Electric Auto Association

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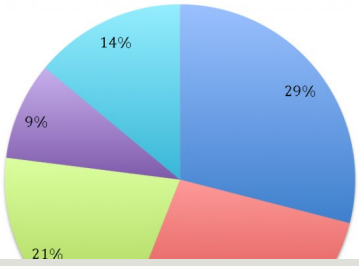

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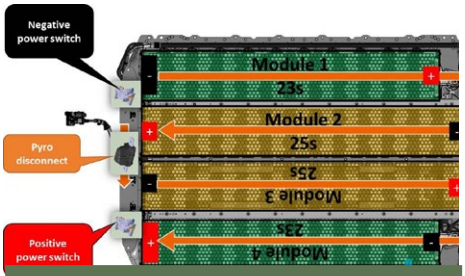

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Current EVents Back Issues on the Web

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

Please visit
http://electricauto.org/ and from the home page, click on "*Documents*" in the top navi-gation 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.

EV Perspectives and Prospects

Port of Oslo uses Nissan eNV200 electric utility vans based on the LEAF platform.

By Marc Geller, Plug In America

Our automotive future is becoming visible in Norway, first stop on my summer trip to Northern Europe. Electric cars and charging infrastructure are commonplace. I saw all the EVs we have here, just more of them. Plus a few vehicles we wish were offered here. The Nissan eNV 200 utility van and the once-promised Mitsubishi PHEV Outlander have long been available in Norway. There is lots of curbside charging with simple outlets in posts in urban residential areas, as well as in parking garages and workplace lots with dozens of access points to which drivers bring their own connectors. There is DC charging in urban garages and fast charging and supercharging together on the highway.

As I crossed the border into Sweden, however, the proliferation of Teslas, LEAFs and VW eGolfs and eUp!s I'd become used to on Norway's roads, disappeared precipitously. Sweden, Estonia, Latvia and Lithuania all revealed the occasional LEAF or BMW i3 or iMiev, but few and far between. I was torn between celebrating a fast charging station I passed by in Tallinn, and realizing how long it seems it will take for the world to catch up to Norway, which itself still has a ways to go. The generous financial incentive on EVs in Norway has driven purchases as no where else in the world. What will it take to quicken the pace of EV adoption every where else?

Simple outlets supply much of the public accessible electricity for EVs in Oslo. El-bil is electric vehicle in Norwegian.

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EV Expectations

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Banning the sale of ICE cars, perhaps. Increasing numbers of governments are about to set a date certain to end sales of internal combustion vehicles. The nearest at hand is Norway, of course, which is considering a date of 2025. Currently about 40% of new car sales are plug-in electric in this Scandinavian country of five million people. It feels like it could happen here in eight years. Many other countries — in Europe as well as India and China — are aiming for 2035 or 2040. We can't expect our current administration in Washington to sign on. But California and the ZEV states ought to join them and set a target date to end sales of gasoline and diesel cars and light trucks.

Community Center, Nittedal, Norway

The 2nd generation Nissan LEAF has finally had it's official release. In the wake of the recent arrival of the Chevy Bolt EV and Tesla Model 3, each delivering over 200 miles range, much has been made of the lower range of the LEAF, which will be available with a 40kW/150 mile range battery. (A 60kW/200 mile+ range LEAF will follow next year some time.) I think the focus on range misses the point. I'd focus on price and utility. Most commuting EV owners will still charge at home at night as needed, whether the car has 100, 150 or 230 miles range. People will choose the range they need at the cost they want to pay. If Nissan remains committed to making the LEAF a high volume car, and they offer competitive leases at various ranges, the car could continue to be the best selling EV in the world.

Nissan LEAF fast charging in central Tallinn, Estonia

While the increasing range of EVs is a serious cause for celebration, it is not a panacea. Every EV other than a Tesla remains dependent on private third party companies — neither utilities nor automakers in most cases — to install and operate the DC fast charging stations needed to enable truly long distance travel and urban ownership for those without access to electricity nightly. Public and settlement dollars are being put into these private networks to spur the development of interurban DC fast charge locations. Still, a drive between San Francisco and Los Angeles or Portland in a Bolt EV remains an adventure, I suspect. Somewhat ironically, Tesla's proprietary network built without di-

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Leaf Unveiled – US Version Expected in 2018

Source article by Darrell Etherington for TechCrunch

Nissan's new LEAF made its official world premiere on September 5th. We got the first detailed look at the car,verifying previous teasing images of headlights and tail lights.

This is purported to be a major revamp of the Nissan all-electric car (one of the first ever actually produced and sold by a major automaker). The 2018 Nissan LEAF not only gets a new leaf, but also comes with a 40 kWh battery that could offer as much as 150 miles of range per charge, with potential to upgrade to a 60 kWh pack for a boosted range of around 200 miles.

That's still not quite as much range as Tesla's Model 3 offers, or as much as the 2017 Chevrolet Bolt EV, either. But the Nissan LEAF comes equipped with the company's ProPILOT semi-autonomous driver assistance features, which offer SAE Level 2 features, including lane-keeping, acceleration and braking control. The early 2018 US version is expected to start at $29,990.

