



CURRENT EVENTS

June 2017 Promoting the use of electric vehicles since 1967 Vol. 49 No. 6

eMotorWerks Electric Vehicle to Grid Charging Platform Sales Increase 100% for Third Consecutive Year



With over 18,000 charging stations installed globally, eMotorWerks' exponential growth is bolstered by key smart-grid EVSE partnerships

Showing strong traction in the growing electric vehicle market, the sales and user base of eMotorWerks is growing exponentially. In the past 12 months, eMotorWerks has increased both its sales and customer base to over 18,000 charging stations installed globally. The year 2016 was also the third consecutive year in which eMotorWerks doubled its revenues, making it one of their most successful years to date. This continued expansion coincides with eMotorWerks' recent partnership with multiple third-party EVSE companies such as AeroVironment (NASDAQ: AVAV), top-tier OEM supplier Webasto, and the cashless payment provider Nayax. These are among the many product companies who are enabling their charging stations

continued on page 4



**New Numbers on EVs –
Cleaner!
... page 8**



**FC Energy Use vs EVs
or Hybrids!
... page 24**



**Harley Davidson
100 New Models
... page 31**

Articles

- 1 **EMOTORWERKS ELECTRIC VEHICLE TO GRID CHARGING PLATFORM SALES INCREASE 100% FOR THIRD CONSECUTIVE YEAR — Increasing both sales and customer base**
- 3 **DOING YOUR PART — “Word of mouth” is powerful**
- 6 **SUBARU PLANS FOR ALL-ELECTRIC VERSIONS OF EXISTING MODEL LINES — Rather than develop new vehicle lines**
- 8 **NEW NUMBERS ARE IN & EVS ARE CLEANER THAN EVER — Looking at the global warming emissions**
- 11 **REFUEL COMES TO MAZDA RACEWAY LAGUNA SECA JUNE 25 — The ninth annual event**
- 12 **25 YEARS OF DRIVING A CAR WITH A PLUG — Brief story of Jim Montgomery's love affair with EVs**
- 14 **THERE'S NO PLACE LIKE WORK! — The Overwhelming Case for Underwhelming Power**
- 15 **A MAJOR COMPONENT OF TESLA'S NEW AFFORDABLE ELECTRIC VEHICLE JUST WENT INTO PRODUCTION**
- 16 **CHAPTER HIGHLIGHT — A Brief History of the Las Vegas Electric Vehicle Association**
- 18 **NEW DEVELOPMENTS — Yet another H₂ hurdle has been overcome, but more remain**
- 20 **INSURANCE! — Its Role In The EAA at NDEW, and Other Events**
- 24 **ENERGY USE FOR HYDROGEN FUEL-CELL VEHICLES — higher than electrics, even hybrids (analysis)**
- 29 **CHARGING NEWS — EV Charging In Multi-Unit Structures**
- 30 **VINTAGE ELECTRIC AND EMORY MOTORSPORTS TEAM UP FOR A PORSCHE-INSPIRED EBIKE — Several elements borrowed from the car**
- 31 **HARLEY-DAVIDSON CONFIRMS ELECTRIC MOTORCYCLE, 100 NEW MODELS — New models to appear within 10 years**
- 32 **DISRUPTIVE TECH: ELECTRIC AIRPLANES COULD DESTROY THE AUTOMOTIVE INDUSTRY — RethinkX raising the curtain on future ground transportation**
- 33 **LILIUM SHOWS MAIDEN FLIGHT OF WORLD'S FIRST WORKING PROTOTYPE OF AN ELECTRIC VTOL JET**
- 41 **EMOTORWERKS ADDS WEBASTO TO EXPAND ITS JUICENET SMART GRID ELECTRIC VEHICLE CHARGING PLATFORM**
- 43 **TESLA CAN PRODUCE 6M+ CARS WITH 4 TO 5 FACTORIES, SUGGESTS MUSK**

Columns

- 3 **EAA BOARD OF DIRECTORS 2016**
- 14 **CHAPTER HIGHLIGHTS**
- 29 **CHARGING NEWS**
- 36 & 37 **EVENTS & CONFERENCES**
- 38 & 39 **NOTABLE VIDEOS AND ARTICLES**
- 40 **EAA MEMBERSHIP FORM**
- 42 & 43 **CHAPTER LISTINGS**



Contributors:

E-mail: contact@electricauto.org
 Bob Oldham, Ron Freund, Marc Geller, Forbes Bagatelle-Black, Earl Killian, JB Straubel, Doug Korthof, Jerry Pohorsky, Linda Nicholes, Lee Galbraith, Daniel Davids, Jim Bohorquez, Felix Kramer, Paul Scott, Monte Gisborne, Doug Brentlinger, Darell Dickey, Thomas Sidle, Bill Hammons, Tim Wong, Chelsea Sexton, David Turock, Olaf Ungerer, Jack Rickard, Jack Ashcraft, Irwin Dawid, Tom Dowling, Oliver Perry, Jack Bowers, Eric Burns, John McEwan, Michael Bianchi, Jory Squibb, Dave Kodama, David Hrivnak, Tom Moloughney, Charles Hall, Charlton Jones, Mark Larsen, David Herron, Prof Eckhard Elmers, Ruediger Hild, Tom Saxton, Stephen Johnsen, Noel Adams, Richard Lane, Charles Whalen, Anatoly Lobstov, Carol Cole, Jon Ando, George Stuckert, Dave Oliveria, Tim Goodrich, Jason Jungreis, Paul H. Kydd, Julia Sirotna, Brandon Hollinger, Chris Sheridan, Gary Bulmer, Peder Norby, Tim Catellier, Corbin Dunn, Dave Hall, Jeff Finn, Bob Vahsholtz, Gert Gelhaar, James Billmaier, Adam Eberhardt, John Palmerlee, Alan Soule, Chad Schwitters, Guy Hall, Don Gerhardt, Bill Brinsmead, Bob Tregilus, Nick Butcher, Dave Erb, Kim Rogers, Peter Eckhoff, Lee Gasper-Galvin, Rich Burns, Carolyn Amon, Carl Vogel, Michael Thwaite, William (Coty) Keller, Bryan Murtha, Jessie Spruel, Anton Wahlman, Chris Neff, Patrick Connor, Donald R. Davidson, Victor Wowk, Rick Beebe, Bill Palmer, Doug Manowitz, Stephen Noctor, Bryan McCarthy, Bob Bruninga, Jukka Kukkonen, Borisoff Family, Don Christian, Rafael de Mestre, Aaron Rouland, Peter Mackin, Terry Hersher, Alan Arrison, Carl Grunwald, Jim Natale, Gint Federas

Board Chairman, CE Publication – Ron Freund
Associate Editor – Guy Hall
Managing Editor – Dorothy Foglia
Book Reviewers – Warren Winovich, Jack Swartz, Earl Killian, Stan Hanel, Oliver Perry

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 Advertising Manager or CE Staff for details.

National EAA:

Web Site: www.electricauto.org or electricauto.org
Mailing: CE Comments
 847 Haight Street
 San Francisco, CA 94117-3216 USA

Membership/Address Changes:

E-mail: membership@electricauto.org
Mailing: EAA Membership
 323 Los Altos Drive, Aptos, CA 95003-5248 USA
 If you have comments, please send them to ceeditor@electricauto.org.

<http://electricauto.org>



Follow us on Facebook

<https://www.facebook.com/ElectricAutoAssociation>

On Twitter: @EAANational <https://twitter.com/EAANational>



Current EVents is printed on recyclable paper (30% post consumer waste), using soy-based inks. The press chemicals are non-toxic.

Chairman, CE Publication: **Ron Freund**
chairman@electricauto.org

Co-Chairman, Plug In America:
Marc Geller

Guy Hall, secretary@electricauto.org

Chris Neff
marketing@electricauto.org

Treasurer: **Gint Federas**
treasurer@electricauto.org

CE Advertising Manager: **Carl Vogel**
ceadvertise@electricauto.org

Terry Hershner

Board Appointees

Marina Cerin-Stith

Jack Brown

Membership: **Will Beckett**
membership@electricauto.org

Jay Friedland
Education Grant Manager

Historian: **Darryl McMahon**
historian@electricauto.org

EAA Board Contact:
board@electricauto.org 415-861-7278



Notice: IRS requires us to ask for a full disclosure by the donor for donations of \$1000 or more. This should include Full Name, Complete Address, Phone Number, and Social Security or Tax ID Number.

Current EVents Back Issues on the Web

The EAA has put most of its Current EVents issues from 2001 to 2017 on its website.

Please visit

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

The resulting page has a listing of years (in a folder), which when selected will list the issues for each month. There is a downloadable pdf file which averages five MB.



Doing Your Part

By Ron Freund

The Paris Accord inked in 2015 by 195 countries is about as close to an international consensus as one gets — it would have been considered a triumph, a starting point and a pathway for our response as the agreement would grow and move forward. The United States participation shaped the approach to that accord but now removing that US participation creates international uncertainties and confusion.

In recent years, U.S. emissions have been dropping. In California, the grid utilization has dropped from over 80% to well below 50% largely because of efficiency improvements and conservation. Our economy continues to thrive.

Our cars (for EV drivers) are driving cleaner than 10 years ago because the grid itself is moving towards getting cleaner. See this recent restatement from UCS on page 8 in this issue.

What that means is that Ohio and other states near the east coast—where solar and wind are not as pervasive as in the west—EVs continue to be very clean clean!

We cannot cling to 19th and 20th century technologies which result in treating our atmosphere as a waste dump.

Fortunately, US withdrawal from the Paris Agreement will not spell the end of the push. Indeed, all signs point to a redoubling of efforts. Many states and communities within the United States have experienced that the clean energy solutions to climate change *create* economic opportunity and good jobs for their citizens — *not* necessarily take them away.

More people than ever today are employed in renewable energy than in the past 20 years. I have read that it is over 10 million worldwide!

Tesla is growing and continues hiring. The upcoming Model 3 is zipping around Northern California with nearly daily sightings.

Yes, the genie is out of the bottle. Have you committed to reducing your carbon footprint? Shedding ownership of an ICE is the single biggest step you can take in that direction. In the short term and in the long run, it will save you money if you play your hand wisely! Talk to someone near you who's done so. Ask critical questions. Compare notes. And if you already have — tell a friend!

"Word of mouth" is a powerful mechanism and it predates all the fancy technology man has invented.

Do your part!



With over 18,000 charging stations installed globally, eMotorWerks' exponential growth is bolstered by key smart-grid EVSE partnerships.

EMotorWerks

continued from page 1

with JuiceNet cloud software to create an open platform for smart-grid EV charging that leverages abundant renewable energy while offering utility-coordinated aggregation for load balancing and control.

“Our smart grid charging solutions continue to gain significant growth because we solve problems that directly affect EV drivers, charging station equipment manufacturers as well as utility operators,” said eMotorWerks CEO, Val Miftakhov. “Beyond the well publicized growth the EV industry will enjoy during the next five years, a massive challenge lies ahead: the ability for electricity providers to charge EVs while maintaining a reliable grid for everyone, while at the same time taking advantage of the abundant and less expensive solar and wind energy available on our grid. Our solution primes operators for the upcoming grid demand while also providing an intuitive and convenient solution for drivers that doesn't impact usage of their vehicles: smart-grid charging stations from a variety of leading vendors all linked to our JuiceNet open-standards based communications and control platform. We offer a proven track record of robust, reliable and enduring solutions for utilities and EV drivers who are looking to further prepare for the accelerating growth in EV adoption.”

Much of eMotorWerks' success has come from the company's JuiceNet platform. JuiceNet and its associated APIs provides innovative utilities, grid operators and “load aggregators”

the ability to aggregate fleets of charging EVs and modulate energy demand on the grid, to allow for collective EV load shifting to times when renewable resources are more abundant and or energy rates are lower. Beyond AeroVironment and Nayax, eMotorWerks also partnered with the German energy company, conenergy, to create solar-optimized EV charging solutions that increase utility tariff savings for commercial and residential solar owners. Additionally, utilities such as Sonoma Clean Power work with eMotorWerks to provide free smart-grid enabled charging stations and reward programs to EV drivers in their region.

“In addition to manufacturing jobs we're creating by designing and assembling cutting-edge electric vehicle charging stations here in the USA, these home grown, renewable sources of energy create high-quality local jobs,” said Preston Roper, COO of eMotorWerks. “Rather than sending petro-dollars overseas to fuel internal combustion engine vehicles here at home, eMotorWerks is enabling the EV revolution to benefit a variety of parties, from assembly line workers to automotive and utility participants, to drivers.”

Beyond revenue and user growth, eMotorWerks has also grown its workforce to a total of over 40 employees, across its California-based headquarters and European development and sales offices. This past year eMotorWerks has welcomed to the team:

Alec Brooks, Director of Product Management – (formerly Vice President and CTO, Efficient Energy Systems at AeroVironment)

David Schlosberg Director, Energy Market Operations – (former Principal, Energy Market Analysis at Google Alphabet Access & Energy)

Scott Williams, Vice President, Business Development, Global Automotive Markets – (former Vice President, Business Development at ChargePoint)



eMotorWerks recently won a 2017 Grid Edge Award and has been invited to present their solution this year at Energy Storage North America, EES North America, See4All Forum, California's Distributed Future and the 2017 Community Choice Symposium.



