonomous electric truck has made its public roads debut.

Einride's cabless, autonomous electric T-pod has started daily service at DB Schenker's facility in Sweden (Credit: Einride)

Einride says its mission is to make the movement of goods more intelligent, emission-free, safe, cost-effective and sustainable. The company also claims that its first truck – the T-pod – "renders many conventional road transport solutions practically obsolete."

The battery-electric T-pod doesn't have a driver's cab, and is capable of Level 4 autonomy thanks to onboard cameras, radars, LiDARs, and Nvidia's Drive platform. But it can be remote-controlled by a human operator if required. It's reported to have a per charge range of 200 km (124 mi) and a top speed of 85 km/h (52.8 mph).

A test truck was installed at DB Schenker's facility in Jönköping, Sweden, in November, 2018, and on-site testing by the Swedish Transport Agency in March of this year was shortly followed by approval for a public roads pilot.

That pilot took place earlier this week on a short stretch of public road within an industrial area "where traffic speeds are typically low." The T-pod moved off from DB Schenker's warehouse, entered the site terminal through a gate that automatically opened to let it through, reversed up to a terminal port and then drove off again.

"Heavy road transport is responsible for a substantial part of global CO_2 emissions," said Einride's Robert Falck. "The pilot in Jönköping is a small but important step towards a sustainable transport system. The permit from the Swedish Transport Agency is an important testimonial to the safety of the solution."

The T-pod will now enter daily service between the warehouse and terminal. The current permit is valid until December 31, 2020. The video below has more.

https://newatlas.com/t-pod-einride-db-schenker-public-roads-pilot/59738/

China Dominates Global Electric Bus Market, But US Builders Still Have a Tech Edge

By Charles Morris

As regular Charged readers know, dozens of cities in North America and Europe (and a couple in South America) are gradually adding electric buses to their fleets. But Western transit agencies are doing small-scale pilots. New York City's MTA has 10 fully electric buses in service, and another 15 on order, out of a total fleet of 5,700 (it also has 1,700 hybrid buses).

The rest of the world will struggle for years to match China's rapid embrace of electric transit.

Meanwhile, cities in China have been ordering e-buses by the thousand for some time. According to a recent report from BloombergNEF, there were around 425,000 battery-electric buses in service around the world at the end of 2018, and some 421,000 of those were in China (18% of the country's total bus fleet). Europe had around 2,250.

According to BNEF's estimates, by 2025, China will have more than 600,000 municipal e-buses in service, and the US will have about 5,000.

China's authoritarian government is able to take a top-down approach to accelerating electrification: it imposes EV mandates, subsidizes manufacturers and encourages policy competition among cities. The US does none of these things on a federal level, although EV-friendly California plans to require all new buses to be zero-emission beginning in 2029. The EU will begin to phase in zero-emission requirements in 2025.

"There's no industrial policy in the US for e-buses," said BNEF Analyst Nick Albanese. "So unless the US manages to become a big exporter of e-buses, China will continue to stand apart."

Scale isn't everything, however. Bloomberg points out that the US still has an edge in technology. Several companies are building e-buses in North America. "While Chinese companies get more support, the best electric vehicles have been engineered and manufactured by American companies," said Ryan Popple, the CEO of Proterra, a rapidly growing e-bus builder.

Chinese EV giant BYD is building electric buses in California. The company sells some 30,000 plug-in vehicles every month in China, and its buses are in service in about 300 cities around the world. BYD Chairman Wang Chuanfu told Bloomberg that, in China, government policy was to electrify public transport first. "In the West, it's quite the opposite. The subsidies are primarily to private vehicles, not public transportation," said Wang. "We propose to governments that they need to learn from China's example of a staged transition."

https://chargedevs.com/newswire/china-dominates-global-electric-bus-market-but-us-builders-still-have-a-tech-edge/

More at the source:

https://www.bloomberg.com/news/articles/2019-05-15/in-shift-to-electric-bus-it-s-china-ahead-of-u-s-421-000-to-300

Low-Speed Electric Vehicles Could Affect Chinese Demand for Gasoline and Disrupt Oil Prices Worldwide, Says Expert

By Rice University

Low-speed electric vehicles could reduce China's demand for gasoline and, in turn, impact global oil prices, according to a new issue brief by an expert in the Center for Energy Studies at Rice University's Baker Institute for Public Policy.

"Low-Speed Electric Vehicles: An Underappreciated Threat to Gasoline Demand in China and Global Oil Prices?" is authored by Gabriel Collins, the Baker Botts Fellow in Energy and Environmental Regulatory Affairs at the Baker Institute.

"Disruptive innovation is typically a Silicon Valley buzzword and not one commonly associated with discussions of gasoline markets," Collins wrote. "Yet the past several years in China have seen the emergence of a potential disruptor: low-speed electric vehicles. These little vehicles typically lack the aesthetic appeal of a Tesla, but they protect drivers from the elements better than a motorcycle, are faster than a bicycle or e-bike, are easy to park and charge, and, perhaps most endearing to emerging consumers, can be purchased for as little as $3,000 (and in some cases, less)."

The International Energy Agency estimated there were 4 million low-speed electric vehicles in China as of midyear 2018, representing about 2 percent of the country's passenger cars, Collins said. Low-speed electric vehicle sales there appear to have slowed in 2018, but manufacturers still sold nearly 1.5 million of them, roughly 30 percent more units than conventional electric vehicle makers did.