The photos in this article are from Nissan unless noted.

Source article:
https://techcrunch.com/2017/09/05/watch-nissan-debut-its-new-2018-leaf-electric-car-live-right-here/

photos continued next page

The aerodynamic nose of the new Nissan Leaf

The new Leaf has a bigger boot

The new Leaf was inspired by the IDS Concept
It has a drag coefficient of just 0.28

The pointy nose of the Nissan Leaf is more attractive and aero-dynamic than before

The new Nissan Leaf will have a semi-autonomous ProPILOT cruise control system.

Tail light assembly

The latest Leaf has a 40 kWh battery pack and has 110 kW of power, as well as 320 Nm of torque. The diffuser on the helps contribute to a 0.28 Cd

Blue detailing on the new Nissan Leaf

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CHAdeMO standard for the US model based on the press pictures. (Photo Elecktrek)

The infotainment system.

Behind the wheel of the new Nissan Leaf . CarPlay and Android Auto will be available.

The front seats.

A funky take on the gear selector.

e-Pedal allows drivers to take full advantage of the regenerative braking

continued next page

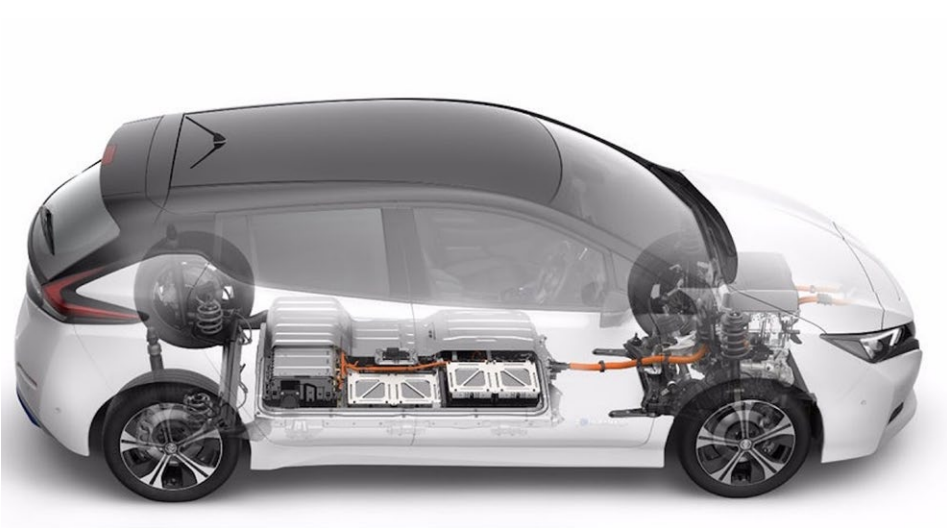
ProPILOT is installed and the new Leaf will park itself

Aero wheels

New Larger Capacity Battery for More Nissan Competition

Nissan has officially launched its all-new, all-electric 2018 Nissan Leaf. For early shipments it is equipped with a 40 kWh battery which provides an EPA-rated 150 miles. As this is being published we learn that it will get a 60 kWh battery option during 2018. Drawing its followers with a less than $30,000 price point as an economy EV is the goal. The question on some minds is what the range of this bigger battery will be.

Those considering the new Nissan based on the facelift it underwent, may also want to consider standard range battery pack on the 220-mile Tesla Model 3, as well as the 238-mile Chevy Bolt-EV. A Nissan exec added, "The larger pack is a third more energy dense than the standard 40 kWh pack, and so it should offer a third more of the range."



A look through the Nissan Leaf

Nissan promises to offer a higher power, longer range version at a higher price in model year 2019. The new Nissan LEAF goes on sale in Japan on Oct. 2. The model is slated for deliveries in the U.S. and Europe in early 2018. The starting MSRP2 in the U.S. will be $29,990.

Don't overlook the video review of the 2018 LEAF with Robert Llewelyn on page 38.

Three Reasons Why You Should Care About Vehicle Efficiency and Emissions Standards

By Josh Goldman

Merely typing "vehicle efficiency and emissions standards," feels like I'm prompting you to click off in search of the latest cat meme or 8,000th story on President Trump. But the next battle in the war for better vehicles looms, and you can help defend against automaker efforts to rollback a program they agreed to not so long ago.

Here are the top three reasons why you should care about the U.S Environmental Protection Agency (EPA) "Request for Comment on Reconsideration of the Final Determination of the Mid-Term Evaluation of Greenhouse Gas Emissions Standards for Model Year 2022–2025 Light-Duty Vehicles" (aka federal vehicle efficiency standards) and what you can do about it

Vehicle efficiency standards save money for all Americans, but especially low- to middle-income earners

Researchers at the University of Tennessee analyzed 34 years of consumer spending data and found that not only did households from all income levels save money because of improved vehicle efficiency, but low- to middle-income households saved a greater percentage of household income compared to higher earners. Better fuel efficiency saved an average middle-income family as much as $17,000 over the study period – even after households paid more for new and used cars equipped with fuel-saving technology. Vehicle efficiency standards, the researchers concluded, are therefore a true progressive (as opposed to regressive) policy because they benefit lower earners more than higher earners.