<http://www.prnewswire.com/news-releases/emotorwerks-electric-vehicle-to-grid-charging-platform-sales-increase-100-for-third-consecutive-year-300461986.html>

TucsonEV.com

Your stop for EVerything J1772

Zero to J1772 Adapter

- 14AWG
- C-13 Plug
- Can have up to 3 plugs
- 24" cord



Tesla UMC to J1772 Conversion

- 40A capable
- 120/240vac
- New UMC
- Used UMC
- Tesla Plugs available



CHAdEMO Inlet and Plug

- Yazaki
- 500VDC
- 120Amps
- 1m cord



Plugs with and without Cord



20ft 30A or 40A Extension Cord

- Any length cord in 30A or 40A
- All Plugs and Inlets are 50A rated

J1772™ Adapter Boxes

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



- Remote and regular
- 30A - 50A versions

Inlets with and without cord



- 10AWG, 8AWG and 6AWG
- 1m to 10m lengths

EVE 40A Cord

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

EVE 30A Cord

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

Quantity discounts available, for more information and pricing:

www.TucsonEV.com or EV@TucsonEV.com



CLIPPERCREEK

THE Electric Vehicle Charging Station

ClipperCreek.com

Introducing the

ProMountDuo™ Universal Pedestal

RUGGED, ECONOMICAL

Accommodates two stations with no additional hardware necessary



LEVEL 2
240 Volt
CHARGING STATION
Starting at
\$379
LCS-20 shown



Single Mount
LCS-20
16A, LEVEL 2
CHARGING STATION
\$813



Single Mount
HCS-40
32A, LEVEL 2
CHARGING STATION
\$999

LEARN MORE CALL 877-694-4194

RELIABLE
POWERFUL
MADE IN AMERICA

Subaru plans for all-electric versions of existing model lines

By John Voelcker

It's now clear that every automaker, no matter how large or small, will have to develop and sell battery-electric vehicles by 2020 to 2025.

Companies like GM and Volkswagen, which each make 10 million cars a year, can afford the breathtaking costs of developing expertise and engineering cars with entirely different powertrains.

For smaller companies, it's tougher.

Now Subaru is moving toward its first plug-in vehicles, with a plug-in hybrid planned for 2019 and a battery-electric model after that.

In an interview published recently by Bloomberg [<https://www.bloomberg.com/news/articles/2017-05-21/subaru-considers-electric-versions-of-its-cars-to-leverage-brand>], the company's CEO Yasuyuki Yoshinaga said that it plans to make all-electric versions of existing models rather than develop new vehicle lines for the new powertrains.

By global standards, Subaru is a relatively tiny automaker, at about one million vehicles a year—more than half of them sold in the U.S.

That means its R&D budgets must be very carefully meted out to ensure that Subaru can meet increasingly tough regulations around the world while still positioning future products where they need to be to lure new and repeat buyers.

The adaptation of existing models to battery power is essentially a practical matter for Subaru, Yoshinaga explained.



2018 Subaru Crosstrek, 2017 Geneva auto show



2018 Subaru Outback

"Providing the choice of an electric vehicle," he said, "means the customer can still desire the same Subaru."

The CEO offered the example of a Subaru buyer in Beijing who might want the company's very popular Crosstrek (sold outside North America as the Subaru XV).

If that customer is effectively required by Chinese regulations to buy an electric car, Yoshinaga said, "if there's no electric version, then he can't buy it."

The tactic also allows Subaru to escape the high cost of establishing new models, which incur substantial

continued on next page

promotion and marketing costs to establish in any new country.

To pay for the research and development required to launch a fully electric car, Subaru is downplaying its efforts in autonomy, or self-driving cars, and connected vehicles.

It has budgeted more than \$1.2 billion to spend on R&D by next March, which is more than double the comparable figure from just two years ago.

The key choices, the CEO said, will be suppliers for the battery and the electric motor—a decision he said will have to be made within the year.

In part, the company can make the switch, Yoshinaga said, because the brand's signature feature has evolved from its flat "boxer" engines to a broader image of safety.

The New Global Platform that will underpin all future volume vehicles from the company — starting with the 2017 Impreza compact and 2018 Crosstrek crossover — has been designed to permit electric drive and installation of battery packs.

Reports last summer indicated that Subaru would introduce an all-electric crossover utility vehicle in the summer of 2021.

It seems likely that it will be a version of the XV Crosstrek, because compact (or C-segment) vehicles have the highest global volume compared to other sizes.

Michael McHale, director of corporate communications for Subaru of America, told Green Car Reports that the company hasn't yet confirmed its plans for plug-in vehicles.



2017 Subaru Crosstrek



Subaru eyesight safety system

"We are still gauging the overall demand for plug-ins," he said, "and watching the current demand carefully."

But, he cautioned, the company also knows that "the reality of customer acceptance of any new system is always

lower than the results from polls"—in the same way that a 2014 poll found that 30 percent of respondents planned to buy a hybrid vehicle.

Hybrid vehicle sales, of course, have remained at roughly three percent of the U.S. market for a decade.



John Voelcker, Senior Editor

John is the Editor of *Green Car Reports*, providing varied news coverage and reviews. He has covered advanced auto technologies and energy policy for numerous print, online, and radio outlets. Voelcker has driven electric and hybrid cars from almost two dozen automakers, and hundreds of other vehicles as well. He received a BS in Industrial Engineering from Stanford University and lives in southeastern New York.

New Numbers Are In & EVs Are Cleaner Than Ever



By David Reichmuth
Clean Vehicles Program at Union of
Concerned Scientists

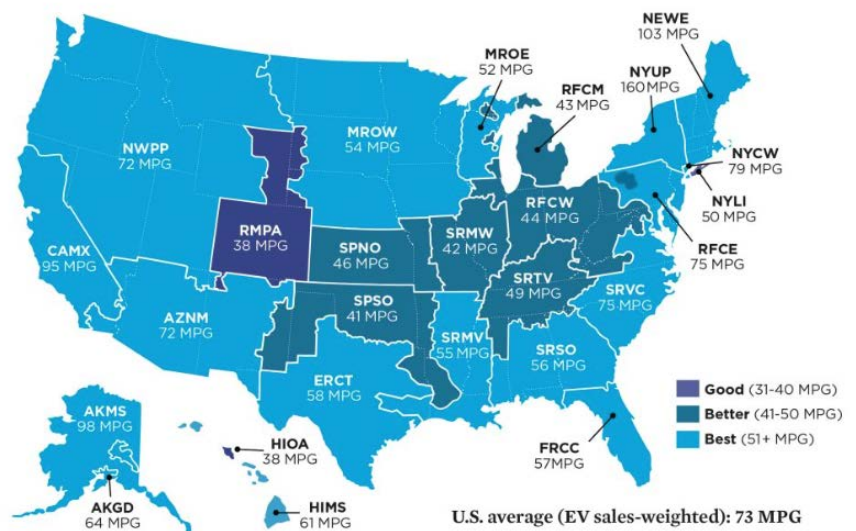
One of the most common questions I'm asked about electric cars is, "how clean are they?"

Five years ago, UCS answered this question, publishing its first look at the global warming emissions from electric vehicles (EVs) in our 'State of Charge' report. In early 2017, the US EPA updated their data on emissions from electricity generation, now capturing power plant emissions through the end of 2014. How does this new data change our assessment of EVs?



This post is a part of a series on
[Clean Energy Momentum](#)

Electric Vehicle Global Warming Pollution Ratings and Gasoline Vehicle Emissions Equivalents by Electricity Grid Region



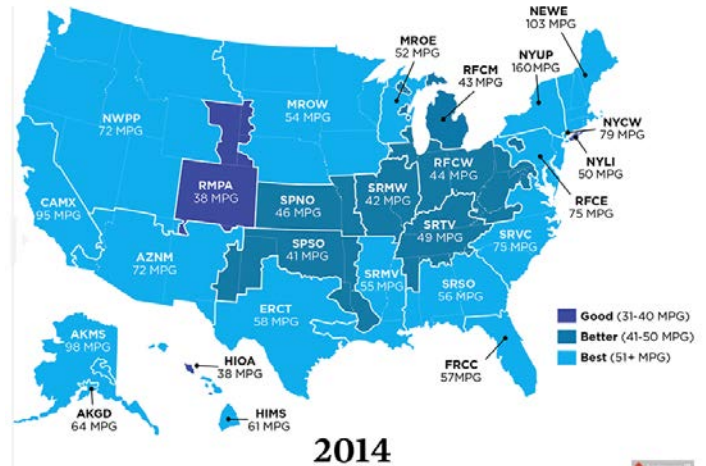
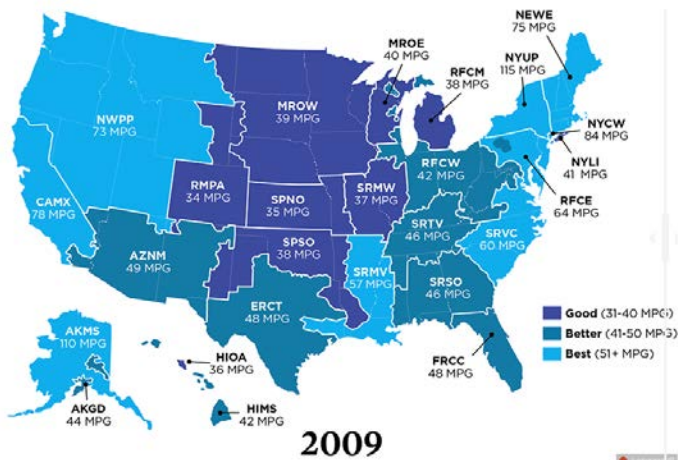
Note: The MPG (miles per gallon) value listed for each region is the combined city/highway fuel economy rating of a gasoline vehicle that would have global warming emissions equivalent to driving an EV. Regional global warming emissions ratings are based on 2014 power plant data in the EPA's eGRID 2014 database (the most recent version). Comparisons include gasoline and electricity fuel production emissions. The 73 MPG U.S. average is a sales-weighted average based on where EVs were sold in 2016.

For over 70 percent of Americans, driving an EV results in fewer emissions than even a 50 MPG gasoline vehicle.

continued next page

We now find the overall global warming emissions from using an EV is significantly lower for most of the US. Several regions of the country showed significant decreases in emissions, as compared to our first EV emissions assessment.

When compared to our initial report on EV global warming emissions, the changes are impressive. That report used 2009 power plant data (the most current available in 2012) and placed only 9 of 26 regions in the ‘best’ category. **Now 19 regions are in the best category with only 2 in ‘good’ regions.** For example, the Northern Midwest region that includes Minnesota and Iowa improved from 39 MPG equivalent to 54 MPG and Eastern Wisconsin also jumped from ‘good’ at 40 MPG to our ‘best’ rating with emissions equal to 52 MPG gasoline cars.



Based on where EVs have been bought to-date, the average EV in the US now produces emissions equivalent to a hypothetical gasoline car achieving 73 MPG.

Nearly half of the EVs sold to date have gone to California, where the average EV produces global warming emissions equal to a 95 MPG gasoline car. The next five states for EV sales (Georgia, Washington, New York, Florida, and Texas) account for 20 percent of US EV sales and are regions that have emissions ratings of 50 MPG or better.

Manufacturing emissions are important, but much less of a factor than fuel emissions.

The emissions estimates presented above compare the use of an EV compared to using a gasoline vehicle. However, there are also emissions associated with the production of these cars, and in general making EVs produces more emissions than a comparable gasoline car. We studied this issue in our “Cleaner Cars From Cradle to Grave” report in 2015 and found that the extra emissions from making an 80-mile range EV (compared to a similar gasoline car) are

about 15% higher. However, this extra emissions ‘debt’ is quickly recovered by the savings that accrue while using the electric vehicle.

How quickly the emissions are recovered depends on where the car is charged, but for an EV the size of the Nissan LEAF, we found that break-even point occurs after 6 to 13 months of use (depending on electric grid region), well shorter than the likely lifespan of the car.

Choosing an electric car over an inefficient gasoline model is one of the most influential decisions a household can make to reduce emissions

For the average American, transportation makes up about a third of all household global warming emissions. And compared to some other sources of emissions, we have a great deal of control over how efficient a vehicle we choose. The average new gasoline vehicle in the US is rated at 25 MPG. On average, driving an EV (at 73 MPG equivalent emissions) would produce global warming emissions at less than half of the rate of the average new vehicle.

continued on page 10

EV Numbers

continued from page 9

If you're curious about how clean specific EVs would be where you live, check out our EV tool here. It's recently been updated with our newest estimates of EV emissions, and we've also added many new EV models. If you are interested in the most efficient (and lowest emission) EV models, check out the Hyundai Ioniq BEV, Chevy Bolt, and BMW i3 BEV models.

Changes since our last report include generation, fuel production, and transmission efficiency.

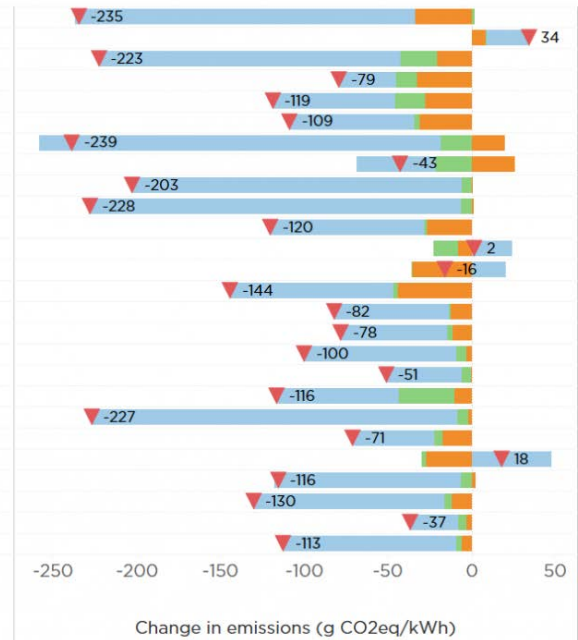
Our initial assessment comparing gasoline vehicle emissions to those from electric vehicles were detailed in our 2012 State of Charge report. That report relied on the best data available at the time. This included estimates of power plant emissions and transmission losses from 2009 and also included the most recent estimates of 'upstream' emissions (such as coal mining and oil refining).

While we used the same analysis method as both the State of Charge and Cleaner Cars From Cradle to Grave reports to generate these new emission estimates, the input data has changed.

The EPA estimates of power plant emissions in their eGRID database have been updated from 2009 data to 2014 data. In many cases, the emissions from power plants decreased, often due to reductions in coal-fired power and increases in renewable generation. However, some regions did show an increase. For example, in the Pacific Northwest, hydroelectric power output was reduced and fossil fuel plants supplied additional power.