"Depending on how proposed government regulations of the sector unfold in 2019 and beyond, sales could rise significantly as low-speed electric vehicles penetrate deeper into lower-tier markets where motorcycles and bicycles remain the prevalent means of transport, as well as into the increasingly crowded urban areas where space is at a premium and many residents still cannot afford larger vehicles," Collins wrote.

If a million low-speed electric vehicles displaced a million gasoline-powered midsize sedans from the market, about 15,000 barrels per day of gasoline demand could effectively be lost, Collins said. At the current estimated low-speed electric vehicle fleet size, the potential fuel demand displacement could exceed 60,000 barrels per day—2 percent of current total Chinese gasoline demand.

"Low-speed electric vehicles (and other electric vehicles) are even more impactful when it comes to capturing incremental demand for transport services that might otherwise be served by gasoline-burning motors," Collins wrote. "Here, 4 million low-speed electric vehicles could capture an amount of incremental gasoline usage equivalent to the nearly 64,000 barrels per day of gasoline demand growth in China between 2016 and 2017."

Collins concluded: "The fact that low-speed electric vehicles in China have thus far been the only electric vehicles worldwide that have successfully sold at industrial scale without unsustainable levels of government financial support suggests that they are a wild card worth watching. This is particularly true given China's outsized importance as the global 'oil consumer of last resort,' as well as the fact that if low-speed electric vehicle manufacturing capacity scales up in China, manufacturers are likely to begin targeting export markets in Africa, India and Southeast Asia. These regions have many of the same characteristics as rural China in terms of no prior car ownership history and low-income levels that often make 'conventional' cars prohibitively expensive for most consumers."

Collins conducts a range of globally focused commodity market, energy, water and environmental research. In addition to his research on shifts in China's domestic oil consumption structure, he focuses on oil field water issues, evolutions in the global gasoline market, water governance and groundwater valuation in Texas and the nexus between food, water and energy.

https://phys.org/news/2019-05-low-speed-electric-vehicles-affect-chinese.html

Shining A Light on Battery Heating

By CE Staff

INTRODUCTION

Some public EV charging power levels now approach several hundred kilowatts. Such fast-charging and other use of ever higher energy-density batteries pose significant safety concerns due to high rates of heat generation. For some vehicle designs, a solution is to use many smaller cells, to achieve a larger total surface area to dissipate this heat. Of course, heat is generated during discharge too, but to a much lesser extent, as it is created in a less sustained manner.

Understanding how the resultant localized high temperatures affect a battery is critical but remains challenging. This is mainly due to the difficulty of probing the internal temperature of a battery with high spatial resolution.

Research continues in labs worldwide, yet one Stanford University group has a method to *induce* as well as *sense* localized high temperatures inside a lithium cell.

They have learned that temperature hotspots can *induce* significant lithium metal *growth* as compared to the surrounding lower temperature area. More importantly, localized high temperature can be one of the factors to cause battery internal shorting, which further elevates the temperature and increases the risk of thermal runaway. That is when things get hot, causing additional current to flow, which causes more heat, in a positive feedback mechanism.

They may have identified the root cause of dendrite growth, and gained insights on the effects of unequal temperatures within cells. This will surely aid in the development of safer batteries, better thermal management schemes, as well as diagnostic tools.

Yi Cui, a professor at Stanford University and SLAC National Accelerator Laboratory, was the principal investigator along with nearly a dozen others on his team.

His work was supported by the DOE Office of Energy Efficiency and Renewable Energy, and part of the work was performed at the Stanford Nano Shared Facilities and the Stanford Nanofabrication Facility.

The DoE Office of Science is the single largest supporter of basic research in the physical sciences in the United States, and is working to address some of the most pressing challenges of our time. For more information on what they are up to, visit *https://www.science.energy.gov*

BACKGROUND

Long ago we learned that electricity is worse than ephemeral. Capturing electrical energy by storage with rechargeable batteries is critical to enable renewable energy technologies and environmental sustainability. Imagine capturing the power in a lightning strike! While that is still a ways off, significant progress has been made on the development of lithium-based batteries in recent decades. However, the increasing charging rate and energy density pose significant safety concerns as self-heating becomes a non-negligible effect.

While the role of a nice uniform temperature on the forms of lithium growth, cyclability, and aging rate has been studied previously, batteries in realistic situations generally operate with non-uniform temperature. Sometimes they get localized-temperature hotspots from internal or external heat sources, or from manufacturing nonuniformity and defects. How localized high temperature affects battery operations is not yet understood.

Among the challenges to study local temperature effects is the difficulty of probing the internal temperature of batteries with high spatial resolution. Temperature measurement techniques employed in batteries are typically remote (e.g., sensors attached to battery

continued next page

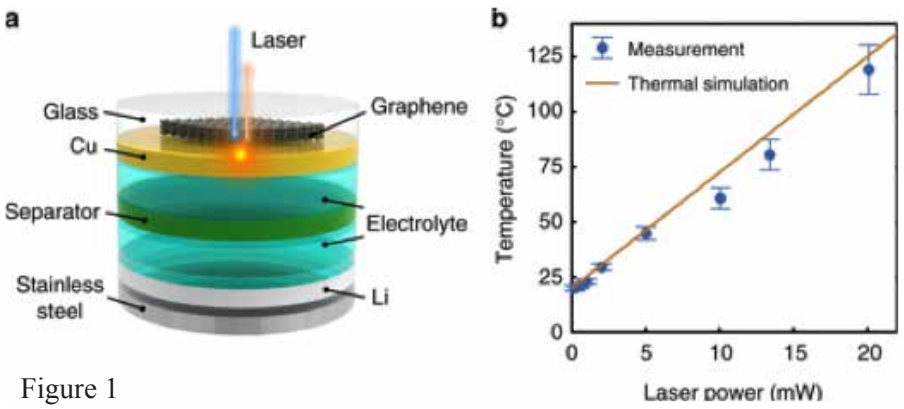


Figure 1

external packaging) or macroscopic (e.g., via thermocouples and infrared imaging).