Interested in more of these findings?

Without fuel efficiency standards, automakers would only make gas guzzlers

Free market advocates argue that fuel efficiency standards aren't necessary. If there is demand for fuel efficient vehicles, then automakers will create a supply to meet that demand. While that sounds good in theory, in practice it doesn't happen.

In the absence of federal standards, fuel efficiency largely stagnated and automakers proved reluctant to offer fuel efficient options outside of small sedans. But Americans largely don't want small sedans. We want SUVs… and fuel efficiency! Fortunately, the vehicle efficiency standards incentivize automakers to make vehicles across all classes – including SUVs, pickup trucks, and minivans – more efficient. Because the standards do not require automakers only to make small, ultra-efficient vehicles, they prompt automakers to create innovative technologies that boost the fuel-saving performance of the larger vehicles that Americans tend to prefer.

For example, the 2017 Toyota Highlander Hybrid, a full-size SUV, gets a combined 29 miles per gallon. That's what I average in my mid-sized 2012 Subaru Outback Sport. Not too long ago, the 2001 Highlander only got a combined 18 mpg and the 1995 4Runner (the Highlander predecessor) got 13 mpg. And, the standards are incentivizing automakers to develop electric vehicles. There are growing numbers of electric vehicle models and several auto companies are set to release full electric SUVs in the next several years.

By providing automakers with flexible

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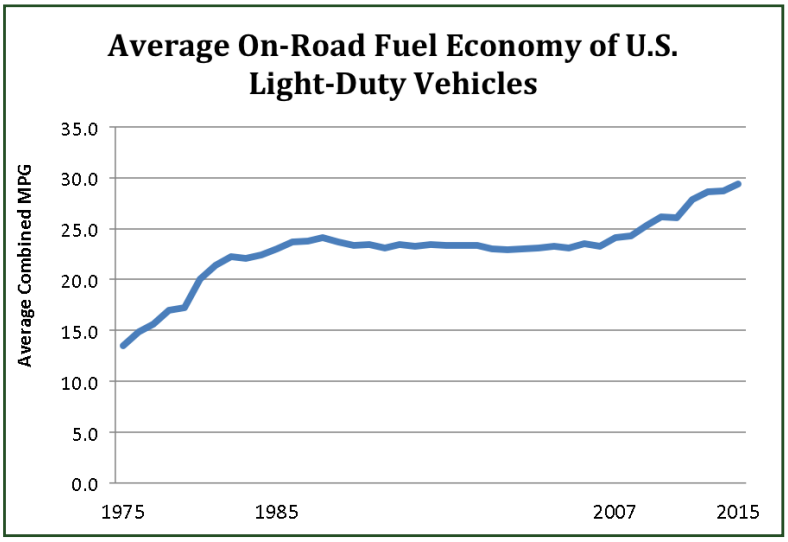


In response to the 1973 oil embargo, Congress established fuel economy standards for new passenger cars in 1975, then again in 1978. These standards were intended to roughly double the average fuel economy of the new car fleet to 27.5 mpg by 1985. No fuel efficiency standards passed until 2007, when Congress set a target of least 35 miles per gallon by 2020, and required standards to be met at maximum feasible levels through 2030. The standards now at issue cover vehicle model years out to 2025. Source: EPA 2016 Fuel Economy Trends Report.
Appendix D: Fuel Economy Data Stratified by Vehicle Type. Available at; *https://www.epa.gov/fueleconomy/download-co2-and-fuel-economy-trends-report-1975-2016*

ways to comply with the standards (aka compliance pathways), the federal vehicle efficiency program has been instrumental in giving consumers more fuel efficient choices no matter what sort of vehicle they need.

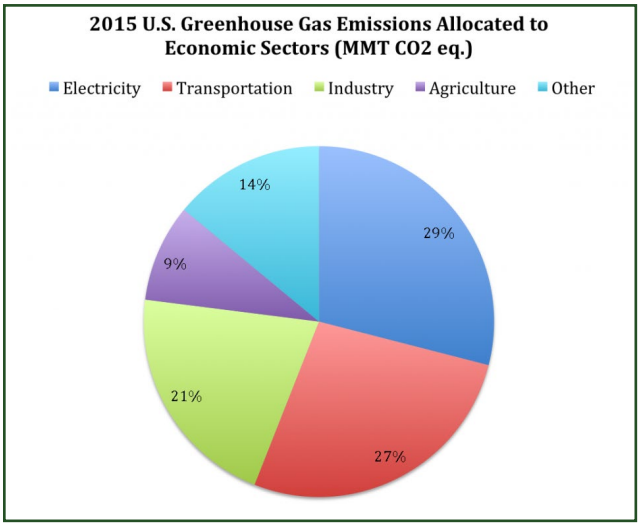
Vehicle efficiency and emissions standards are the single most important federal climate policy

I'm guessing that you care, at least tangentially, about climate change. You are reading a blog from the Union of Concerned Scientists, after all. So, you should know that the standards are set to achieve the largest reduction in global warming pollution from a single federal policy (other than the Clean Power Plan, which is mired in legal trouble and threat of repeal from the current Administration).