The eGRID data also includes an updated method for calculating the losses attributed to the transmission and distribution of electric power from generators to the end user. This

eGRID subregion	State(s)
AKGD	AK
AKMS	AK
AZNM	AZ,NM
CAMX	CA
ERCT	TX
FRCC	FL
HIIMS	HI
HIOA	HI
MROE	WI
MROW	MN,ND,SD,NE,IA,WI
NEWE	VT,NH,ME,MA,RI,CT
NWPP	WA,OR,NV,ID,MT,UT,WY
NYCW	NY
NYLI	NY
NYUP	NY
RFCE	PA,NJ,DE,MD
RFCM	MI
RFCW	IN,OH,VW,PA,VA
RMPA	CO,WY
SPNO	KS,MO
SPSO	OK,TX,LA,AK,NM
SRMV	LA,AR,MS
SRMW	IL,MO
SRSO	AL,GA
SRTV	KY,TN,MS
SRVC	VA,NC,SC



■ Change in generation
■ Change in grid loss
■ Change in upstream emissions

Most regions showed a decrease in emissions from electricity generation and distribution from 2009 to 2014. Red triangles indicate the total change in global warming emissions due to changes in generation sources, upstream emissions from fuel production, and losses in transmission and distribution of electricity from power plants to the end user.

loss estimate is significantly lower than previous estimates, and therefore lowers emissions attributed to EVs.

Finally, we also updated the estimates of emissions from 'upstream' sources like fuel extraction and refining. We used the most recent version of the GREET model from Argonne National Laboratory to estimate these emissions.



DAVID REICHMUTH is a senior engineer in the Clean Vehicles Program, focusing on oil savings and vehicle electrification.

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

<http://blog.ucsusa.org/dave-reichmuth/new-numbers-are-in-and-evs-are-cleaner-than-ever>

Refuel Comes to Mazda Raceway Laguna Seca June 25



Photo: Caliphotography

The 9th annual Refuel clean power motorsports event is coming up at Mazda Raceway Laguna Seca, Sunday June 25, 2017.

This is a special once a year event on the famed Monterey racing circuit where pure electric EV and electric motorcycle drivers can push their vehicles to their limit. There are several sessions throughout the day where drivers can put on a helmet and go out on the track. The organizer, Speedventures, provides reduced cost track time and a time trial to a fraction of the cost of a typical track weekend. Track time is less than \$100, spectators can come to the track for free and not only see production vehicles, but performance conversions, prototype EV racing vehicles, the truly unusual and even witness some OEMs doing some undercover mule testing.



Photo: Jack Brown

For more information and registration, go to
<http://www.refuelraces.com/>



25 years of driving a car with a plug

By Jim Montgomery

Twenty five years ago today was a significant day in my life. It was the day I took ownership of my first 100% battery electric, plug-in vehicle. A 1987 Pontiac Fiero converted to electric by Solar Electric and Green Motorworks. It has been an interesting journey, with numerous ups and downs, as I've been a strong proponent of transitioning away from dirty fossil-fuel based transportation for decades and I've experienced first-hand numerous entities who profit by the status quo doing all they can to kill the electric car. But due to the efforts of countless individuals over the years, many of you on this list, [Ed: reference to the original RAV4 EV's mailing list] I am hopeful and gratified to see us on the cusp of a clean energy and clean transportation future. The future is bright!

Back when I got my Pontiac Fiero the only options were conversions and they were not really ready for the masses. There were numerous sacrifices one would make due to the technology limitations. My Pontiac Fiero had a range of about 35-40 miles on a charge, took many hours to recharge on 120V and went from 0 to 60 mph in about a minute! Now we have numerous production vehicles to choose from with performance that blows away fossil-fuel powered vehicles.

I've been digging through my archives and it truly is a trip down memory lane. This is just stream of consciousness so forgive me as I pass by, gloss over or otherwise don't note those involved in the history.

The Electric Vehicle Discussion List and all the home-conversion folks



1992-1998: 1987 Pontiac Fiero Conversion 36,000 miles driven.



1996: Earth Day

continued on next page

on that list (and it still exists today). NEDRA (the National Electric Drag Racing Association) and all they did to promote electric propulsion as a high-performance, superior technology to fossil-fuel powered vehicles. The ZEV mandate and first generation of electric vehicles and the owner groups that sprung up evangelizing about the awesomeness of the technology. The day we got HOV access with our electric vehicles! Our EV rallies and parades and Earth Day events. Going to CARB hearings to support the ZEV mandate, reading all the lies in the media as those who opposed the technology did all they could to kill the electric car. The dark ages when the ZEV mandate was overturned and all the leased vehicles were taken back and crushed but not before spawning groups to protect them, like PlugIn America. The various groups, individuals, politicians, companies and others who kept the electric vehicle flame burning after the ZEV mandate was overturned. And fast forward to today. The diversity of production vehicles available in just the last few years is astonishing and gratifying. The growth in sales is increasing dramatically. With 200+ mile range vehicles available in the mid \$30K price point we are finally getting there. And I see performance continuing to improve while prices continue to drop rapidly over the next 5-10 years.

My thanks to all of you on this list, especially the early adopters and supporters. We've kept the faith for many years, each of us supporting the technology in our individual ways, some more than others, but all important. When we look back another 25 years from now, I am sure we will be able to say the ICE (Internal Combustion Engine) Age is over... and it will be due in large part to our collective efforts!



1998-2002: 1998 Honda EV+, 7,000 miles driven



2002-present: 2002 Toyota RAV4 EV, 200,000 miles driven and on the wait list for the Tesla Model 3!



There's No Place Like Work!

The Overwhelming Case for Underwhelming Power



Marc Geller has been driving electric cars since 2001. He has long been an officer of the EAA, and helped co-found Plug In America.

By Marc Geller,

Plug In America and GGEVA

One of the great attributes of plug-in electric cars is the versatility of electricity as the energy supply. Electricity can be delivered almost anywhere, including where the car will sit for hours on end. And it can be delivered slow or fast. The convenience and low cost of home charging is a tremendous incentive to get a plug-in car. To fill up with liquid fuels for vehicles — be it gasoline or diesel you've got to drive to a location that exists for the sole purpose of refueling, entailing no small cost in money, time

and fuel. Because a plug-in car's battery can be refilled while you do something else, faster isn't necessarily better. Faster, in fact, can cost more in equipment, can be problematic for the electric grid, and surprisingly inconvenient.

While easy access to low cost, convenient charging at home is perhaps EVs' greatest asset, nothing makes the benefits of an EV more obvious to potential EV drivers than access to electricity for cars at the workplace. What could be more tempting than a "water fountain" dispensing electricity

for your car to sip all day? The car sits around for hours doing nothing; it might as well be plugged in. Workplace charging done right makes EV drivers. More valuable than the actual power dispensed is the allure of free power. Nissan, BMW, Tesla all use the appeal of free power to make sales. That opportunity — free low power at work — hasn't been properly exploited in the effort to accelerate EV adoption.

Practically speaking, power for cars at work can extend the electric range of a plug-in hybrid or it can enable those with a longer than average commute to drive a full EV. Practicality, however, is actually a small part of the equation. Most people get a vehicle that can do the task at hand. They get an EV that can do their commute without charging at work. Most people's commute is about 20 miles each way. Every EV on the market can do that no sweat. Very few people *need* a charge at work. For those of us interested in accelerating the rate of EV adoption what matters is the proven draw of easy access to power at work. The opportunity to charge at work, especially if it is delivered as a workplace perk, is a tremendous motivator to seriously consider switching to a vehicle that can plug in.

Fortunately there are many compelling reasons for employers to grant access to power for cars at work. Many public and private workplaces have sustainability goals that can be significantly met by providing access to charging. The best employees are often among those requesting charging. At about a dollar a day in electricity per vehicle, the running costs are manageable.

continued next page

In addition, In some places there are public incentives to prod workplaces to provide some access to electricity for EVs.

But there are also disincentives. There is no one size fits all solution for “the workplace.” There are many products available in the marketplace, and given that this is new to almost all workplaces, the array of choices can be overwhelming. The most inappropriate solution might have the best marketing, while the best solution might have no advocate. How is a workplace to decide the best approach? What role should EV drivers and other employees play beyond request charging facilities? Is this a simple matter of bringing simple 120V power to many spaces in the parking lot, or does it necessitate panel upgrades to enable a few sophisticated 240V charging stations that can manage authentication, monetization, and timely evacuation of the parking space? And how is one to plan for future expansion?

During the first seven years of the

modern era of EV availability we have learned that most workplaces don’t charge for the power to charge EVs, whether they simply allow access to existing electrical outlets or install expensive, sophisticated charging stations. Why? Because the expense of the power is insignificant, less than the cost of providing bottled water or coffee to employees on a daily basis.

Larger corporate campuses have been among the first to install EV charging, usually with the aid of government grants. Despite the sophisticated capabilities of the Level 2 systems often installed, the power is usually offered for free. The cost of the electricity delivered is, all things considered, insignificant. It is the installation, equipment, and ongoing networking and service agreements, not the electricity, that can make providing charging expensive. The happy result of free car charging at a workplace is that demand for access to the charging stations quickly exceeds supply. The workplace that installed charging stations costing thousands of dollars

each is usually slow to expand without further government subsidy. Instead they begin to utilize the charging station smarts to restrict access to charging. Employees spend time moving their cars around when their time is up to maximize utilization. However employee value is wasted. Cords must be disconnected. Cars must be moved. What was low cost and enticing now costs enough to keep those who don’t need it away. PHEV drivers calculate which cost more, workplace electricity or gas.

It is simply true. People love free stuff. We shouldn’t be fighting that impulse, rather harnessing it, if we mean what we say about the need to get people off fossil fuel.

We must focus now on cost effective solutions to making access to power for cars near ubiquitous at the American workplace. The Department of Energy has published a report on the value of Level 1 charging at work. I recommend you download it and bring its findings to your workplace.

https://www.afdc.energy.gov/uploads/publication/WPCC_L1ChargingAtTheWorkplace_0716.pdf

A Major Component of Tesla’s New Affordable Electric Vehicle Just Went Into Production

Production on the batteries for Tesla’s Model 3 has begun at the company’s Gigafactory in Nevada. The first Model 3s are expected to be delivered in 2017, and once production scales, the batteries will be incorporated into Tesla’s other models.

This is a major step forward for Tesla with their Model 3. Starting production on the electric vehicle’s battery cell at Gigafactory 1 began in Nevada over the weekend. According to *Electrek*, Tesla cofounder JB Straubel said during a presentation at the Midwest Renewable Energy Association’s 28th Annual Energy Fair that the battery was in production “right now.”

Tesla’s 2170 batteries for vehicles are made using Nickel Cobalt Aluminum Oxide (NCA), as opposed to the 2170 battery cells that power the company’s stationary energy storage products, which utilize Nickel Manganese Cobalt Oxide (NMC).

Musk has called the batteries “the best cell in the world that is also the cheapest cell” and says they have the “best energy density in the world.” While they will initially only be used in the Model 3, which is due to go into production in July, Tesla plans to eventually scale up to integrate them into the Model S and Model X, which are already in production. [Go to the url, watch the video and view the infographic to keep up with the progress].

<https://futurism.com/a-major-component-of-teslas-new-affordable-electric-vehicle-just-went-into-production/>

Chapter Highlight



This new monthly report will feature short activity summaries from our various chapters to foster knowledge transfer. Such sharing can be powerful for planning new startup activities, special meetings, or just reinvigorating established groups as we grow into our second 50 years of pioneering e-mobility.

A Brief History of the Las Vegas Electric Vehicle Association

Before there was a Tesla Gigafactory in northern Nevada or plans for a Faraday Future electric car factory in North Las Vegas, there was the Lectra Motors factory at 5380 South Valley View Blvd in Las Vegas, that produced over 1,000 electric sports cars, sedans, and trucks from 1979 to 1982. Each model was based on a new Datsun chassis, whose gasoline engine components were stripped and sold back to the local dealership for spare parts. The Lectra Centauri was built on top of a Datsun 200SX chassis, while an electric pickup truck was built on a Datsun Lil' Hustler chassis.

Al Sawyer and Charlie Amadon were engineers at the Nevada Test Site. They started up Lectra Motors in response to an oil embargo by the Organization of Petroleum Exporting Countries during 1973 and the Iranian revolution in 1979. Shortages of refined gasoline created long lines of cars at gasoline pump service stations, along with sudden price hikes.

Lectra Motors vehicles integrated 18 six-volt golf cart batteries, an electronic controller from a mining industry conveyor, and a DC motor from General Electric into rebuilt Datsun chassis models. Lectra cars and trucks were tested to a top speed of 80 mph, with a range of about 40 to 60 miles before the battery pack needed to be recharged. The company also developed electric air conditioning,



(Photo courtesy of LVEVA): Al Sawyer (right with cane), founder of Lectra Motors, compared his Lectra Motors Centauri (far right) to a new Nissan LEAF with a Nissan representative (left) during 2010.



(Photo courtesy of Stan Hanel): Jim Katzen plugs his vintage Jet Electrica into a DC Solar portable charging station during Speedway Childrens' Charities' car show at Las Vegas Motor Speedway. Evan Eskelson showcases a 1974 Aztec 7 kit car with FiberFab body built on a Volkswagen chassis at an electric car rally during National Drive Electric Week 2016.

continued next page

electrohydraulic braking, and battery monitoring systems for all of its electric car and truck models.

During the early 1990s, Sawyer joined with scientists at the Desert Research Institute, a research arm of the University of Nevada Las Vegas, to start up the first Las Vegas chapter of the national Electric Auto Association. Gail Lucas became President and promoted educational outreach throughout southern Nevada.

25 years later, the Las Vegas Electric Vehicle Association is now led by Lloyd Reece as President and Treasurer, with support from newly-elected Vice-president Justin Steele, Stan Hanel as Secretary, Evan Eskelson and Jim Katzen as Board of Directors members:



(Photo courtesy of Stan Hanel): Speedway Children's Charities Car show.

<http://www.lasvegaseva.org>

Reece and Steele own Nissan LEAFs, but Reece is also a proud owner of a 1982 Lectra Motors Centauri that was originally owned by Al Sawyer. Katzen drives another vintage 1978

Jet Industries 'Electrica' car, that was factory-rebuilt from a Ford Escort chassis. Eskelson led an EV workshop to restore a vintage 1974 Aztec 7 kit car from FiberFab onto a Volkswagen Beetle chassis.