However, the small sizes of battery electrode materials and their electrochemical processes require temperature sensing at a more microscopic level. In particular, in the event of thermal runaway (which can cause catastrophic fire or explosion and is typically caused by battery internal shorting), capturing the local-temperature response provides valuable information to aid fundamental understanding of failure mechanisms and the development of thermal management strategies. *[See figure 1 previous page.]*

Figure 1 shows their experimental setup. In inset **a** Schematic (not to scale) of a modified coin cell with an optically transparent glass window for laser access to graphene as a temperature indicator and the thermally evaporated copper current collector.

b Temperature of the hotspot on copper generated by a 532 nm laser in a coin cell as a function of the laser power. The dots are experimental results and the solid line is from thermal simulation in COMSOL Multiphysics.

GROWING LITHIUM ON A HOTSPOT

To understand how local hotspots affect the battery, lithium growth behavior in the presence of a hotspot with controlled temperature was investigated on the Raman spectroscopy platform and examined by scanning electron microscopy (SEM). In their experiment, a constant amount of charge was applied at the same lithium plating rate of 1 mA per square cm for 2 minutes for coin cells with different laser heating power. After the lithium plating, batteries were immediately disassembled inside the glove box and

Research continues in labs worldwide, yet one Stanford University group has a method to induce as well as sense localized high temperatures inside a lithium cell.

the morphology of Li deposited on the hotspot and the surroundings was characterized in SEM. As the hotspot temperature increased, more Li was grown on the hotspot with respect to the surrounding lower-temperature background.

To understand the observed non-uniform lithium deposition, the researchers simulated the initial temperature distribution and lithium deposition current density distribution in COMSOL Multiphysics. The inputs of the temperature model only include thermophysical properties and geometries of the cell materials without any fitting parameters. The applied laser power was low (low tens of milliwatts using a 500nm radius spot size, with absorption of 0.4 for 532 nm laser on copper).

The peak temperature of these hotspots *from simulation* increases with the laser power from 55 °C to 108 °C, which agrees well with their measured temperatures.

So their computer model was validated with real measurements. The low thermal conductivity of the glass window and their electrolyte, and the thin (170 nm) copper electrode film all contribute to the high peak temperature. The temperature rise is very localized, primarily as a result of the tiny heat source. The rest of the cell, a mere ten of microns away from the hotspot remains unheated, just at room temperature.

The researchers discovered that local lithium deposition rate drastically increases with increased laser power and corresponding local electrode heating. Peak current density values at the center of the laser spot and are 1–2 orders of magnitude higher than the background current density (1 mA per square cm). The reference paper describing the phenomenon goes into great detail on some of the considerations and mechanisms at potentially at work here.

Hotspot-induced battery shorting and local-temperature sensing

While it has been well understood that internal shorting can generate hotspots and cause thermal runaway, the fast lithium growth on the hotspots lead researchers to propose that **internal local high temperatures could, in reverse, be a mechanism to trigger battery shorting.** They first verify this hypothesis by simultaneous optical visualization and voltage-current measurement of an optical battery cell.

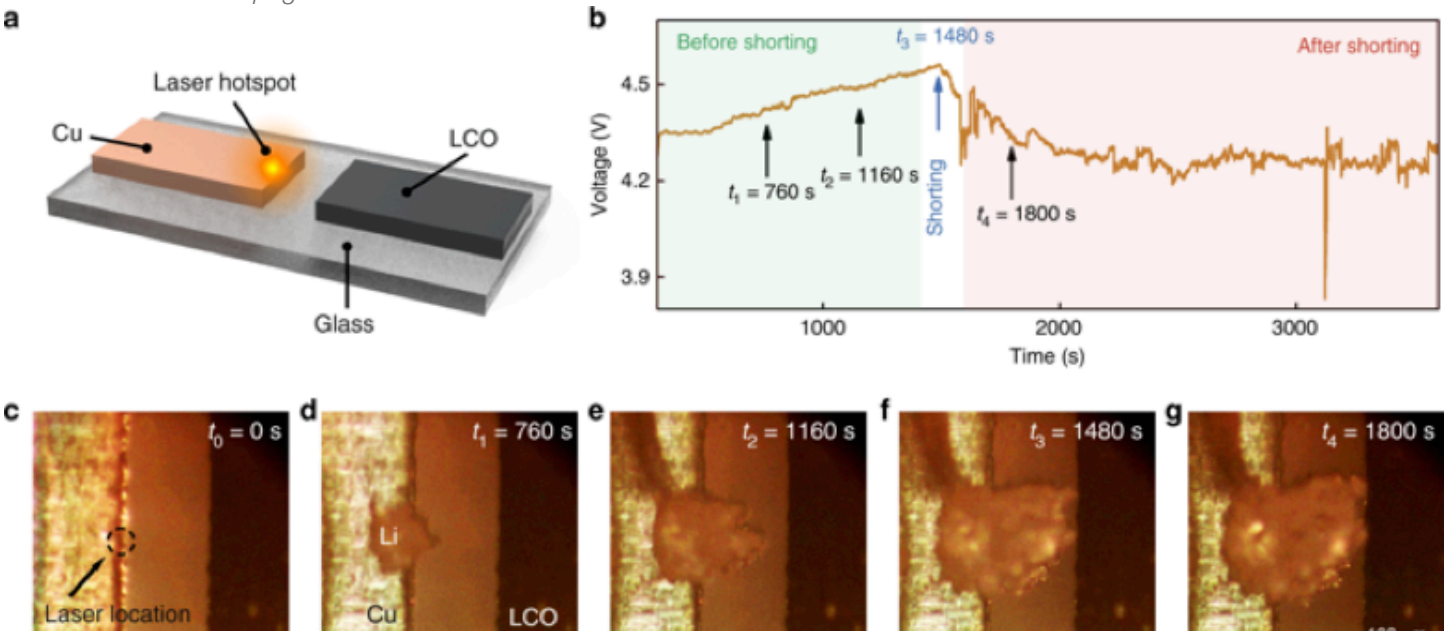
With the ability to thermally seed and grow lithium at any specific location through laser heating, they further detected the local temperature rise of a hotspot-triggered internal shorting event with a fabricated micro temperature detector. This local temperature detection would otherwise be challenging to achieve without being able to induce a short at will and knowing where the short occurred.