Transportation is one of the biggest sources of global warming pollution in the U.S., having accounted for 27 percent of emissions in 2015. Cutting emissions from transportation is challenging as our nation continues to rely on personal vehicles and driving has become incentivized by relatively low gas prices and may become further incentivized by the introduction of autonomous driving features. 2016 had the largest increase in national vehicle miles travelled (VMT) since regulators began tracking this data in 1971 and doesn't show any sign of slowing down. More cars were sold in 2016 than ever before, adding to the 263 million registered vehicles on American roads.

That's why – along with electric vehicles, better biofuels, and better transit options – improving the fuel efficiency of vehicles is so important. When including the emissions reductions from the finalized standards for heavy-duty vehicles, the federal fuel efficiency programs will cut emissions by an estimated 550 million tons in 2030 alone. That would be a reduction of over 3 percent of today's transportation-related emissions and would achieve more reductions over time as the vehicle fleet turns over and gradually becomes more efficient.

How you can help protect the federal vehicle efficiency and emissions standards



Transportation is one of the biggest sources of global warming pollution in the U.S. Source: EPA Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990–2015. Table ES-6. Available at, *https://www.epa.gov/ghgemissions/inventory-us-greenhouse-gas-emissions-and-sinks*

UCS is leading the way on telling the EPA and Department of Transportation that consumers want to stick with the current standards. Not only are the standards cost-effective and feasible to meet, the agencies' research showed that automakers could even exceed them. Help protect standards that are savings Americans money at the pump and reducing the risks of climate change.

Head on over to the UCS Action Center for a couple easy actions you can take, including

- submitting an official comment to the latest EPA rulemaking on the standards
- calling your Congressional representative to tell them that you don't support President Trump's attempted rollback of the standards, and
- sending a note to automakers telling them that you demand more fuel efficient vehicles across all vehicle classes.

Josh Goldman is a lead policy analyst managing legislative and regulatory campaigns to help develop and advance policies that reduce U.S. oil use.

http://blog.ucsusa.org/josh-goldman/vehicle-efficiency-standards-save-money

Continental rethinks the wheel—and the brake—for electric cars

When it comes to making a car slow down, for the last few decades pretty much every car on the road has used the same idea: a brake disc mounted to the axle with calipers that press high-friction pads onto the disc's surface, slowing its rotation. It's a tried-and-tested formula, one that car makers adopted from the aerospace industry as a better solution than the venerable drum brake. But the boffins at Continental (the tire company) have been rethinking the standard way of doing things, specifically in the context of small and medium-size electric vehicles. Enter the New Wheel Concept.

The focus on EVs is logical, since, in their case, deceleration is often achieved via regenerative braking using the electric motor instead—at least on the driven wheels. Obviously, EVs can't ditch the conventional brake. There needs to be a redundant system for situations when regenerative braking isn't possible, like when the battery is full and can't accept more energy. A consequence of using regenerative braking is that the friction brakes get much less use than in a conventional car, so they tend to last a lot longer. But there is a downside to this: a buildup of rust that can impair their performance when you need to use them, according to Continental. (This is only an issue with cast iron brakes, but we're not aware of many hybrids that use carbon ceramic discs outside of the hypercar crowd.)

"In EVs, it's crucial that the driver expends as little energy as possible on the friction brake," said Paul Linhoff, head of brake pre-development in the chassis & safety business unit at Continental. "During a deceleration, the momentum of the vehicle

continued next page

is converted into electricity in the generator to increase the vehicle's range. That's why the driver continues to operate the brake pedal—but it certainly doesn't mean that the wheel brakes are active, too."

So there's a wheel rim, to which the tire is mounted, and then an inner component called a carrier star—the bit with spokes that mounts to the axle. Instead of mounting a brake disk to the axle, here it's married to the carrier star, with the caliper attached to the inside. That means that the disc can be much larger than a conventional brake disc, which needs to be small enough so that there's room to fit the caliper without impeding the wheel itself.

It's also made of aluminum rather than cast iron, solving that rust problem. But Continental says there are some other advantages, too. For one thing, aluminum is lighter than cast iron, and any weight you can save from an EV loaded down with batteries is a good thing. (We believe the weight savings to be about 4.4lbs/2kg per wheel.) Second, aluminum is a good conductor of heat that's more quickly dissipated than with a conventional set up. And finally, the larger brake disc means a better leverage effect from the caliper, which in turn means a smaller caliper is possible.