Other recent coverage of LVEVA by Las Vegas Review-Journal includes a video featuring LVEVA President Lloyd Reece demonstrating the operation of his Nissan LEAF:

<https://www.reviewjournal.com/business/nevada-prepares-for-an-electric-car-boom/>

Media coverage by Las Vegas Business Press regarding EV infrastructure in Nevada, written by Stan Hanel:

<https://businesspress.vegas/economy/transportation/new-law-promotes-electric-car-infrastructure-in-nevada/>

The 28TH ANNUAL
ENERGY FAIR
 CLEAN ENERGY + SUSTAINABLE LIVING

See You in September

New!
 ST. PAUL, MN
 SEPT. 9-10, 2017

TheEnergyFair.org

FEATURING: JB Straubel, CTO of TESLA, at WI Fair!
 HUNDREDS OF WORKSHOPS & EXHIBITS / CLEAN TRANSPORTATION SHOW / LIVE MUSIC
 SUSTAINABLE LIVING / RENEWABLE ENERGY / CRAFT BEER / KID FRIENDLY / & MORE

New Developments

By CE Staff

Scientists are generally a pretty smart bunch. They don't deal with politics because science is apolitical, by definition. Now clever researchers have developed a new catalyst to try to mimic mother nature in splitting the water molecule. This means that the hydrogen and oxygen could effortlessly be separated as done in every tree leaf. That would result in no more need to use steam reformation of natural gas to make pure hydrogen – if this can be scaled up to industrial scale production.

We know that hydrogen is a promising clean fuel for use in cars, our houses, as standby energy for hospitals, and in portable generators. If only renewable energy is used to produce it from water, it could be produced somewhat sustainably with no additional carbon footprint (additional means there is already one – from steam reformation. See below). But there are hurdles in the way of adoption of a hydrogen economy. One by one, they may be toppled.

We're not there yet. Today, we see that steam reformation of natural gas' primary component leaves a bunch of carbon monoxide behind. Just take that methane (CH_4) gas, combine it with H_2O while adding a bunch of energy and rearrange the molecules. Afterwards, you get H_2 plus CO (carbon monoxide). It's basic chemistry. Steam has very high energy content so it's ideal to make this transformation, but heating water to boiling and beyond ($700\text{--}1100^\circ\text{C}$) takes a lot of energy. Superheated steam is produced by passing saturated steam through an additional heat exchanger. To make hydrogen, it's all done in the presence of a nickel catalyst. See Ref [1]

Now, making water-splitting systems means using an efficient catalyst. These will help speed up the chemical reaction which does the water splitting (into hydrogen and oxygen). Such systems need to prevent the liberated gases from recombining back into water. Scientists have developed a new catalyst with

producing hydrogen from water while inhibiting the back reactions. But the precise 'how' was not revealed.

Searching for Stability

Garcia-Esparza started working on this while a grad student in Saudi Arabia at King Abdullah University of Science



The graph shows hydrogen production over time, rising then leveling off with the non-coated catalyst, while the volume continually grows with the coated one. Photo from Andy Freeberg / SLAC National Accelerator Laboratory)

a molybdenum coating that prevents this problematic reverse reaction. Supposedly it works well in real world-like operational scenarios.

Understanding just how the molybdenum coating worked was key here. With experiments, a DOE Office of Science User Facility at SLAC the scientists reported their results April 13 in *Angewandte Chemie*, a German publication. Angel Garcia-Esparza was the lead author from the French Ecole Normale Supérieure de Lyon. That team discovered that a molybdenum-coated catalyst was capable of selectively

and Technology (KAUST). His mentor, Dr. Takanabe's research group explored the stability, performance and function of many different elements before they selected molybdenum as the coating for a standard platinum-based catalyst.

A major challenge was finding a coating that worked well in the acid electrolyte which is used for water splitting, because many materials simply degrade in the acidic conditions admitted Dimosthenis Sokaras, a staff scientist at SLAC.

Of the coatings they tested, Molybde-
continued next page

num was the best-performing material in acidic media, where the proper conditions exist.

Testing the Performance

Another major challenge was finding a way to measure the properties of their molybdenum-coated catalyst, because these molybdenum compounds are not stable when exposed to air. The material transforms when exposed to air.

So Garcia-Esparza spent a summer performing electrochemistry experiments to characterize the new catalyst under operational conditions. The idea was to work together to see how the molybdenum-coated catalyst performed

and determine its electronic structure when it was operating as they wanted to understand why the back reaction doesn't happen. They learned that the molybdenum layer acts as a membrane to block the oxygen and hydrogen gases from reaching the platinum surface, which prevents water formation.

A standard catalyst of platinum on strontium titanium oxide (Pt/SrTiO₃) has back reactions with are light sensitive. The new molybdenum is not, and is nearly twice as effective in production.

These results are promising, but much more work still needs to be done, they

are far from actually a commercial device, but the reverse reaction has been quelled. Now they need to find a way to make the coating more durable for longer hydrogen production. We need to reduce the energy contained in the superheated steam, since the leaves on my plants are not capable of withstanding those withering temperatures! Yet another hurdle has been overcome, but more remain. But another step close we now are.

Citation: Angel T. Garcia-Esparza, et al, *Angewandte Chemie* (2017), doi: 10.1002/anie.201701861

References

[1] https://en.wikipedia.org/wiki/Steam_reforming

[2] <http://onlinelibrary.wiley.com/doi/10.1002/ange.201701861/abstract>

Angel T. Garcia-Esparza, et al, *Angewandte Chemie* (2017), doi: 10.1002/anie.201701861



Setting a Course for Carbon-Free Shipping

In conjunction with Fjellstrand, a Norwegian shipyard, Siemens has developed the technology for the world's first electrically-powered car ferry. The fact that the ferry, which entered service in early 2015, causes no carbon dioxide emissions is in part due to Norway's electricity mix. The world's first electric ferry entered service in Norway's Sognefjord in early 2015. With a capacity of 360 passengers and 120 cars, it is free of emissions.

Read more about this innovation at:

<https://www.siemens.com/innovation/en/home/pictures-of-the-future/mobility-and-motors/electromobility-electric-ferries.html>



Insurance!

Its Role In The EAA at NDEW, and Other Events

By Gint Federas, GGEVA,
EAA Treasurer

Last year at the Los Angeles Auto Show a man test-driving a Fiat 500e drove across a sidewalk and crashed into a concrete planter, sending six people to the hospital. To make matters worse, the driver that signed up for the ride and drive, wasn't even licensed. Event staff mistook the California ID card for a driver's license.

As a result, the question of insurance has become an important topic with respect to EV ride and drive events and of course National Drive Electric Week. Are chapters adequately insured for NDEW or other ride and drive events? These are questions all chapter leaders should be asking. The answer: It depends. Let me explain.

The Electric Auto Association is insured for Commercial General Liability (GL). GL is typically the "core" coverage for an organization. The most common occurrence covered by this policy is "slip and fall". This would also cover the chapter if the wind blows away a pop up tent and damages property or injures attendees. GL covers negligent acts that result in bodily injury, personal injury, advertising injury or property damage to a third party (others). GL does not cover intentional acts, damage to our own vehicles or property, or losses from theft. GL also DOES NOT cover member vehicles in "ride and drive" events.

Many event venues will ask for a Certificate of Insurance naming their organization as additional insured. To add this protection you must notify the EAA's agent at ISU Lovering in San Mateo CA in advance of the event at 650 585-7502. Our Policy Limits are \$1 Million per occurrence, \$3 Million in aggregate. Additional coverage for damage to rented premises is capped at \$100,000.

Let's turn to personal insurance.

NOTE: Not an endorsement of one insurance company over another, but these great informational graphics are from All State. If a personal car's owner is insured, takes a passenger for a ride, and unfortunately has an accident, (s)he would



be covered to the extent of their personal auto underlying coverage. If you lend your car to someone else, your insurance is responsible if there is an accident, and YOU will be held liable for all damages.

Contrary to popular opinion, auto insurance follows the car, not the driver. You aren't just lending out your car, you are also lending out your insurance coverage. If someone doesn't normally drive, they are probably uninsured. Your "friend" may total your car, cause major injuries to others, but YOU will be held liable for damages, and pay the medical bills. If your insurance doesn't cover all the damage, you will probably be sued personally as well.

There are four major components of personal auto insurance:

- a) Bodily Injury and Property Damage (BI/PD);**
- b) Collision; c) Comprehensive (Comp); and d) Medical.**

a) Bodily Injury and Property Damage (BI/PD) is the General Liability of auto coverage. As the name implies it covers Property Damage to others, which could be the other driver's car, or a fence or anything else that gets in the way. Bodily Injury takes care of other people involved in an accident outside of your car. The legal requirements vary from state to state. California, New Jersey and Nevada require minimum coverages of \$15,000 each party, and \$30,000 in aggregate. Washington State requires minimums of \$15,000 and \$30,000. These coverages while meeting the legal mini-

continued next page



WHAT DOES AUTO LIABILITY COVER?

If you're at fault for a car accident, your car insurance policy's **liability coverage** may help pay for the other party's expenses. Liability coverage is required by law in most states. There are two types of required coverage:

PROPERTY DAMAGE LIABILITY



If you damage another person's property, this coverage may help pay for repairs, up to the limits you chose when you purchased coverage.

BODILY INJURY LIABILITY

If you injure another person with your vehicle, this coverage may help pay for their medical expenses, up to the limits you chose when you purchased coverage.



LIMITS



Each state sets minimum coverage limits drivers must purchase for bodily injury and property damage liability. You may select higher liability coverage limits, depending on your needs.



Allstate
You're in good hands.

Learn more about car insurance coverage:
www.allstate.com/tools-and-resources



WHAT DOES COLLISION COVER?

Collision coverage is typically optional on your car insurance policy – it's not mandated by state law. But, if you're leasing or financing your vehicle, your lender may require it.

WHAT IT DOES



Helps pay to repair or replace your vehicle if it's damaged in a collision, regardless of fault.

WHAT IT TYPICALLY COVERS

Damage to your vehicle from:



A collision with another vehicle



A collision with an object, such as a tree



Single-car accidents that involve rolling or falling over

WHAT IT DOESN'T COVER



Damage to your vehicle not related to driving (examples: hail or theft)



Damage to another person's vehicle



Medical bills (yours or another driver's)



Allstate
You're in good hands.

Learn more about car insurance coverage.
www.allstate.com/tools-and-resources

mums are woefully inadequate for most drivers. Minimum coverage barely covers a fender bender with an old jalopy, and is nowhere near enough for major damage to a single new car, let alone bodily injury resulting from a major accident. Most insurance agents recommend higher coverage based on each customer's risk tolerance and asset base.

b) Collision covers property damage to your own car, subject to a deductible.

c) Comprehensive (see next page) covers damage to your car not involving a collision, subject to a deductible. This insurance covers things like a broken window, theft of
continued on page 22

Insurance

continued from page 21

vehicle, etc. This coverage does not cover contents of the car that may be stolen like purses, computers, etc. These are covered by homeowners or renters insurance. If a tree falls on your car while it is parked, Comprehensive would cover any damage. If the same tree falls on a car that is moving, Collision covers the damage.

WHAT DOES COMPREHENSIVE COVER?

Comprehensive coverage can help pay for damages to your car that aren't caused by a collision. What does that mean? Here's a quick breakdown of what comprehensive typically covers (and what it typically does not cover):

WHAT COMPREHENSIVE MAY COVER



NATURAL DISASTERS



A CIVIL DISTURBANCE



FALLING OBJECTS



FIRE



HITTING OR BEING HIT BY AN ANIMAL



VANDALISM



THEFT

WHAT COMPREHENSIVE DOES NOT COVER



DAMAGE TO YOUR CAR FROM A COLLISION



MEDICAL EXPENSES OR LOST INCOME FOR YOU OR YOUR PASSENGERS AFTER AN ACCIDENT



DAMAGE TO ANOTHER PERSON'S CAR FROM A COLLISION



MEDICAL EXPENSES, LOST INCOME OR LEGAL FEES FOR ANOTHER PERSON AFTER AN ACCIDENT



Contact your local Allstate agent to help you decide if comprehensive coverage makes sense for you. www.allstate.com/tools-and-resources

For informational purposes only.

d) Automobile Medical covers injury to passengers inside your car. Coverage is usually limited to a small amount intended to cover the passenger's own medical deductible, not full medical coverage. The driver of the car isn't covered.

Recommendation: I strongly advise that NO members EVER lend their own cars to others or allow their cars to be used in a ride and drive event. You will be held liable for any property damage or bodily injury, not to mention damage to your own vehicle. Instead of a ride and drive, just do a drive-along. The insured car owner drives their own vehicle, with any number of passengers aboard. Drivers insurance covers passengers. With passengers, I recommend adding medical coverage – \$5K/ person doesn't cost much (est. 4 cars just \$24 / 6 mo.) covering everyone in the car except the owner. No deductible if there is an injury! This is not just for a typical accident between vehicles, but for someone slipping out of a car or slamming a door on a hand.

Recommendation: You should carry enough insurance to cover what you stand to lose. If you own a house, car and a

few toys, you may want to increase your auto coverage to at least \$250/500K. You may also consider getting Personal Umbrella Insurance for an extra layer of coverage. If you drive in or participate in a carpool, own rental properties, have a pool or trampoline, have dogs, own a boat, RV, or other toys, or coach youth sports, you really should have a Personal Umbrella policy.

Car Dealers, on the other hand, carry special insurance as they take people on test drives every day. ***If you hold a ride and drive event, the dealer should take the responsibility for qualifying driver candidates, and chapters should include a "Release of Liability" form indemnifying the chapter and EAA from any Liability.*** Dealers generally include this wording in their Release forms.