Simultaneous visualization and voltage current measurement was carried out on an optical cell which consists of a thin

continued page 40

Battery Heating

Continued from page 39



copper foil as the working electrode and lithium cobalt oxide (LCO) on an aluminum foil as the other electrode. A hotspot was generated near the edge of the copper with a laser, and an optical image was captured every 40 seconds, in alternation with the laser light source.

Over time, after 1400+ seconds from the start, lithium touched the opposite electrode. At that instant, the cell voltage dropped, the onset of shorting) and began to fluctuate as charging continued. The in-situ visualization proved their hypothesis that *local high temperature can lead to battery shorting.*

The graphic above is about the hotspot-induced battery shorting.

Inset **a** shows a schematic of an optical cell with Cu and lithium cobalt oxide (LCO) as the electrodes. Inset **b** depicts cell voltage over time, as the battery was charged at a constant current of 30 µA. After onset of shorting, the voltage started to drop and fluctuate.

The next series of photos represent the visualization of lithium-plating process initially at **c** with time t0 = 0 seconds, before shorting at **d** t1 = 760 seconds, **e** t2 = 1160 seconds, onset of shorting at **f** t3 = 1480 seconds, and after shorting at **g** t4 = 1800 seconds.

This method to measure the local-temperature response to a shorting event can serve as a tool to study other model battery systems. Modeling is usually a less expensive way of predicting reasonably well what may happen under extreme or dangerous conditions.

The researchers acknowledge that that thermal runaway of a large size battery could be very different, due to several factors including cell capacity, architecture, and packaging, which affect heat spreading, and others.

For real batteries, detection of early-stage internal thermal runaway or shorting may be possible by embedding Resistance Temperature Detectors (RTD) sensor networks into the battery, although the spatial resolution is limited by the spacings between adjacent RTDs.

UNDERSTANDING SCATTEREDLIGHT

The investigation was to study the effect of internal temperature hotspots on a lithium battery using micro-Raman spectroscopy as a temperature sensing platform. (This is where laser light is directed at an object, and relying on scattering in the visible [*https://en.wikipedia.org/wiki/Visible_spectrum*], near infrared [*https://en.wikipedia.org/wiki/Infrared*], or near ultraviolet [*https://en.wikipedia.org/wiki/Ultraviolet*] range. That laser light interacts with molecular vibrations, phonons [*https://en.wikipedia.org/wiki/Phonon*] or other excitations in the system, resulting in the energy of the laser photons being shifted up or down.)

continued next page

WHAT HAPPENED?

Through their experiments, researchers have learned that the lithium deposition rate was shown to be orders of magnitude faster on their introduced hotspot due to the enhanced surface exchange current density. They demonstrated with simultaneous voltage-current measurement, with optical visualization, and monitoring tem-perature response that the **battery shorting can be triggered with a non-uniform, localized high temperature spot.**

This temperature-sensitive phenomena within lithium batteries they came upon sheds light on the positive feedback nature of dendrite growth. **High local temperatures can trigger this enhanced lithium deposition rate, and can then further short the cell, raising local temperatures further.**

They conclude that the two-way relationships between lith-ium dendrite growth and local temperature increases serve not only as foundations for understanding electrochemical dynamics within the cell, but also as guiding principles and limits for the design of practical cells.

There are other mechanisms in general which also elevated cell temperatures, but they were controlled for this study.

HOW DID THEY APPROACH THIS?

Three notably innovative approaches were used to further this discovery. Without these, there is no known way to observe what actually happens in this very confined space, under these very specific conditions. First the container was a common button cell; that cell was modified for laser light access; and finally, special tiny temperature sensors were created.

- *Coin cell*
  For this laser-induced hotspot experiment, coin cells (the size of a common CR 2032) were modified to provide an optical window, made of glass about five thousandths of an inch thick. A lab-grown Graphene layer was first put on a substrate, after which a much thinner layer of copper was put on the glass, covering the graphene to act as one working electrode. Thin lithium foil was used as the other electrode. Two layers of Celgard-brand separators were used to separate the electrodes. A tiny quantity of electrolyte was added. During the experiment, a constant amount of charge was applied under various different laser heating powers. The lithium deposited was rinsed with diethyl carbonate to remove salt residues so that scanning electron microscope (SEM) imaging (at 5 kV) could proceed.