"Because the brake disk is fixed on the outside and the brake engages from the inside, the brake caliper can be designed particularly light and stiff. The force is transmitted largely symmetrically into the center of the axle, and this has a favorable effect on the noise behavior of the brake," Linhoff said. Again, that's not something you'd care about in a car powered by a noisy internal combustion engine, but it is another plus when it comes to the silent driving experience that EVs offer.

https://arstechnica.com/cars/2017/08/continental-rethinks-the-wheel-and-the-brake-for-electric-cars/

2017 Chevrolet Bolt EV Extended Test Drive Review

By Tom Moloughney

With the introduction of the 2017 Chevrolet Bolt EV, General Motors was the first OEM to market with an "affordable" long range all-electric car. For a few years, it appeared that Tesla would be the first to market with such a vehicle, however when GM introduced the concept Bolt at Detroit in 2015, it was clear that the race was on, and ultimately GM was able to beat Tesla to market by about eight months.

The 2017 Bolt EV Premier shown in Kinetic Blue Metallic

Now to be clear, I know that the Bolt and the Model 3 are distinctly different types of vehicles. However, the fact that they both have a single-charge range of over 200 miles, and basically the same base MSRP, there will inevitably be some degree of cross shopping. That said, the purpose of this review isn't to compare the Bolt to the Model 3, as some other automotive publications already have. Personally, I think GM is going to find that more Bolt customers were former Nissan LEAF, Chevy Volt or BMW i3 owners, than they were Model 3 reservation holders that cancelled their reservation and bought a Bolt.

GM was kind enough to offer me six days with a loaded Bolt Premier, which gave me an opportunity to use the car for daily commuting as well as a couple of long weekend road trips. I ended up putting 800 miles on the odometer, which was more than enough time to get a good feeling of what the car has to offer.

Performance & Comfort

The 200 HP motor with 266 lb-ft of torque provides more than enough power for the 3,580 lb Bolt EV. Off-the-line acceleration is potent, and you can even get some wheel spin before the traction control takes over.

There is one drawback of having all that power available at zero RPM though. Since the Bolt EV has front wheel drive, the torque steer is definitely noticeable, but manageable. In fact, it reminded me a lot of the front wheel drive MINI-E that I leased from 2009-2012, which was a lot of fun to drive.

Side by side: The Chevy Bolt EV and BMW i3

Also, when pushed to the limit, there was the typical understeer associated with front wheel drive, but it wasn't unforgiving. If I just eased off the accelerator a bit the car quickly corrected. The Bolt will go zero to sixty in about six and a half seconds, and that's quick enough to beat any stock EV on the road, this side of Tesla. The Bolt is such a good performer in fact, that at this year's Refuel at Laguna Seca, Billy Kwan set a Production Class record, and even beat all of the Tesla car's times from the 2016 event.

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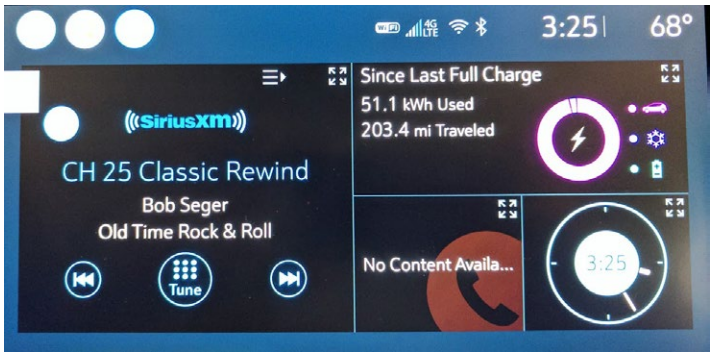
While I really loved the Bolt's rear camera mirror, under some inclement conditions, the vision can become obstructed by the rain, and the driver needs to flip it back to a standard mirror.

The ride is pretty good for a car of this size, perhaps helped somewhat by the added weight of the large 60 kWh battery. It is smoother than my BMW i3, which has a tighter suspension and is much less forgiving over uneven road surfaces. It probably isn't quite as smooth as a Nissan LEAF though, which I've found to offer a very soft, comfortable driving experience, even on less favorable road conditions. GM clearly wanted the Bolt EV to fit more into the "Hot Hatch" category, with above-average acceleration and good handling, while Nissan was more interested in making the LEAF a comfortable all-electric family mover.

Since I brought up the word "comfort," I wouldn't be honest if I didn't say that I was a little disappointed in the Bolt's front seats.

I understand that seating comfort is not an exact science, and what one person finds comfortable another may not. However, other publications like Consumer Reports and Edmunds have already written that they also found the Bolt's seats to be less than satisfying. I too, share that sentiment. They seem to be very narrow and lack lower back support.



The center display has a couple different screens dedicated to displaying the vehicles recent energy use.

Unfortunately, the 2017 Chevy Bolt seats look better than they feel. The narrow seat back has been widely criticized.

The rear seating area offers plenty of room for passengers

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Bolt EV Review

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To be fair, my wife said she found the seats fine, but she has a small frame and is thin, so the width of the seatback wasn't a problem for her as it was for me. Since I had the Bolt Premier model, it came with the leather seating option. While I have sat in the standard Bolt LT with the cloth seats, I haven't had enough time in it to really make a fair comparison. I do urge potential Bolt owners to sit in both versions, and go for a long test drive before they make a purchase decision.