Recommendation: If you are assisting or managing a test drive event, unless you or your staff are professionally trained, you should not be determining whether an individual is legally or physically capable of driving. Would you be able to recognize a fake driver's license, recognize

continued next page

if someone is high, etc. You certainly wouldn't know if a license was suspended because of a DUI or unpaid fines without access to a DMV computer. You also can't tell if a driver's insurance was canceled for non-payment. In a similar vein, are you trained to define the test drive course or route? Do you know where the schools are? I recommend that you make it clear to the Car Dealer representative, that they have the responsibility for these items. This is part of their standard business practice. You can use the form on the next page to make it clear to the Dealership Sales Rep of their responsibilities.



There are still risks. Since Attorneys look for deep pockets, we can assume the dealer in that aforementioned 2016 test drive in So.

California, as well as the Auto Show, and anyone else they could find were also sued. Don't add *YOUR* name to that list.

Agreement and Understanding of Responsibilities

This is an understanding of the Responsibilities of

(Auto Dealership)

to be able to participate in the event on _____ at _____.

The Auto Dealership representative on site recognizes and understands that EAA Chapter members do not have the skill or training to recognize whether a person is legally permitted to, or capable and competent to drive.

The Auto Dealership representative on site has the sole responsibility to determine whether a person driver is legally permitted, capable and competent to drive or not.

The Auto Dealership representative on site has the sole responsibility to determine whether a test drive route is safe and appropriate. Chapter members have NOT been trained to determine safe or appropriate routes for test drives. Any maps produced by a Chapter member are initial suggestions and have NOT been validated or checked for safety or appropriateness.

Auto Dealer Representative: _____ Date: _____

Chapter Organizer: _____ Date: _____

Preparing for an Event

- Be sure you have the information and policy number for General Liability and how to file a claim. Go through some worst case scenarios ahead of the event and be prepared with the necessary contacts and documents.
- Have participating dealers agree that they are responsible for their vehicles and test drives
- Be sure all private party owners are aware and agree to the risks of letting others drive their vehicles. Verify their personal insurance is current.
- Have a signup sheet with the name, address, phone, email and driver's license # and expiration of those that will be driving.
- Verify the driver's license and picture is accurate, matches the address and has not expired.
- Plan a test drive route that minimizes risk while showing the full capabilities of driving an EV. Avoid construction, high traffic, narrow winding roads, areas with high pedestrian or bicycle traffic and avoid having to reverse the vehicle in or out of the test drive.
- Be sure the test drivers are supervised while driving the vehicle.



GINT FEDERAS, CEO, COO, CFO
Electric Auto Association
MBA, St. Mary's College of California
San Francisco Bay Area

Electric Auto Association Treasurer since Feb 2015. His Strategic Financing background allows him to contribute to EAA financial planning, budgeting, and Fund Accounting. CA Insurance Lic 0I59742. EV owner since 2005. Current: 2013 RAV4 EV (BATMOB).

Energy use for hydrogen fuel-cell vehicles: higher than electrics, even hybrids (analysis)



2015 Hyundai Tucson Fuel Cell, 2016 Toyota Mirai at hydrogen fueling station, Fountain Valley, CA

By John Voelcker

It's now clear that the zero-emission vehicles of the future will be powered by electric motors.

The electricity to power those motors, however, will come from one of two competing technologies: high-capacity batteries or hydrogen fuel cells.

The debate over which technology is superior, which has the lowest wells-to-wheels carbon footprint, and which is likely to appeal more to mass-market buyers has become ... epic.

As long as the costs, efficiency, practicality, and consumer appeal of the two technology are publicly debated, Green Car Reports will publish a variety of articles exploring different ways to analyze those issues.

Our reader Victor A. Ettel, an electrochemical engineer and retired R&D ex-

ecutive, has had a life-long interest in advanced transportation technologies, including hydrogen fuel-cell vehicles.

He submitted an analysis comparing the energy usage of the two approaches that we felt was worthy of publication. What follows are his words, lightly edited by Green Car Reports for clarity and style.

Fuel-cell vehicles are, without a doubt, a brilliant technical accomplishment.

But with the technology rapidly maturing and approaching its limits, it is becoming clear that they cannot offer viable, cleaner and more sustainable transportation than other showroom-available, new vehicle technologies.

Emerging hard data leaves no room for any other conclusion, meaning that the life support for the fuel-cell dream increasingly depends on discredited

assumptions, deceptive comparisons, and unconvincing distant future prognostications.

The two most energy-efficient vehicles among the three fuel-cell cars now offered in California are the Honda Clarity Fuel Cell and the Toyota Mirai, rated at 68 and 67 MPGe respectively.

Miles Per Gallon Equivalent (MPGe) is the distance a car can travel electrically on the same amount of energy as contained in one gallon of gasoline.

But MPGe ratings should not be directly compared to the ratings of gasoline cars since, unlike gasoline, **producing** hydrogen requires twice the energy that the resulting hydrogen contains.

Hydrogen wastes energy resources, whether fossil or renewable.

continued on next page



2017 Honda Clarity Fuel Cell, Santa Barbara, CA, March 2017

This proves to be true whether the gas is produced by electrolyzing water or through steam reformation of natural gas.

This estimate, based on multi-year monitoring of existing hydrogen refueling stations, is consistent with design energy requirements published by a manufacturer of hydrogen refueling stations and other credible sources.

As both technologies have been practiced on an industrial scale for nearly a century, and their efficiency is limited by the laws of physics, these numbers cannot be expected to change dramatically.

Moreover, as real fuel cells operate at around 50-percent efficiency, only a quarter of the initial energy (fossil or renewable) is available to power the fuel cell vehicle—compared to more than 80 percent of the initial electrical energy that remains available to power an electric vehicle.



Hydrogenics hydrogen fueling station

As a result, the Honda Clarity Fuel Cell consumes more than three times more electricity per mile than an electric vehicle (e.g. the 2017 Chevrolet Bolt EV).

It also consumes almost the same amount of natural gas as the now-

discontinued 2012 Honda Civic Natural Gas—which, unlike a hydrogen fuel-cell vehicle, did not use energy-conserving hybrid technology.

The idea that future transportation will be based on hydrogen produced from
continued on page 26

Fuel Cell

continued from page 25

renewable electricity proves completely unrealistic, as it would require doubling total electricity generation in the U.S.

That would demand an increase in wind and solar-power generation by a whopping 1,500 percent, and the nation's electricity distribution grid would require commensurate upgrades.

Considering three-quarters of the electrical energy stored as hydrogen is lost, proposals to use hydrogen to store intermittently produced wind or solar energy will likely prove unrealistic as well.

Whatever share renewable generation attains in the future electricity mix, wasting most of it by making hydrogen to power fuel-cell vehicles makes no sense whatsoever.

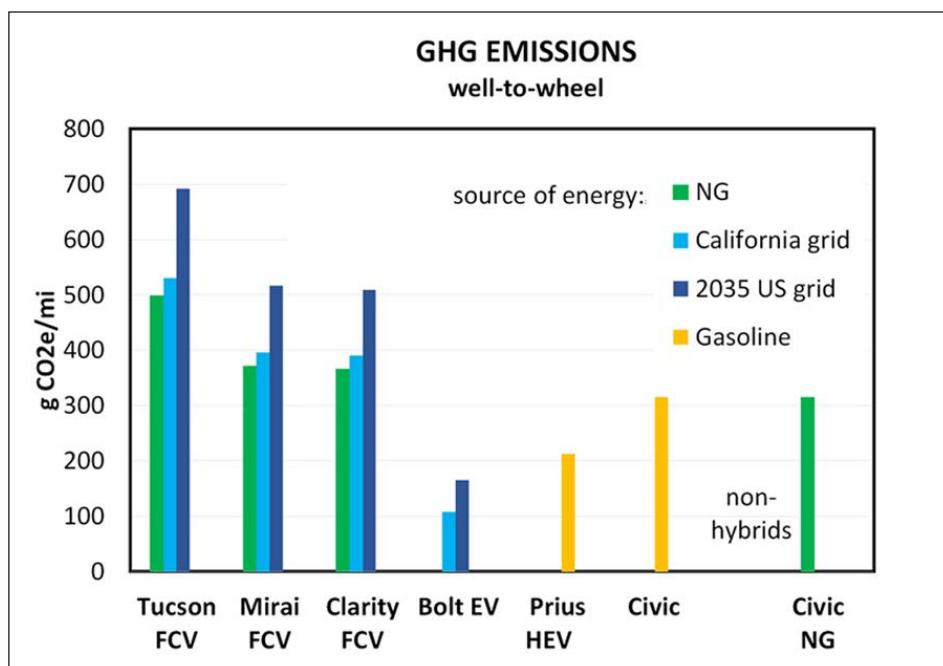
Fuel-cell vehicles produce more greenhouse-gas emissions

Because of their higher energy consumption, fuel-cell cars generate more greenhouse-gas emissions than other powertrain technologies.

The emissions come from the hydrogen-producing facilities that use natural gas, or from power-generating plants—but their effect on the environment is the same.

Greenhouse-gas generation estimates from hydrogen refueling stations in California show that a Clarity Fuel Cell, powered by hydrogen produced from natural gas or from the relatively low-carbon (or 'clean') California grid, produces 80 percent more greenhouse-gas emissions than a Toyota Prius or a Honda Accord Hybrid, a hybrid mid-size sedan of a similar size.

Most importantly, the Clarity generates more than three times the greenhouse-



Wells-to-wheels greenhouse-gas emissions from various vehicles [chart: Victor Ettel]

gas emissions of an electric car, such as the Chevrolet Volt plug-in hybrid, when running solely on battery power.

Publications aimed at the general public often propagate such disinformation.

As one official fuel-economy guide states, "[FCVs] generate much less GHGs than conventional gasoline and diesel vehicles."

Very high fuel costs

Bob Carter, a senior Toyota vice president, has admitted that driving the company's Toyota Mirai sedan will not be cheap.

His estimate of \$50 per 300 miles works out to twice that of driving a Prius, or four times the cost of driving an electric car. Carter based his comment on the U.S. Department of Energy's projection of \$10 per kilogram of hydrogen.

But that number can be considered somewhat optimistic, as the energy requirement to produce compressed electrolytic hydrogen alone accounts

for around \$7 per kg.

Suggestions that the price of hydrogen can be brought down to, for example, \$1.14 per kg appear outright dishonest.

To lease very limited numbers of fuel-cell vehicles each year, Honda, Hyundai, and Toyota all offer three-year leases that include \$15,000 worth of "free" hydrogen fueling—clearly an unsustainable practice.

The approximate fueling cost estimates in the table below are based on five-year average retail prices of fossil fuels and of industrial-rate electricity.

Another serious hurdle is that hydrogen fueling stations are expensive to install, and probably not viable without public financing.

Seven new stations in California, recently announced by Shell and Toyota, will cost \$28 million. California will pay 60 percent of that total.

Operating around the clock, each station

continued next page



2016 Toyota Mirai - Quick Drive - Portland, July 2015 [photo: Doug Berger]

can fuel up to 300 hydrogen cars a day.

California expects to spend more than \$200 million by 2024 to reach its target of 100 hydrogen stations, capable of supporting 30,000 fuel-cell vehicles—which is a mere 0.1 percent of all vehicles on California roads.

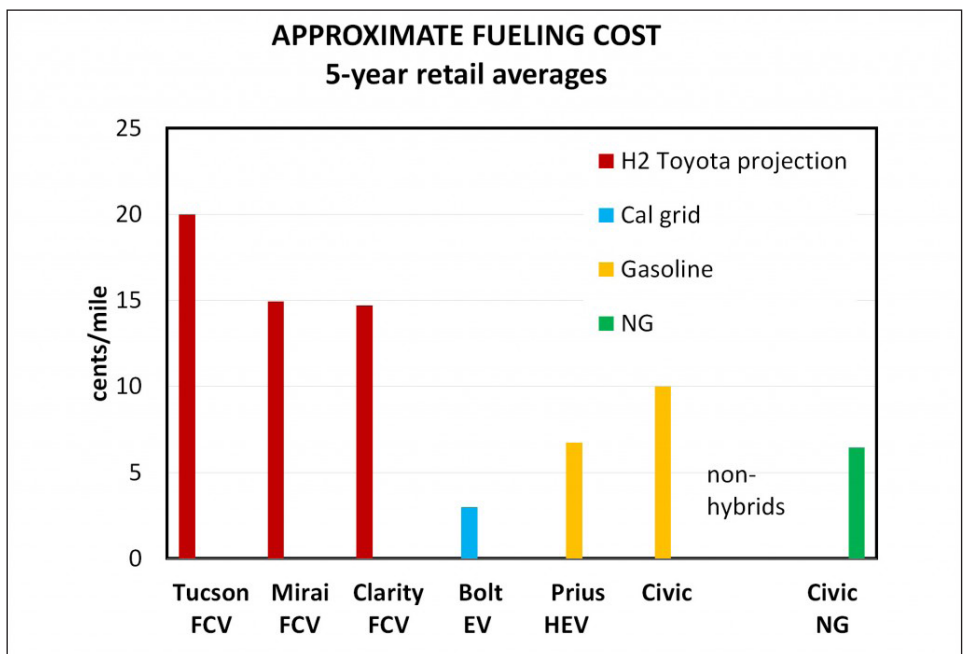
Unrealistic way to reduce oil use

Considering all the obstacles and requirements for new infrastructure (estimated to cost as much as \$400 billion), fuel-cell vehicles seem likely to be a niche technology at best, with little impact on U.S. oil consumption.

Battery-based vehicles have a far more realistic potential to reduce oil consumption. The average daily driving distance of 30 miles is well within the range of new electric vehicles.

New plug-in-hybrids with battery ranges of 30 miles or more can eliminate most gasoline use on commuting trips, and operate as efficiently as hybrids on longer trips.

With the per-mile costs to fuel electric cars far lower than any other vehicle



Approximate fueling costs in cents per mile for various vehicles [chart: Victor Ettel]

type, they have the potential to spread independent of government subsidies, as conventional hybrids mostly did.

In oil-rich Norway, a concerted long-term program of incentives and penalties has brought plug-in cars to 30 percent of all new vehicles sold today.