- *Optical cell*
  To observe this phenomenon, researchers used optical microscopy using an optical cell with transparent windows. The electrodes inside were aligned in parallel with a gap for the electrolyte. The cell was covered with glass and the edges were sealed with epoxy. Then these were characterized on the Raman spectroscopy platform.

  During lithium deposition, an optical image (through a ×10 objective) of the suspect deposit on the copper was recorded every 40 seconds, and for the rest of time the light source was switched to a 532 nm laser, which produced the desired hotspot on the copper. Their use of the light source was for imaging or for heating.

- *Resistance Temperature Detectors*
  Resistance Temperature Detectors (RTDs) were fabricated using a standard photolithography process. Thin layers of titanium (Ti) and platinum (Pt) were thermally evaporated, annealed to avoid resistance drift, then calibrated in an environmental chamber.

CONCLUSION

All these findings suggest that the design of future high-power-density, fast-charging EV and storage system batteries needs to take into consideration thermal management aspects to ensure uniform temperature. This might be done by way of enhanced thermal conductivity of battery components, improving the tab design to reduce localization of Joule heating, minimizing defects, and utilizing efficient heat spreading in the internal current collector.

These researchers devised temperature mapping techniques using micro-Raman spectroscopy or arrays of micro-RTDs all of which could open new doors for better more detailed thermal characterization of energy storage devices. Beware EV designers, not using active temperature management may be your downfall! In the end we can all enjoy more capacity, less losses, and safer, faster charging.

Reference:their full paper is at *https://www.nature.com/article/s41467-019-09924*

Don't Miss These...

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

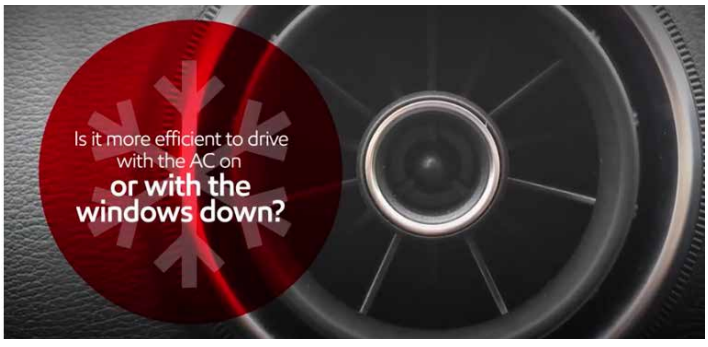
Videos of Interest

The Lilium Jet five seater all-electric air taxi

In 2017 we revealed something the world had never seen before, a two-seater, all-electric, jet-powered vertical take-off and landing air taxi. Now, we're taking it to the next level with the maiden flight of our five-seater prototype. The Lilium Jet takes us another huge step towards making urban air mobility a reality.
www.lilium.com

https://www.youtube.com/watch?time_continue=2&v=8qotuu8JjQMcontinue=2&v=8qotuu8JjQM

FAQ: Is it more efficient to drive with the AC on or with the windows down?



This video addresses use of air conditioning (A/C) and how it relates to summer driving. For going short distances, if it's tolerable, just open the windows. If going fast, close the windows, and use the A/C. (No need to have the thermostatic 'set point' at 65 degrees, just set it at 72 or so, for the system to have a better chance of reaching it. Since the insulation in typical cars is nearly none, save energy by raising the set point, instead of making the system work endlessly toward a goal it may not be able to get to realistically, given the incoming heat flux in the car.

https://www.youtube.com/watch?v=DxV5s9E2QD8&list=PLIrXlHj7zayaHhly0bXNWzF4aEA6IHcgp&index=27

Why Personal Flying Machines Could Be the Future of Commuting

Traffic. Congestion. Pollution. Hours-long commutes. What if you could leave it all behind and trade it in for an environmentally friendly and energy-efficient personal copter—all without a pilot's license? This kind of future is the one that Matt Chasen and his team at Lift Aircraft are flying toward at full speed. Their octodecacopter is the dream many have been waiting for—a real flying car—and they hope to make it fully accessible in the near future. Motherboard lifts off with exclusive access to Lift Aircraft's prototype drone copter. *https://www.youtube.com/watch?v=A4IqRr1eicE&feature=youtu.be*

FAQ: Can Properly Inflated Tires Save You Money?

Tire inflation: here is our seasonal message to check and maintain yours. 32 pounds per square inch is the minimum for an EV. Tesla recommends 45 for their Model S and X. When in doubt follow the B pillar label, as a minium. Remember: within reason, higher pressure can reduce energy consumption! YMMV!

https://www.youtube.com/watch?v=-wMsITcRES0&list=PLIrXlHj7zayaHhly0bXNWzF4aEA6IHcgp&index=26

Don't Miss These ...(cont.)

Five Best Personal Aircraft - Passenger Drones (Flying Taxis) and Flying Cars

Here is a list of five Personal Aircraft, Passenger Drones (Flying Taxis), and Flying Cars. Cora, SureFly, Lilium Jet, Vahana and Switchblade. **Cora** is a self-flying taxi developed by Kitty Hawk, a startup backed by Google's co-founder and billionaire Larry Page. **SureFly** – Manufactured by Workhorse Group, is a personal hybrid helicopter designed perfectly for safe and easy flight. **The Lilium Jet** – while a vertical take-off and landing is not new, the company called Lilium claims to have invented a completely new VTOL aircraft concept for the modern age. **Vahana**; Introducing the Self-Piloted, electric Vertical Take-Off and Landing aircraft from A3 by Airbus. **The Switchblade** is a three wheel, street legal sport flying car that you can drive from your garage to a nearby local airport and fly it up to a height of 4km at a speed of 322km/h. *https://youtu.be/NHmT4pKFjgc*

I Turned My Tesla Into a Pickup Truck

This fun 31 [R-Rated] minute video is something that anyone who has ever contemplated building their own EV conversion should enjoy. Nicely produced, together with a team of experienced friends, Simone Giertz takes a new Tesla Model 3 and butchers it, to build her own unique vehicle in San Francisco. This self-proclaimed Swedish maker/robotics enthusiast/non-engineer shows the thinking, planning and execution of her dream, a Tesla Truck. *https://www.youtube.com/watch?v=jKv_N0IDS2A*

An accompanying short (1:46) ad was created, filmed in the beautiful nearby Marin County countryside.
See: *https://www.youtube.com/watch?v=R35gWBtLCYg*

Don't Miss These ...(cont.)