2017 Chevy Bolt rear view camera isn't as clear as the rear camera mirror

Interior Finishes & Controls

I really liked the layout of the Bolt's center display and controls. Everything was easy to understand, and the bright 10.2" center display was simple to operate. I'd prefer if it were angled more towards the driver, or have a greater vertical angle though. It's positioned on an odd angle, so the driver not only has to look to their right, but also look down.

There are plenty of energy information screens to scroll through if interested, and I particularly liked how the main screen displayed the number of miles driven and kWh used since the last full charge. I think this really helps people who are new to EVs to better understand their energy use.

We all understand miles per gallon, but not everyone who buys an EV understands mile per kWh, and having this on display will help. I think other OEMs should take a close look at how GM implemented this, and follow what they did because it works. In addition, you can configure the drivers display to show the instantaneous energy draw, as well as the level of recaptured energy in kWh from braking. All of this information helps the owner, most likely relatively new to electric vehicles, better understand the basics of energy consumption of electric vehicles.

While I do like the layout and the amount of space of the interior, there was a little too much shiny plastic in my opinion. I would have preferred if the top-of-the-line Bolt Premier had a little more top-of-the line feel to the interior surfaces. After all, the MSRP of the car I had was $43,905, but the interior finishes were more suitable for a car that cost much less.

Another nitpick I had was that the reverse gear is in an unusual position. You must press the button on the shifter, then push the shifter forward and to the left to find reverse. At first, I didn't like this because it just felt unnatural and I missed getting in gear a couple times. However, after a couple of days, I had conditioned myself to do it correctly, and it was no longer an issue. It reminded me of the unusual gear shifter on the steering column of the BMW i3. Pushing the control knob forward for drive and pulling it towards me for reverse seemed backwards at first, since conventional shifters operate the opposite way. But after a little while with my i3, it only seemed right that I would push the knob forward to drive forward, and pull it backwards to drive in reverse. It's all a matter of conditioning.

The rear seating area is spacious and comfortable, especially for a car of its size. The outward vision from anywhere in the cabin is excellent, and that helps make the small car feel bigger than it actually is. The ventilation system worked very well and was able to cool the cabin quickly, even on very hot days. The energy displays even tell you the energy use breakdown between propulsion, heating and cooling, and battery conditioning. This, again, helps the owner better understand the energy use of their electric car.

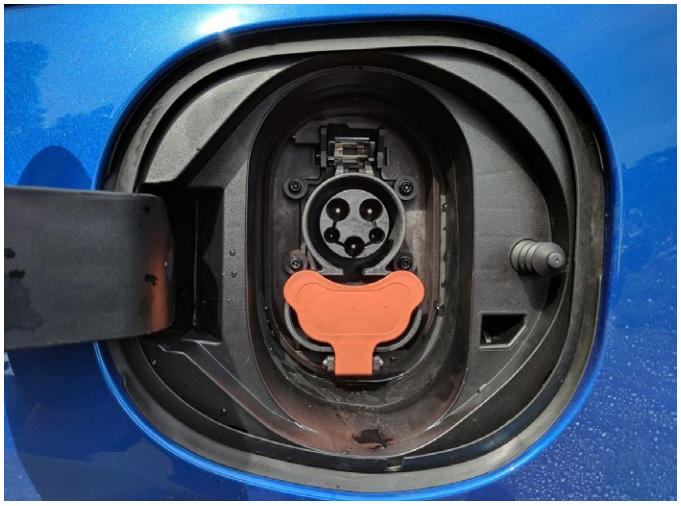
I really liked the rear camera mirror which comes standard with the Bolt Premier. It offers a better view outside of the rear of the vehicle, and this is something I'm sure will become commonplace on all vehicles soon. The Lane Keep Assist with Lane Departure Warning is another great safety feature. When activated, it gives a visual warning on the drivers display screen and gently nudges the steering wheel to move the car back into the lane you were driving in. It can easily be overpowered if it is your intention to leave the lane, but it is strong enough to let you know you

continued next page

may be unintentionally wandering out of your desired lane.

The Surround Vision gives a 360 degree birds-eye view for parking and the four-camera system works very well. The rear view camera is standard and worked well also, but it isn't nearly as clear as the rear camera mirror. In fact, I got out of the car once to clean the camera off, thinking it was dirty because of the cloudy view. However, the picture didn't improve so I realized the camera just isn't very high definition. The rear view camera on my BMW i3 for instance is much clearer than the Bolts. However, the more expensive i3 doesn't even offer the options of a rear camera mirror, or Surround Vision that the Bolt has, either.

The driver's display offers a minimum and maximum estimated range. When fully charged, the minimum and maximum are roughly 20% less and 20% more than the true estimated range. This gives the driver a 40% variance from the predicted range.



The Bolt's charge port isn't illuminated

Charging

The Bolt's large 60 kWh battery takes about nine hours to fully charge on a 240v, level 2 EVSE. Both my JuiceBox Pro 40, and my ChargePoint Home EVSEs showed a charging rate of 7.3kW, until tapering down near the end of the charging session.