In the U.S., plug-in vehicles currently

represent one percent of all new cars sold—but they already save more gasoline than do conventional hybrids, which have two percent of the market.

Tailpipe emissions and the zero-emission mandate

Advances in emission-control technology have reduced the tailpipe emissions

continued on page 28

Fuel Cell

continued from page 27

of modern cars by more than an order of magnitude in 20 years.

So-called Super-Ultra-Low-Emission Vehicles, for example, are guaranteed to emit less than 0.02g NO_x per mile, 20 times less than the average in 1994.

But 20 years ago, the regulators of the California Air Resources Board concluded that improving exhaust-gas treatment technology would not sufficiently reduce smog-forming and toxic emissions.

So they introduced a complex regulatory system that required carmakers to sell increasing percentages of zero-emission vehicles (ZEVs).

The original 1990 California ZEV mandate kick-started the development and commercialization of many new automotive technologies, including electric-vehicle batteries.

One unintended consequence of the mandate was the emergence of hybrid-electric vehicles, which have saved about 10 billion gallons of gasoline globally and reduced CO₂ emissions by some 100 million tons.

The mandate was originally written to encourage all zero-emission powertrain technologies: not only battery-electric but also hydrogen fuel-cell vehicles.

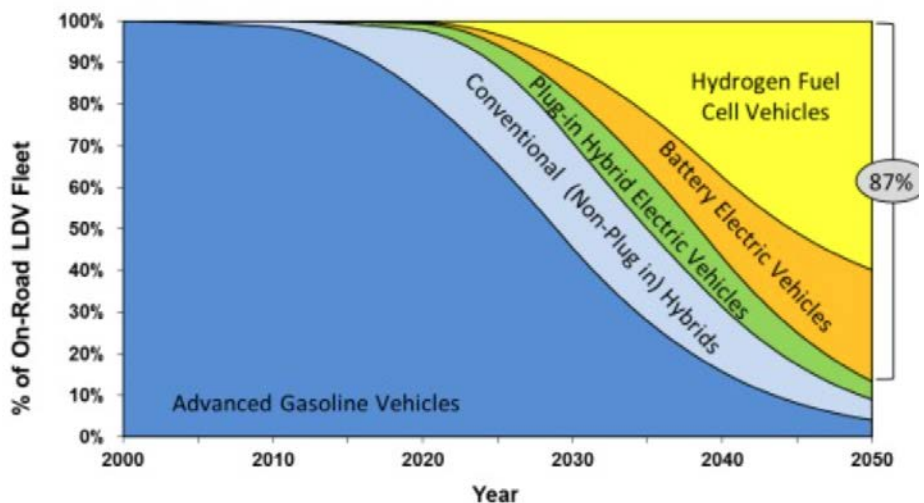
Counterproductive?

Today, however, in my view, CARB's continued focus on developing fuel-cell technology has become counterproductive.

Carmakers produce them and subsidize their sales mainly to receive valuable



2016 Chevrolet Volt Vs. 2016 Toyota Prius



Light-duty vehicle type scenario, now 2050 (California Air Resources Board)

ZEV credits for every one they deliver—credits that are higher than those they receive for other vehicles with lower wells-to-wheels carbon emissions.

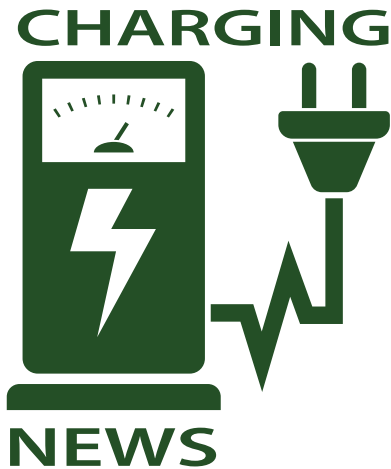
As a senior Honda executive recently suggested, “California air quality targets could be met with new plug-in hybrids, if the regulators set air quality standards instead of mandating percentages of ZEVs ... and let automakers figure out how to meet them.”

With available new technologies offering more energy-efficient, cleaner, and more economical alternatives than fuel-cell vehicles could possibly pro-

vide, even in a far-distant future, development efforts and heroic investments into hydrogen infrastructure no longer make any sense.

Green Car Reports welcomes commentary on the issues raised in this article, preferably with source citations. We respectfully remind readers that direct personal insults or profanity are not allowed under any circumstances, and ask that any such comments be flagged for moderation. Thank you in advance for helping us keep our comments on topic, civil, respectful, and fact-based.





EV Charging In Multi-Unit Structures

By CE Staff

The electric utility panel capacity determines the power levels that any building can deliver.

When all the electric loads are turned on together — nothing will blow, if the installation conforms to code. They are designed for such worst case scenarios. However, when adding an EVSE connection (or multiple connections in the case of multi-unit garage stalls), there are limits. Discussion of EV charging is best approached from the panel capacity point of view.

Parking stalls need lighting to maximize safety. If all the lights were replaced with low energy LEDs, which reduces the average load during darkness. Suddenly more current capacity is available but an LED light connection still takes up the same breaker space, like that fluorescent predecessor (or, gads, the incandescent one) before it! So panel space is always at a premium

If the switchover to high efficiency lighting saves 100 amps of current capacity, that would provide for 2-3 EVSE at Level 2 (L2). We're assuming there are still a few slots for additional breakers left at the panel. If not, using half-width breakers can help ease that squeeze. (These are the same capacity as full width breakers, just a more modern design, allowing for higher density). But if the bus bars behind the breakers can't handle the additional current, then an upgrade is probably in order. The issue here is that normal household loads are

not constant. They come and go, whereas an EVSE presents a steady constant load for many hours at a time. Be sure to consult a practicing electrician, familiar with the latest National Electric Code (NEC) requirements.

For EV drivers, assume most will need 40 miles of range or less per day. (National statistics bear that number out.) Assume also 350 Wh/mile from the wall outlet to the wheel. So that covers 14 kWh for 40 miles or 10.5 kWh for 30 miles. Assume that there is no charging available at the workplace.

At 3 miles of range added every hour, that would require nearly 10 hours of charging. Come home, plug-in, then get something to eat and continue with your evening, while the car is charging. Do it this way, every night. (It will have an immediate positive impact on your bottom line, your monthly fuel expenditures!)

Here are some alternatives for landlords to consider when there is 150 A capacity at the panel. There may be less, so scale it back accordingly.

Install:

Two each L2 stations with 7.6 kW charging on 240V/40A circuits. That takes 1.8 hours for 40 miles, 1.4 hours for 30 miles. That would handle most EVs on the road today with ease

Or install:

Four each smaller L2 stations with 3.8 kW charging on 240V/20A circuits. That's 3.6 hours for 40 miles, 2.8 hours for 30 miles. (Twice as many at ½ the rate)

Or

Eight each L1 stations with 1.9 kW charging on 120V/20A circuits. That's 7.3 hours for 40 miles, 5.5 hours for 30 miles.

All of these choices will replenish enough charge used overnight (8 hours) for the US average commute of 30 miles. All will take care of 40 mile commutes overnight.

Level 1 is the least expensive approach and works for a vast majority of EV owners today, who use it because it's already in their garages, in their parking stalls. Consider putting in twice as many 120 volt charging stations than servicing less with more expensive Level 2 units. A small rental apartment parking facility might "test the waters" to see if additional expansion is worthwhile, offering tenants a chance to live greener lifestyle.

So, which is better, charging 2 cars for nearly quadruple the cost or charging 8 cars for nearly the same basic cost? Landlords are not used to dealing with load calculations, but perhaps some gentle guidance will help them consider what we all want. Conduit is dirt cheap, wiring a bit more expensive. But without the needed physical panel capacity, nothing but a total upgrade can happen which probably becomes prohibitively expensive. What other choices do renters have? Offer to pool their money and contribute to offset the costs, find a qualified electrician to do the work pro bono. Running a long extension cord is a non-starter, especially given the layouts of apartments today. Even 4, 6 and 8-plex row apartments that simply won't work for a variety of reasons. Consider working with an electrician at the planning stages, as there are many ways to arrive at an acceptable solution. Those don't need to be gold plated and expensive!

Drop us a note if you have any charging questions on how to approach things in an apartment. We provide practical advice at the best possible rate. Free!



Vintage Electric and Emory Motorsports team up for a Porsche-inspired ebike

When it comes to ebikes, they all tend to look a little similar. Either they resemble a standard bicycle or they aim for something futuristic. Vintage Electric is a company that goes for something different. In an effort to stand out in a crowded market, the company has taken inspiration from a WWI-era motordrome racer.

The latest bicycle from Vintage Electric is the Emory Outlaw Tracker. Built in collaboration with Emory Motorsports, this ebike modifies the existing Tracker with design elements that celebrate vintage Porsche sports cars.

Inspired by tastemakers, misfits, and hard workers, the Outlaw Tracker is an extremely limited-edition ebike with quality, speed, and style at the forefront. Only 50 units will be developed, each painted with the same deep silver metallic paint that Rod Emory uses on his refurbished Porsches.

Taking further design elements from the car, this ebike features a bucket headlight with a mesh grille. The powerful LED light will keep the journey well lit long after the sun goes down. A rear tail light located just under the saddle makes for a safer ride. Using integrated wiring, the main battery powers each light.

The battery itself is a 702 watt-hour lithium unit housed in an aluminum box. The box itself resembles a vintage motor and helps disperse heat from the battery. This allows the system to run at lower temperatures, increasing its efficiency.

Just like other ebikes from Vintage Electric, the Outlaw Tracker comes

with Race Mode. By taking advantage of the 3,000-watt rear hub motor, the bike can rapidly accelerate to 36 miles per hour.

This mode is for off-road use only. Switching back to the 20 miles per hour street-legal mode is as easy as

removing the Race Mode key.

A full charge of the battery takes approximately two hours and is good for 35 miles of range in Street Mode. According to Vintage Electric, the average cost of a recharge is 18 cents.



Outlaw electric bike



Be sure to watch this video posted in the article.



https://www.yahoo.com/news/porsche-inspired-ebike-comes-race-020302071.html?soc_src=mail&soc_trk=ma

Harley-Davidson confirms electric motorcycle, 100 new models



By John Beltz Snyder

A couple of years ago, Harley-Davidson drummed up excitement about electric motorcycles, offering rides on its Livewire prototype. We were told at the end of that project that there would be an electric Harley eventually, but details were scarce. Now, the company tells Drive that it has plans for 100 new motorcycles over the next 10 years, and an electric bike is definitely part of the plan.

Sound is playing a key role in the development of the electric Harley, says Bill Davidson, Harley-Davidson Museum President and great-grandson of company founder William Davidson. Noting the unique sound of gas-powered Harleys, he says the company wants to set its electric bike apart in the same way. "We have studied our competitors, and we understand what they are up to, and we did not want a normal-sounding electric motorcycle. We wanted something that plays into that look and sound formula. It is something really cool. I often refer to it as sounding like a jet fighter."

Davidson says the company doesn't have a definite timeline for the electric motorcycle's introduction, but the project is "progressing well" and that it will launch the bike "eventually." Davidson declined to say whether the company would produce a range of multiple EV motorcycles.

Davidson also says he believes autonomous driving could have a positive effect on Harley-Davidson sales, but not because the technology will make its way into motorcycles. Quite the opposite, he thinks riding could attract new buyers from the enthusiast community as driving becomes more automated.

"Society has become driven by so many factors and we are all now in touch 24/7 as we're surrounded by electronics," says Davidson, "and I think riding a motorcycle lets you break free of that and enjoy nature and have fun."



<http://www.autoblog.com/2017/05/11/harley-davidson-confirms-electric-motorcycle-100-new-models/>

Disruptive Tech: Electric Airplanes Could Destroy The Automotive Industry

By Llewellyn King

Electricity, the world's silent workhorse for a century, is about to conquer new worlds.

While electric cars are coming on fast, their acceptance will speed up geometrically in the next decade, according to an extraordinary new study by RethinkX, a San Francisco-based research group and think tank. Indeed, the group is predicting a true revolution in electrified transportation.

In this revolution, futuristic companies with a lot of talent and a lot of money — like Uber, Google and Amazon — will be seminal players. Old-line car companies and the oil companies will have to deal with a new order in which their roles could be dramatically diminished.

The big winner in this transportation future is electricity. Even the electric airplane — an idea about as old as aviation — is surging forward.

RethinkX raised the curtain on the future of ground transportation in its new study, Uber raised the curtain on the future of the electric airplane this month at its Elevate conference in Dallas. More than 500 aviation enthusiasts attended the conference: dreamers, designers, builders — and even venture capital investors, who have already signed their checks. Dozens of designs for small electric airplanes, using multiple rotors and batteries, were on display. Enthusiasm was incandescent.

This July small, electric pilotless aircraft — crosses between drones and helicopters — are scheduled to go into

service in Dubai. They are supposed to ferry single passengers from their hotels and other gathering points to airports and recreation centers in the largest and most populous city in the United Arab Emirates.

These small aircraft, with electric motors and batteries, have an endurance time of about 30 minutes. EHang, a Chinese company, developed them.

If Uber, and more than a dozen other U.S. companies have their way, similar aircraft will one day take their place in the skies of America and other advanced nations. Uber hopes to test-fly an electric airplane in 2020.

According to RethinkX, the private car is about to disappear, or to be rapidly reduced in importance. The report — which might boost the stock of futuristic companies and electric utilities, and depress the stock of oil companies and old-line car makers and oil companies — is making waves in the far reaches of corporate thinking.

Tony Seba, co-founder of RethinkX and co-author of the report, told me

that mainstream analysts are not yet on board with the changes which will rock the automobile, oil and electric industries. They have not understood the impact of technological convergence, he said.