Rivian R1T Electric Camper Truck Walk Around: Overland Expo

Overland Expo West is happening right now in Flagstaff, Arizona, and EV automaker Rivian is there with its forthcoming R1T pickup truck. Being a show dedicated to off-road explorers and adventure campers, Rivian decided to dress up its model with some gear that overlanding aficionados might appreciate. In the process, Rivian gains the distinction of having the first electric vehicle ever on display at the 10-year-old event.

https://www.youtube.com/watch?v=i9BIg4Dph1E&feature=youtu.be

A Tesla Is the Most Patriotic Car An American Can Buy!

This video is about a true American Car Company. Cameron's rapid fire comments from North Carolina address many issues. Yes, the German car makers see Tesla as "THE" threat to address. Regardless of what the nay-sayers utter, their talk of impending bankruptcy, etc - the proof and pleasure is in the car itself. This phenomenon continues to baffle many.

https://www.youtube.com/watch?v=MiDWgh7jhTE

Electric F150 Confirmed? Ford's Investment in Rivian Explained + RTR F150 & Giveaway – F150 News

In this video of F150 news, we're talking electric trucks, RTR F150s, and the new Ford Scout. Ford invested $500million in Rivian an electric truck startup to use their tech in future Ford products.

https://youtu.be/lOy1G9IQHlw

Electric Car Guest Drive

Filmed at the City of Glendale Water and Power's "Electric Car Guest Drive" - this event was put on with the tremendous organizational impact of Chris Allen with Electric-Car-Insider.com, (who was our EAA 2018 Entrepreneur of the Year Award Winner back in January at our annual meeting). Watch what the participants reflect on, which is why we all work hard putting on NDEW, DEED, and other events across the country, all year long. This is the perfect situation for newbies to experience what we long time owners know to be the facts. Contact Chris' team at the number on page 7 in this issue to arrange a visit in or near your area.

https://www.youtube.com/watch?v=MiDWgh7jhTE

Volkswagen Obliterates Nürburgring Electric Record By Over 40 Seconds

The toughest motorsport track in the world, the Nurburgring, is the scene where VW has broken the electric record by over 40 seconds, with its hardcore ID R racer, setting a lap time of 6 min 05.336sec. The fastest gas lap was done with a Porsche 911 GT2 RS (6:47.30), which clearly doesn't have the ability to accelerate as fast as the EV does. That instant torque really delivers, with no waiting for the turbos to spool up. Probably using one-foot driving, maybe paddle driving (but still better than the fastest shifting with an automatic trannie). VW may be the first of big auto to give Tesla a run for their money. But their offerings are due next year, and aren't particularly sexy, just very utilitarian. But that's what most of the world wants. The change is on.

https://newatlas.com/volkswagen-nurburgring-electric-record/59970/

LA to Vegas: About That NYT Electric Car Trip In A Chevy Bolt EV

YouTube journalist – Nikki Gordon-Bloomfield calls out need for more consumer awareness from OEMs and dealers in describing differences from gas cars – especially in planning for charging on EV road trips – combats misrepresentations of NY Times reporter, Penn in LA to Vegas road trip, by data from her own LA to Vegas Bolt trip.

The New York Times recently ran an article by energy correspondent Ivan Penn (*https://www.nytimes.com/2019/06/22/business/energy-environment/electric-cars-charging.html*) in which he detailed that famous and long trip – from Los Angeles to Las Vegas and back – all in a single day. His headline "LA to Vegas and Back by Electric Car: 8 Hours Driving; 5 More Plugged In" says it all. Yes, he perpetuates the fears that the uninformed non-EV drivers hear about. But this video flags that wrong-headed thinking.

When charging EVs, it's well known that waiting the final few miles of range can be excruciatingly painful. When travelling long distances, you don't charge completely every time! Typically one only needs to get enough (plus some extra margin for headwinds, wet or colder weather, etc.) to make it to the next charging spot because charge tapering off slows things significantly.

A good rule of thumb would be 20% additional miles that the actual miles indicated. So staying in between 20-80% of full is often the targetted 'sweet-spot' to maximize battery life. (Unless of course, you have to do a full up charge!)

Opportunity charging means get a boost wherever possible. When traveling you charge until you have enough to make it to the next charging spot (plus safety margin) but that too, still requires some planning. Hear the TEN takedown of this article in this thoughtful video.

https://www.youtube.com/watch?v=AZn0lmISllU

Welcome to Membership in The Electric Auto Association!