On one occasion, the Bolt just stopped charging when it was approximately 85% charged. The driver's display had the message "Unable to Charge. See Charge Station." I don't have any way of proving if it was the car's fault, or that of the EVSE, so I can't blame the Bolt for this issue. I also charged it on 24 kW ChargePoint DC fast charger. It was charging at a steady 22kW and adding the expected ~33% state of charge per hour. This is one of the lower-powered DC Fast chargers, that are better suited for smaller-battery EVs. Still, it will add 90 to 100 miles of range per hour to the Bolt, which is still much better than level 2 charging. Unlike many other EVs, the Bolt surprisingly doesn't have any LED lights in the charge port opening. This can be a little problematic when you need to plug in, in an unlit area.

On The Road

The first thing that I noticed was the presence of artificial creep. Put the car in drive and release the brake and the vehicle will slowly creep forward, like a conventional gas car. At first I was disappointed to find this, because personally, I prefer not to have this "feature" on my EVs. But then I remembered a conversation I had with the Bolt's chief engineer, Josh Tavel, a couple years ago, when he told me they would have artificial creep for drive, but if the vehicle was in low the creep would disappear. So I tried it out and he was correct, no creep when in low gear.

Furthermore, if the car is in drive, and you come to a stop using the friction brakes, the car will creep when you release the brakes. However, if you use the regen paddle to stop the car, the

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Bolt EV Review

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vehicle will not creep when you release the paddle. Instead, it will hold the position until you use the accelerator. I really liked this implementation. It gives the driver the opportunity to decide if they want the vehicle to creep forward or not, upon releasing the brakes.

With an EPA electric range rating of 238 miles per charge, GM didn't just simply beat competitors like the Nissan LEAF, BMW i3, Volkswagen eGolf, et al, they crushed them.

As noted above, the Bolt is also a great performer, and can out-accelerate and out-handle the competition as well. I planned two road trips to see how efficient the Bolt was at highway speeds with the air conditioning on and the results were very good. I averaged 4.0 miles per kWh for both trips, and I was driving 75 – 80 mph for much of the time with the air conditioning on. In all, I drove the car 800 miles and averaged 4.1 miles per kWh. That's pretty respectable considering I had the air conditioning on all the time, and also drove in a couple rainstorms.

The first trip was a day trip to Bayhead down at the Jersey shore. The round trip was 147 miles and the Bolt consumed 36.5 kWh. My second trip was to Vermont and was over 200 miles each way. On the trip there the Bolt needed 51.1 kWh for the 203.4 mile journey. I've made this trip before in my i3 but always needed to stop along the way a couple times and use a DC Fast charger. Arriving at my destination with about 30 miles of remaining range, after driving over 200 miles on a single charge was really liberating. The Bolt minimizes the potential concern of range anxiety extremely well, and only the proliferation of nation-wide high-speed DC fast charge infrastructure will completely eliminate it.

On previous trips to Vermont I had to stop at the DC Fast chargers to replenish the battery on my i3. WIth the Bolt EV, I made the entire 203 mile trip on one charge, and still had 33 miles of remaining range.

The Bolt's large windshield offers very good outward vision, and the rear camera mirror gives the driver a better view of what's behind than a standard mirror could. However, I did notice that sometimes while it's raining the camera mirror's view can become obstructed by water, and you then need to flip the mirror back to standard non-camera position.

I also noticed (and liked) the electric motor whine, especially during heavy acceleration and deceleration. While the cabin is mostly quiet as with all EVs, you can hear the jet-engine sound of the Bolt's electric motor a little more than you can in most other EVs. I imagine that this is the case because the motor is positioned in the front of the vehicle, just a few feet from the driver.

The regen-on-demand paddle is located on the back of the left side of the steering wheel

Regenerative Braking

While I could have discussed the Bolt's regenerative braking system in the previous section, I was so impressed by how GM implemented this feature that I wanted to dedicate more time reviewing it.

Manufacturers are still struggling to find the best way to implement the

continued next page

regenerative braking systems on their electric vehicle offerings. I know this for a fact, because I have personally been asked by more than one OEM to run polls and surveys among the EV community to gather information regarding how current EV drivers like or dislike the way the system is implemented in the EVs that they have driven. I now have a simple answer to give whenever I'm asked about my thoughts on regenerative braking: Just do what GM did with the Bolt EV.

The Bolt offers a regen setting for everyone. You want your car to act like your old gasser did? Then just leave it drive and the car will coast when you back off on the accelerator. In this mode it will still recapture some energy because it's not totally freewheel coasting, but the level of regen is very mild. If you want a more aggressive regen, pull the shifter back and pop the car in low and you'll instantly have the one-pedal driving experience that so many EV enthusiasts talk about. If GM had stopped there, the Bolt's system would still be the best regenerative braking system available today, but they didn't. They added a regen-on-demand paddle on the left side of the steering wheel that works so well, you can virtually drive all day without touching the friction brakes. This regen paddle initiates such strong regenerative braking, you can even stop the car on a steep decline nearly as quickly as friction braking would.