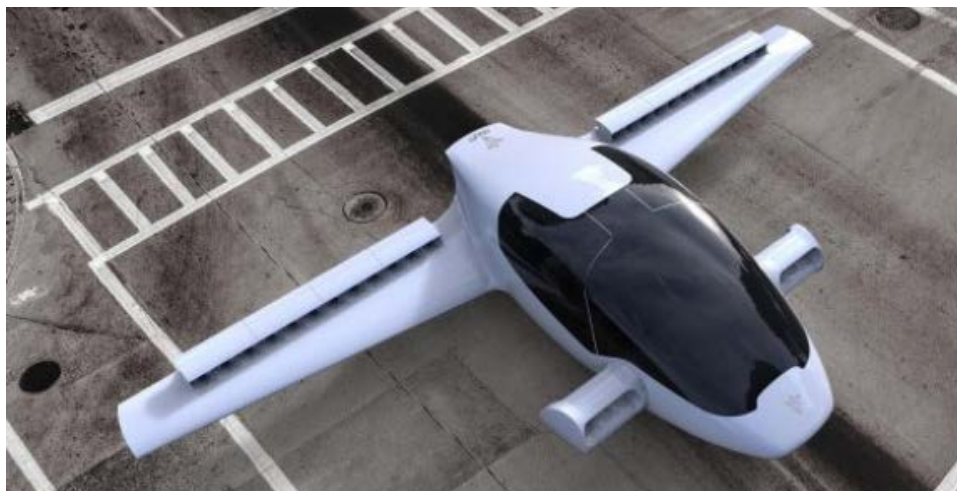
He sees a future, about to happen, in which driverless electric cars, owned not by individuals, but rather by transportation companies like Uber, flood the streets, to be summoned by phone and directed by voice: "Take me out to the ballgame."

Seba, an MIT-trained engineer and student of what he calls "disruption," told me he expects a convergence between electric vehicles, automated driving and ride-sharing will come soon, reducing the number of vehicles on U.S. roads from 247 million in 2020 to 44 million in 2030.

"The average family will save \$5,600 in transportation costs," Seba says.

Apart from the transport companies, the big winner will be the utilities which will see a demand growth of 18 percent,

continued next page



Seba predicts. He believes present infrastructure can accommodate this growth surge because demand will be mostly off-peak.

There are similar expectations of a golden future for small, electric, vertical takeoff airplanes, incorporating drone and other technologies. The limit for the aircraft, which use lithium batteries, is the batteries. But the enthusiasts gathered at Uber's conference say

flight is possible now with present-day batteries and these will only get better.

Richard Whittle, a leading aviation journalist and author who chaired an Elevate session, told me, "It was a pretty impressive event."

While the arguments by Seba and his co-author James Arbib, a Silicon Valley entrepreneur and philanthropist, point to an electrified transportation

future, I have one question: Will people give up the personal, primal pleasure of owning a car?

Seba and Arbib think so, pointing out that people used to take pride in their LP and CD collections, but now they access their music electronically.

The future is pulling up on a highway near you; it may also be flying overhead.



Lilium shows maiden flight of world's first working prototype of an electric VTOL jet



By Fred Lambert

Last year, we reported on Lilium Aviation when they secured a €10 million investment from Atomico, an important global venture capital firm based in London. The Germany-based startup founded in 2015 by four aerospace engineers and product designers is developing the Lilium Jet, an electric vertical take-off and landing (VTOL) aircraft.

Today, Lilium announced that their full-scale prototype had its maiden flight and they released some impressive footage of the achievement.

The prototype is a two-seater and it managed to execute "a range of complex

maneuvers, including its signature mid-air transition from hover mode to wing-borne forward flight."

Lilium co-founder and CEO Daniel Wiegand said:

"Seeing the Lilium Jet take to the sky and performing sophisticated maneuvers with apparent ease is testament to the skill and perseverance of our amazing team. We have solved some of the toughest engineering challenges in aviation to get to this point. The successful test flight programme shows that our ground-breaking technical design works exactly as we envisioned. We can now turn our focus to designing the five seater production aircraft."

The images of the flight are quite impressive: [A video runs in the article - see the photo on the next page.]

The company claims that the Lilium Jet can achieve a range of "more than 300 km (186 miles) with a maximum cruising speed of 300 km/h.(186 mph)"

With current air travel, a lot of time and energy are dedicated to getting passengers to the airport and to the aircraft gaining altitude and later descending. VTOL aircraft will allow passengers to save a significant amount of time in those parts of air travel, and electric propulsion has the potential to

continued on page 34

Germany's Lilium

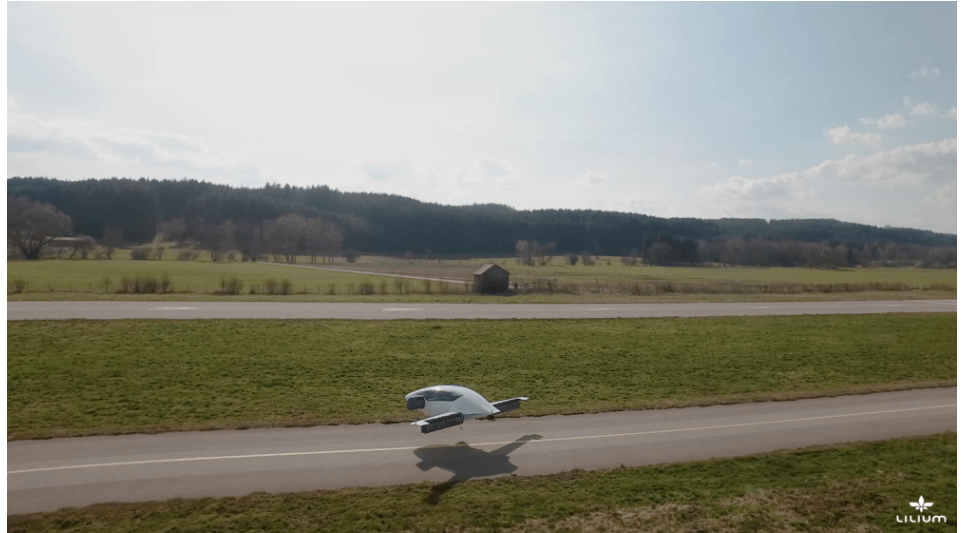
continued from page 33

reduce fuel and maintenance costs and to open air transport to more people and more services.

Lilium says that once in flight, the efficiency of its prototype is comparable to an electric car.

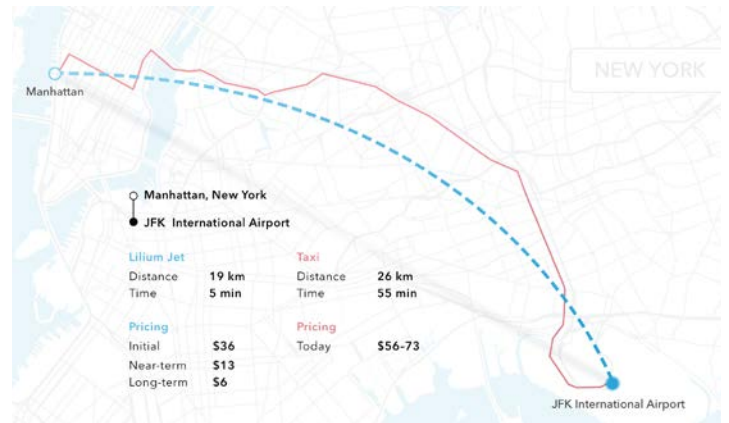
Here's the Lilium jet in bulletpoints:

- The Lilium Jet is a lightweight aircraft powered by 36 electric jet engines mounted to its wings via 12 moveable flaps.
- It is unique in combining the benefits of VTOL offered by helicopters and drones, with the speed and range of a jet aircraft.
- At take-off, the Lilium Jet's flaps are pointed downwards to provide vertical lift.
- Once airborne, the flaps gradually tilt into a horizontal position, providing forward thrust.
- When the wing flaps are horizontal, all of the lift required to keep the Lilium Jet in the air is provided by air passing over the wings – as with a conventional airplane.
- Safety is of primary concern of Lilium, and the Jet is designed along the principle of Ultra Redundancy: The aircraft's engines are individually shielded, so the failure of a single unit cannot affect adjacent engines.
- The Lilium Jet's power cells are designed to continue delivering sufficient power for continued flight and a safe landing in the unlikely event that part of the battery configuration fails.
- Lilium's Flight Envelope Protection System prevents the pilot from performing maneuvers that would take the aircraft beyond safe flight parameters.



- The company is also now revealing plans for a 5-seater version of the jet in order to create an on-demand air taxi service.

continued next page



Due to the low-cost of operation, Lilium Jet actually plans to cover routes generally made by cars – but at least 5x faster. They give the example of a flight from Manhattan to New York’s JFK Airport in about 5 minutes, compared to 55 minutes by car.

There’s no word on when it would be available, but they now have a team of over 40 engineers working on bringing the aircraft to production.

The will have some competition. Google co-founder and Alphabet CEO Larry Page launched two startups working on VTOL electric aircraft.

A prototype believed to be from one of his two startups, Zee. Aero, was spotted testing last year (see below).



Lilium shows maiden flight of world’s first working prototype of an electric VTOL jet

Kitty Hawk, the other startup backed by Google’s founder, is also moving forward with their VTOL aircraft project. With Lilium’s latest accomplishment, the field is starting to get interesting.



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

Keep Up on all Auto Shows & EV Related Conferences US and International Events

SAN JOSE, CA
**CONNECT2CAR EXECUTIVE
LEADERSHIP FORUM**
6/6/2017 - 6/7/2017

NOVI, MI – AUTOMOTIVE DETROIT 17
6/7/2017 - 6/8/2017

REDONDO BEACH, CA
**IEEE INTELLIGENT VEHICLE
SYMPOSIUM (IV) 2017**
6/11/2017 - 6/14/2017

STRASBOURG, FRANCE
12TH ITS EUROPEAN CONGRESS
6/19/2017 - 6/20/2017

VIENNA, AUSTRIA
**2017 IEEE INTERNATIONAL
CONFERENCE ON VEHICULAR
ELECTRONICS AND SAFETY**
6/27/2017 - 6/29/2017

**ADVANCED AUTOMOTIVE
CONFERENCE**
MARRIOTT MARQUIS
SAN FRANCISCO
6/19-6/22/2017

SAN FRANCISCO, CA
AUTOMATED VEHICLES SYMPOSIUM
7/11/2017 - 7/13/2017 **ANCILLARY
MEETINGS: 7/10 - 7/14/2017**

CITY OF SANTA MONICA, CA
**12TH ANNUAL ALTCAR EXPO &
CONFERENCE – 9/15/2017 - 9/16/2017**

TORONTO, ONTARIO, CANADA
VEHICLE TECHNOLOGY CONFERENCE
9/24/2017 - 9/27/2017

ASIAN BATTERY CONFERENCE
KUALA LUMPUR
9/19 – 9/22/2017



The 1st Oil & Gas Battery Conference
August 24-25th, 2016

continued next page

EVENTS



north
america
2017

September 12-14, 2017

Novi, Michigan, USA

ABOUT | VISIT | EXHIBIT | EXHIBITOR LIST | CONFERENCE | RESOURCES | INFORMATION

Latest News: LORD Corporation Announces Enhancements to Adhesive/Sealant and Seam Sealer Product Lines

"The show has been great. A lot of really good connections and a very busy booth. Excellent show."

BorgWarner, 2016 exhibitor

THE BATTERY SHOW
NORTH AMERICA 2017

September 12-14, 2017

Novi, Michigan, USA

ABOUT | VISIT | EXHIBIT | EXHIBITOR LIST | CONFERENCE | RESOURCES | INFORMATION

Latest News: Black Diamond Structures opens new advanced Battery Testing Facility

"Once again, The Battery Show has exceeded our expectations. We have actually seen a tenfold boost in our website sales during the show"

Jeff Norris, CEO, Paraclete Energy

BATTERIES 2017
NICE, ACROPOLIS, FRANCE
10/3/2017 - 10/6/2017

BUCHAREST, ROMANIA EV 2017
10/5/2017 - 10/6/2017

STUTTGART, GERMANY
30TH INTERNATIONAL ELECTRIC
VEHICLE SYMPOSIUM & EXHIBITION
10/9/2017 - 10/11/2017

SANTA CLARA, CA
ELECTRIC VEHICLES
11/16/2017 - 11/17/2017

SAN FRANCISCO AUTO SHOW
11/18/2017 - 11/26/2017



19th Edition since 1999



The International Energy & Power Supply Conference and Exhibition

October 3rd - 6th 2017
Nice Acropolis, France

Created & Chaired by



Business Meeting & Networking - www.batteriesevent.com



Plug-In Electric Vehicle Test Drives Presented by PG&E Electric Vehicle Ride and Drive:

PG&E is hosting its 3rd Annual EV Test Drive event at the Auto Show on Monday and Tuesday November 21st & 22nd from 10am to 3pm. The latest electric vehicles (EVs) from a variety of manufacturers will be available, including Audi, BMW, Chevrolet, Ford, Nissan, and Volkswagen, (subject to change).

Participants can receive a FREE TICKET to the Auto Show after completing the brief Best.Ride.EVer! campaign survey before and after the electric car test drive. The pre- and post- test drive surveys ask 5-6 questions about perceptions of electric cars and transportation options currently being used. The Best.Ride.EVer! surveying will take place at the electric car test drive registration area.

<http://www.sfauto show.com/special-attractions/plug-in-electric-vehicle-test-drives-presented-by-experience-electric-in-partnership-with-pge/>



Don't Miss These...

From time to time there are articles and videos that we are not able to reproduce in this newsletter but would like to bring them to your attention. 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 & Articles of Interest

The Lilium Jet — The world's first all-electric VTOL jet



As energy density of lithium based batteries continues to increase, the possibilities of having more diverse transportation options being powered by batteries increases. Airbus is working on a small trainer, and these innovators from Bavaria are also setting their sights on electric flight.

<https://youtu.be/ohig71bwRUE>



A visual tour of the world's CO₂ emissions



This is a visual of daily concentrations of CO₂ during the entire year of 2006 with a plethora of instructive comments framed during playback, requiring several viewings to grasp all the information provided. Data comes from Scripps/UCSD. Driving an EV reduces ones contribution to the carbon output of our nation and every EV means potentially one less ICE in service.

<https://www.youtube.com/watch?v=fJ0o2E4d8Ts>



Ubitricity | Fully Charged

Ubitricity: <https://www.ubitricity.com/en> We featured an article just over 2 years ago, as our lead article in CE. See our archive November 2014, the article titled "It's already there, you might as well use it!"