Educating and Advocating for EVs since 1967

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

Membership Dues:	**Benefits and Bonuses**
Regular Member: $35	12 months of full color, 40+page E-Magazine "Current EVents"(CE) Chapter meetings, speakers, meet EV owners,. Help increase public awareness by volunteering.
Supporting Members:	**In addition to the above:**
Charged Up: $60	"Current EVents" Personal Listing, "Electric Car Insider Guide"
Supercharged: $120	EAA Polo Shirt, "Current EVents", Supercharged Personal or Business Supporter listing (one issue)
Supercharged Plus: $240	EAA Polo Shirt, "Current EVents" , Supercharged plus Personal or Business Supporter listing two issues)
High Voltage: $500	Polo Shirt, "Current EVents" listing as a High Voltage Personal or Business Supporter (three issues), "Who Killed the Electric Car?" movie

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

Join Today!

www.electricauto.org

Keep Up on all Auto Shows & EV Related Conferences

US and International Events

CONCOURS D'ELEGANCE OF AMERICA
06/26/19 - 06/28/19

AUTOEXPO AFRICA- KENYA
07/18/19 - 07/20/19

GAIKINDO INDONESIA INTERNATIONAL AUTO SHOW 07/18/19 - 07/28/19

AUTONOMOUS VEHICLES, DETROIT, MICHIGAN 08/21/19 - 08/23/19

PEBBLE BEACH CONCOURS D' ELEGANCE 08/18/19 - 08/18/19

SALON PRIVE
PUBLIC DATES: 09/05/19 - 09/08/19

MOTOR TREND INTERNATIONAL AUTO SHOW - LAS VEGAS
09/13/19 - 09/15/19

OKLAHOMA STATE FAIR AUTO SHOW
09/12/19 - 09/22/19

FRANKFURT INTERNATIONAL MOTOR SHOW 09/12/19 - 09/22/19

CENTRAL FLORIDA INTERNATIONAL AUTO SHOW 09/20/19 - 09/22/19

STATE FAIR OF TEXAS AUTO SHOW
PUBLIC DATES: 09/27/19 - 10/20/19

ORANGE COUNTY INTERNATIONAL AUTO SHOW 10/03/19 - 10/06/19

MEMPHIS INTERNATIONAL AUTO SHOW
10/04/19 - 10/06/19

SACRAMENTO INTERNATIONAL AUTO SHOW 10/18/19 - 10/20/19

NASHVILLE INTERNATIONAL AUTO SHOW 10/18/19 - 10/20/19

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

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

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

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

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

Proof of Potential: EVs Traveled to EVS32 in France

EVS32, the largest global e-mobility trade fair, kicked off last month in Lyon, France. There were plenty of first-hand viewing opportunities of the latest breakthroughs in the technology behind electromobility. The EV Industry has already made great strides with electric
transport being a viable, convenient and sustainable mobility solution today. To prove this and to showcase the capabilities of 21st century EVs, two of the AVERE member teams decide to drive to Lyon in their electric cars from all across Europe.

The first was from the Netherlands, included the Dutch members of the Formula-E Team, including the Municipalities of Amsterdam, Rotterdam and Utrecht, the Dutch Ministry of Infrastructure and the Environment, the RVO and AutomotiveNL, who were present at the event with a pavilion under the theme 'Mission Zero', arrived at EVS32 with a caravan of other electric vehicles. Comprisws of more than fifteen vehicles, their electric journey to EVS32 started on 18 and 19 May – two days to travel from Amsterdam to Eurexpo, Lyon. Their aim is to collect data from each car and to showcase how Holland is excelling in the electromobility sector.

From the East, the second team AVERE Member, PSPA – the Polish Alternative Fuels Association, staged a 'Zero Race' – a zero emission race – for journalists from Warsaw to Lyon. Media representatives split in two teams to do a round trip of about four thousand km (2,400 miles), spanning seven European countries. Experiencing the electric journey for themselves they reported on the real capability of two electric SUVs and the status of ultra-fast charging stations along the way, as both teams compete to finish the journey in the shortest possible time. They want to join the many others making e-mobility a daily reality for all drivers in Europe and in the world.

You can read more about the initiative here:
https://avere.org/wp-content/uploads/2019/05/Zero_Race_PSPA.pdf

ELECTRIC AUTO ASSOCIATION CHAPTERS AND AFFILIATES

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

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

NORTH (SF) BAY EAA
Web Site: www.nbeaa.org
Contact: Alan Soule, 707-477-1299

SACRAMENTO EVA (SacEV)
Contact: Guy Hall, 916-717-9158

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

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

COLORADO

DENVER ELECTRIC VEHICLE COUNCIL (DEVC)
Web Site: www.devc.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

IOWA EVA
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

KENTUCKY

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

MASSACHUSETTS

DRIVE ELECTRIC CARS NEW ENGLAND EAA
Web Site: neeaa.org
Contact: Mark Scribner
860-336-7295

PIONEER VALLEY EAA
Web Site: pveaa.org
Contact: Karen Jones

MICHIGAN

MICHIGAN EAA
Web Site: michiganEAA.org
Contact: Larry Tuttle, 734-995-9904
eaa.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

NEVADA

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 (NJEAA)
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

OKLAHOMA

EAA CHAPTER OF OKLAHOMA (TULSA)
Contact: Doug Duke, PE
918-260-8350

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

OREGON

EMERALD VALLEY ELECTRIC VEHICLE ASSOCIATION
Contact: Phil Barnhart phil@barnhart.us
541-912-5412

OREGON EVA
Web Site: soheva.net
Contact: John Christian 503-524-0873

OREGON SOHEVA
Web Site: oeva.org
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

TEXAS

ALAMO CITY EAA
Web Site: www.aceaa.org
Contact: Craig Egan, 210-542-7707

AUSTIN AAEAA
Web Site: www.austinev.org
Contact: Aaron Choate, 512-453-2710

HOUSTON EAA
Web Site: www.heaa.org
Contact: Kevin Douglass, 713-927-6997
houstontxeaa@gmail.com

NORTH TEXAS EAA
Web Site: www.nteaa.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 CLUB
Web Site: www.reevadiy.org
Contact: Mark Hanson, 540-473-1248

WASHINGTON

MID-COLUMBIA EVA
Contact: Garrett Brown, 509-713-0806

NORTH SOUND EVA
Web 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: Stanley J. Lee, 253-383-4371

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

CARB Endorses First-Time Fees On High-GHG Cars, Tax Breaks For ZEVs

By Curt Barry, IWPnews.com
California Air Resources Board (CARB) officials are recommending that state lawmakers charge extra registration or other fees on vehicles with higher greenhouse gas emissions to encourage motorists to buy cleaner cars, while also endorsing more tax and fee relief for buying and driving zero-emission vehicles (ZEVs).

"Develop an equitable, self-sustaining program that incentivizes ZEVs by imposing a fee on vehicles with high GHG emissions," states draft policy recommendations unveiled by CARB staff at a May 31 workshop in Sacramento. The recommendations, which will be included in a report to lawmakers scheduled to be sent later this year, were required by a 2017 state law, SB 498. The law requires CARB to review and conduct a cost-benefit analysis on its programs that affect the "adoption" of light-, medium- and heavy-duty ZEVs, while providing policy recommenddations on how to "maximize the effectiveness of existing programs to expand the use of these vehicles in vehicle fleet use and on a general use basis."

State officials are prioritizing carbon reductions in the transportation sector to help the state meet its GHG emission targets of 40 percent below 1990 levels by 2030 and 80 percent by 2050. In addition, transportation sector pollution cuts are being sought to enable highly polluted areas to meet national ambient air quality standards.

The draft recommendations — which will include much more detail in the final report to lawmakers expected in September — cover nine categories: long-term signals; purchase cost; ZEV fuel pricing; ZEV infrastructure; local government; zero emission miles; outreach and education; workforce development; and program flexibility. CARB staff identified ZEVs' higher up-front purchase costs, compared with conventional vehicles, as a major barrier to more ZEV purchases and a priority in their draft recommendations.

In addition to proposing a new fee on vehicles with high GHG emissions, CARB staff is recommending that lawmakers "equalize the sales tax levied on ZEV vehicles and infrastructure, so that it is equivalent to that of a comparable conventional vehicle, especially for buses and heavy-duty vehicles," said CARB staffer Melanie Zauscher during the May 31 workshop.

Lawmakers should also reduce for lower-income consumers an annual $100 "road improvement fee" on ZEVs that is scheduled to take effect July 1, 2020, the draft recommendations say. This fee is required under a landmark 2017 state law that hiked gasoline and diesel taxes as a way to ensure ZEV owners contribute to road improvements, given that they will be paying little or no fuel taxes that fund such activities.

To bolster ZEV charging infrastructure, CARB staff recommends that the Legislature require charging stations at state facilities, among other measures.

Local Government Authority
Lawmakers should also authorize local governments to "promote policies that favor ZEVs," in part by allowing them to create "zero emission zones . . . where only zero-emission vehicles are allowed to operate or enter without access fees, compared to internal combustion vehicles," Zauscher said.

In addition, local governments should be authorized to implement "pricing mechanisms that favor [vehicle miles traveled (VMT)] reductions, high-occupancy, ZEVs, and mobility needs for priority populations," the draft proposal states. Such pricing mechanisms "could be things like congestion pricing" or "operating fees for new mobility services, which would create new revenue to address regional mobility needs," Zauscher said.

To increase overall "zero-emission miles," the CARB draft staff recommendations include encouraging or requiring a "minimum fraction of zero-emission miles in new mobility services and high-mileage fleets, such as car-sharing, transportation network companies," delivery service fleets, taxis and driverless vehicles, she said. Further, local governments' light-, medium-, and heavy-duty vehicle fleets should have a minimum number of ZEVs "as they become available to meet their needs," Zauscher said, noting that such quotas are already required for transit operators around the state.

Lawmakers should also pass legislation setting zero emission-VMT and VMT targets for the state's fleets, according to the proposal. Some of the recommendations drew questions and concerns from stakeholders at the May 31 workshop.

For example, David Renschler, the city of Fairfield's fleet division manager and the vice chairman of the Municipal Equipment Maintenance Association, said local governments face several barriers to set up the necessary infrastructure to accommodate ZEVs, including heavy-duty, high-voltage battery-electric chargers. In addition, there is a dearth of qualified mechanics and technicians to maintain these new systems, he said.

"We were just notified . . . that some of the new vehicles are going to be coming out with between 800-900 volt power systems. Mechanics are used to working on 12- and 24-volt systems." While more than a dozen community colleges in the region are developing new curricula to train technicians for the new ZEV infrastructure, they are not in place yet, according to Renschler.

Most of the other stakeholders representing the ZEV vehicle and charging industries urged CARB staff to prioritize expanded funding and incentive programs to help encourage purchases of several types of ZEVs and the installation of necessary infrastructure.

CARB staff is accepting written comments on the recommendations until June 15. A draft report is expected to be released in late June, staff said.

WAVE 2019

Join us at the e-Rally "wave"

From the **14th to the 22nd of June around Switzerland** or from the **13th to the 21st of September through Germany** PLUS spectacular landscapes, community, fun & friends. For more info and registration *www.wavetrophy.com*

https://www.facebook.com/wavetrophy