Founded by Knut, a lawyer, who's been doing this for the past nine years – spreading the good word from Berlin and now to London. (Perhaps it'll be a solution adopted in the USA in future years, regulators aside!)

This brilliantly addresses street parking. Billing by the electronics. Here is an exciting video interview by Robert Llewellyn from the UK. <https://youtu.be/rKaEhBjt1ls>

The cable locks at both ends while the vehicle is charging. The simple and very commonplace lamp post will soon become a ubiquitous charge point for electric cars.



15 of the coolest customised Teslas we've seen



View a collection of 22 images shown in this link which illustrate what sort of customizations some Tesla owners have made to their EVs. Some are simple, others are radical. Check out this eye-popping collection! Click on the arrows to steer the presentation.

<http://www.msn.com/en-za/cars/enthusiasts/15-of-the-coolest-customised-teslas-weve-seen/ar-BBC9cHI>



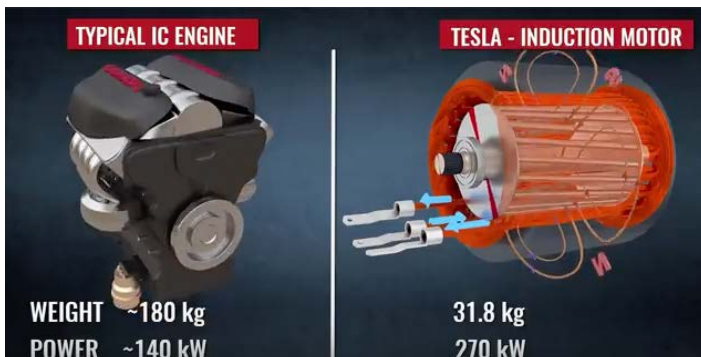
Below are a group of videos. They are fast paced explanations are effective with their excellent graphics.

These instructive videos cover complex operations with a simple descriptive monolog.

The clearly articulated, paced and logically presented videos are excellent teaching aids for the curious.

How electric cars work (focus is on the Tesla Model S)

DC motors (brushed) shunt and series wound motors



<https://www.youtube.com/watch?v=3SAxXUIre28>



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

Single phase AC induction motors

Three phase AC induction motors



<https://www.youtube.com/watch?v=awrUxv7B-a8>



<https://www.youtube.com/watch?v=LtJoJBUSE28>



Electric Auto Association (EAA) Membership Application Form

Our online database **requires** a **User Name** and **Password**; New members will receive and email to set up user name and password for access to the system. You will be able to edit all user information. **Please write clearly!!!**

☐ **New** ☐ **Renewal**

Name:		Email:	
Address:		Phone:	
City, State, Zip:		Cell:	

Fill out this form, attach a check, money order, in US funds only, payable to 'Electric Auto Association' one chapter is always included with your membership. Current Events is out monthly magazine. The paper copy is black and white and sent by postal mail, the electronic version is in PDF format on our web site. Please select the membership amounts below very carefully. Donations options are available in addition to your membership dues. There are no longer senior or student rates available.

Electronic Current EVents ☐ **\$35 USA & non-USA**

Paper Current EVents ☐ **\$60 USA** ☐ **\$95 non-USA**

I support the EAA chapter, required
(please contact membership@electricauto.org for more than one chapter)

Donations:

☐ \$120 (supporting level-1) ☐ \$240 (supporting level-2) ☐ \$500 or more (high voltage) _____ ☐ **do not** list my name

You can **fold this form** as indicated and mail it with your payment enclosed. Use tape to seal the form, **on the sides**, before you mail it Please register online instead of using this form, pay with credit card, bank account (checking or savings) or PayPal, <http://electricauto.org>

All information in this application is for the exclusive use of the EAA and not sold or given to any other organization.

If you own a Business that is Electric Vehicle related, please enter that information below

Bus. Name:		Email:	
Address:		Bus. Phone:	
City, State, Zip:		Cell Phone:	

The Electric Auto Association is a non-profit, 501(c)(3) for the promotion of electric vehicles. Your donations are tax deductible and with your membership you will receive the EAA publication, "**Current EVents**". All information and statistics in this application are for the exclusive use of the EAA and is not sold or given to any other organization or company. Your membership dues include a percentage goes to the EAA Chapter you support for public Electric Vehicle promotion EVents like rallies, shows and EV rides.

===== **FOLD HERE** =====

Return Address

membership@electricauto.org

1st class
postage
here

Electric Auto Association
Membership Renewals
323 Los Altos Drive
Aptos, CA 95003-5248



eMotorWerks adds Webasto to Expand its JuiceNet Smart Grid Electric Vehicle Charging Platform

Collaboration with Tier 1 Automotive Supplier Webasto will ensure EV drivers and utilities have optimized charging control and a better overall experience

Further expanding its reach into the electric vehicle (EV) market, eMotorWerks is teaming up with Webasto, one of the top 100 automotive suppliers worldwide, to launch new EV charging solutions tailored specifically for automotive manufacturers and their dealer networks. The line of intelligent and cloud connected EV charging solutions aims to empower drivers to charge their electric vehicles on the cleanest energy possible, while also enabling electric utilities to aggregate and control EV charging load on the grid to improve reliability and resiliency.

By combining eMotorWerks' JuiceNet software with the automotive expertise of Webasto, the joint solution will help deliver market-leading smart grid charging products to both drivers and utilities with a seamless approach. Webasto's goal is to offer a "one-stop-shop" charging solution, supporting vehicle OEMs in the field of charging by providing hardware that meets automotive standards and superior installation and training for end customers.

"Based on discussions with our core customer base, scalable EV infrastructure solutions that comprise the automated management of electrical load from the battery cell to the power grid are important success metrics for the industry – we need an effective way to deliver them to automotive OEMs given the coming growth ahead," said Fabian Bez, Senior Vice President of the E-Solutions & Services unit of Webasto. "Webasto will now deliver these solutions via eMotorWerks' globally recognized JuiceNet platform, which features dynamic charging capabilities that supports drivers, utilities, and installers alike. We will also provide strong educational materials and a professional installation network. We are looking forward to working with eMotorWerks."

The Webasto partnership marks the first occasion a traditional Tier 1 supplier has teamed with an EV platform company to deliver these solutions directly to automotive OEMs. It is the latest in a series of partnerships for eMotorWerks to enable the expansion, scale, and reach of its JuiceNet platform, including the most recent announcement with Aerovironment and with other partners such as Nayax.

"Webasto has a long history of supplying innovative ideas to



Webasto, one of the top 100 automotive suppliers worldwide, is launching new EV charging solutions with eMotorWerks, tailored specifically for automotive manufacturers and dealer networks.

vehicle OEMs and we're pleased to be working with them to provide the core intelligence around load management for their EV OEM charging solutions," said Valery Miftakhov, founder and CEO of eMotorWerks. "With this collaboration the automotive industry will be more confident they are in good hands when integrating our JuiceNet cloud solutions with yet another of Webasto's proven product lines. Together we will offer the best smart charging products to power the impressive global EV adoption growth Europe and other regions are experiencing."

Market Research indicates EV usage is growing rapidly across Europe and the globe – in the EU alone, an estimated 500,000 EVs are currently being driven throughout the continent, with an additional 540,000 on the road in the U.S.

"In order to fulfill this accelerated demand in electric vehicles, value-added services will be crucial to ensure a consistent and superior customer experience," continues Miftakhov. "Chief among those are technologies that empower both drivers and utilities to maximize the effectiveness of EVs on reducing the world's CO₂ emissions, while minimizing demand impacts to the grid."

<http://www.prnewswire.com/news-releases/emotorwerks-adds-webasto-to-expand-its-juicenet-smart-grid-electric-vehicle-charging-platform-300443791.html>

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
oscar.vidal.soto@live.com.mx

TAIWAN

TEVA | Taiwan Electric Vehicles Association

FaceBook: www.facebook.com/TaiwanElectricVehiclesAssociation
Contact: Mr. David Lane
silas10961@aol.com
Phone: 011 866 987 526 892

United States

NEDRA National Electric Drag Racing Association

Web Site: www.nedra.com
Contact: John Metric

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
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

EAST (SF) BAY EAA

Web Site: www.ebeaa.org
Contact: Ed Thorpe,
510-990-0421

EVA OF SAN DIEGO (EVAOSD)

Web Site: www.evaosd.com
Contact: Raejean Fellows
860-798-8208

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

NORTH (SF) BAY EAA

Web Site: www.nbeaa.org
Contact: Bruce Nyden
707-494-6693

SACRAMENTO EVA (SacEV)

Web Site: <http://www.saceva.org>
Contact: Guy Hall
916 467-9158

SAN JOSE EAA

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

SANTA BARBARA (SBEVA)

Web site: www.SBEVA.org
Contact: Roy Prince
805-448-0465

SILICON VALLEY EAA

Web site: www.eaasv.org
Contact: Kent Okasaki

COLORADO

DENVER ELECTRIC VEHICLE COUNCIL (DEVCC)

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

CONNECTICUT

NEW ENGLAND EAA

Web Site: www.neeaa.org
Contact: David Oliveria
860-938-0808

FLORIDA

CENTRAL FLORIDA EVA (CFEVA)

Website: www.centrafloridaeva.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 EVA

Web Site: www.suneva.org
Contact: Don Bouquet

TALLAHASSEE AREA EVA

Web Site: www.taeva.org
Contact: Gillian Smith

GEORGIA

EV CLUB OF THE SOUTH

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

HAWAII

BIG ISLAND EVA

Contact: Douglas Teeple
808-640-9621

IOWA

IOWA EVA

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

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: Rich Carroll
708-954-7555

INDIANA

HOOSIER EVA

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

KENTUCKY

EVolveKY

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

MASSACHUSETTS

NEW ENGLAND EAA

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

PIONEER VALLEY EAA

Web Site: pveaa.org
Contact: Karen Jones

MICHIGAN

MICHIGAN EAA

Web Site: michiganEAA.org
Contact: eea.mich@gmail.com

MINNESOTA MINNESOTA EAA

Web Site: www.mneaa.com
Contact: Tom Helin

MISSISSIPPI

MISSISSIPPI EAA (MSEAA)

Contact: Luke Lundemo
601-981-6925

MISSOURI

GATEWAY EV (GEVA)

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

MID AMERICA EAA

Web Site: maeaa.org
Contact: Al Pugsley Jr

NEVADA

LAS VEGAS EVA

Web Site: www.lveva.org
Contact: Lloyd Reece

NEW JERSEY

NEW JERSEY EAA (NJEEA)

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

NEW MEXICO

NEW MEXICO EVA (NNMEV)

Contact: Richard Dunn 505-672-3866

NEW YORK

GREATER NY EAA

Web Site: lieaa.org
Contact: Carl Vogel 631-482-7872

NORTH CAROLINA

BLUE RIDGE EV CLUB

Contact: Joe Baum 828-645-1412

COASTAL CAROLINAS- WILMINGTON EVA

Contact: Page Paterson
910-520-0107

TRIAD EVA

Web Site: www.localaction.biz/TEVA
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

GREATER DAYTON EV ASSOCIATION (GDEVA)

Contact: David Lyttle 937-837-2558

EAA OF NORTHWEST OHIO

Contact: Michael Hall
419-691-1569

OREGON

OREGON EVA

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

PENNSYLVANIA

EASTERN EV CLUB

Web Site: www.eevc.info
Contact: Oliver H. Perry
609-268-0944

THREE RIVERS EVA

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

TENNESSEE

KNOXVILLE EVA

Web Site: www.knoxev.org
Contact: Website

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
512-524-7159

HOUSTON EAA

Web Site: www.heaa.org
Contact: Kevin Douglass
houstonxeaa@gmail.com
713-927-6997

NORTH TEXAS EAA

Web Site: www.nteeaa.org
Contact: Ron Swanson

VIRGINIA

RENEWABLE ENERGY & EVA, DIY PROJECT CLUB

Web Site: www.reevadiy.org
Contact: Mark Hanson 540-473-1248

WASHINGTON

NORTH SOUND ELECTRIC VEHICLE ASSOCIATION

Web Site: www.northsoundeva.org
Contact: Jason Thompson
jason@northsoundeva.org

SEATTLE EVA

Web Site: www.seattleeva.org
Contact: Stephen Johnsen
206-321-9164

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



Tesla can produce 6M+ cars with 4 to 5 factories, suggests Musk



By Kyle for Teslarati

Elon Musk responded to a random tweet asking if Tesla could produce Ford's entire global volume or roughly 6.6 million vehicles per year with a single factory, stating that it would make more sense to distribute four or five factories around the world to accomplish the feat.

Elon went on to add color to the jobs each Gigafactory would have, saying that they would have a 'very high' headcount 'around' each Gigafactory to keep it running. The serial tech entrepreneur presumably is not just talking about the manufacturing jobs in the factory, but the massive number of supporting jobs that each factory would need to move raw materials and finished products in and out of the Gigafactory. If one were to look beyond Gigafactory operations, an army of people will be needed for secondary support of the massive factory, namely lodging, food and transportation services.

He also shared that Gigafactory staff won't be doing boring repetitive tasks. With production lines being almost the very definition of a repetitive task, this hints at an entirely new level of automation for the production lines for Model 3. As Tesla seeks to improve production line speeds by 20-fold, new automation must be integrated to eliminate the comparably slow pace of human installers. This is not to say that humans won't be involved in the production process, just at fewer strategic locations and only performing the more refined tasks that are currently more difficult to automate by machine.

The update comes as Tesla is slated to announce another two to four more Gigafactories by the end of this year. Said another way, by the end of this year Tesla will have announced plans to achieve the same production volumes as each of the auto barons of the age gone past – Ford and General Motors.



<https://www.teslarati.com/tesla-gigafactory-produce-6m-cars-ford/>

FORWARDING SERVICE REQUESTED

National Drive Electric Week™

Join us in September!



Did you put the dates on your 2017 Calendar? Or find a place & attend!

<https://driveelectricweek.org/>