To give you an idea of how strong the regen is, if you're driving in low, and pull in the regen paddle, it literally feels like you deployed a parachute to slow the car down! While this may be unsettling for many first-time EV owners, I believe they will quickly become accustomed to this, and before long love how it works. Personally, I like my regen strong, but I understand that not every EV owner will agree with me. What really makes the Bolt's regen implementation special is that it can adjust to what the driver wants. You can select drive or low; you can use the regen paddle or not – there's a level of regen for everyone. GM nailed it. There isn't another regenerative braking system on the market that is this good. Period.

Summary

Before having this extended test drive opportunity, I was already a fan of the Bolt EV. From what I had read and heard from friends who drive a Bolt, GM had done a really impressive job with it. The fact that it offers more electric range than any of its competitors is certainly the Bolt's biggest advantage. However, if GM has simply stuffed a huge battery into a car without trying to make it a great electric car, then I believe it wouldn't have ever realized its full sales potential.

After spending nearly a week with a Bolt, I'm very pleased to say that GM really did their homework. They obviously listened to the focus groups and the surveys, and delivered an EV that is, at least as good, if not better in most regards, than their competitors. I really hope GM puts some marketing dollars behind the Bolt, because it deserves it. There really isn't too much to be critical of with this car. In fact, the lack of a comprehensive DC Fast charge network to support the Bolt EV is probably its weakest link. That, and well, the seats.

http://insideevs.com/2017-chevrolet-bolt-ev-review/

Tom Maloughney has long advocated for EVs and has been driving electric since 2009. A former director at Plug in America, Tom currently works with dealerships to increase their plug in vehicle sales. Tom manages public charging stations he had installed at a strip mall in Montclair, NJ.

Chevy Bolt charging on level 2

Your EV trip to Tahoe just got easier

New EV charging network opening, from the mountains to the sea

By Louis Hansen

A pilot project is making an electric vehicle road trip in Northern California a little cheaper, easier and with a little less range anxiety.

A fast-charging network, known as ***Drive the ARC,*** is bringing more than 50 new electric stations installed at about 25 sites from Monterey to Lake Tahoe.

The network — free to EV drivers with a smart phone app and a common charger — is an international, public-private collaboration aimed at supporting the spread of zero emission vehicles. Many sites are open, and the network is slated for completion this fall.

"It's putting dots on the map to give people confidence," said Tyson Eckerle, deputy director of zero emission vehicle infrastructure for Gov. Jerry Brown. "It's all about finding good locations."

California has an aggressive goal of putting 1.5 million zero emission vehicles on the roads by 2025. Convincing drivers to pay a premium for plug-ins will be hard enough, but the state also needs a bigger network of charging stations to ease driver concerns about running out of charge during long road trips.

Since 2013, zero emission vehicles, or ZEVs, have made up 3.25 percent of all vehicle sales in California. ZEV sales are about one percent of all U.S. car sales this year. Researchers say building an infrastructure is key to growing the small market.

Drive the ARC, short for Advanced Recharging Corridor, came together through a grant from the New Energy and Industrial Technology Development Organization, or NEDO, the Japan government's research and development arm. The agency funded the $20 million project to improve energy conservation and strengthen relations between U.S. and Japan. Japanese companies Nissan Motor and Kanematsu are also leading the project.

The project will collect and analyze driver usage data, and help companies better plan for additional charging network growth and consumer needs. Developers broke ground last year.

Read more about this project in this source article below:

http://www.mercurynews.com/2017/08/24/your-ev-trip-to-tahoe-just-got-easier/

CHARGED UP AND READY TO GO

Drive the ARC is a network of new fast-charging stations for electrical vehicles installed from Monterey to Lake Tahoe. The project broke ground last year, and the final stations are expected to be finished this fall.

Source: DRIVETHEARC BAY AREA NEWS GROUP

Charging the Corridor

DRIVETHEARC project aims to promote EV driving expansion in California by incorporating electric vehicles, intercity charging networks, and real-time information service to meet higher energy and environmental needs.

https://drivethearc.com

HEVF HORSELESS CARRIAGE RAFFLE

Chip Gribben, the Historic EV Foundation (HEVF) resident artist and board member created this great poster for their raffle.

Tickets are still available.

If you wish to purchase raffle tickets to help support our museum here is the link:
https://raffles.ticketprinting.com/raffle/5800-Hevf-Horseless-Carriage-Raffle/

The goal of this raffle is to raise funds for our Route 66 Electric Vehicle Museum in order to improve displays and restore current vehicles in the collection and possibly add to our collection.

The **HISTORIC ELECTRIC VEHICLE FOUNDATION** is a registered 501c3 non profit corporation that was formed in 2013. The Foundation exists for the prime purpose of education concerning the history of electric vehicles from the nineteenth century up to and beyond the twenty first century as well as preserving examples of these vehicles for all the peoples of the world to enjoy and learn from.

On Friday, August 15th, 2014 our foundation opened it's first International Electric Vehicle Museum in Kingman, Arizona right on Route 66, hence the name the Route 66 Electric Vehicle Museum.

1st Place Prize - A replica of an Electric Horseless Carriage from the early 1900s reminiscent of early Columbia Electric Automobiles, Est. Value $15,000

The replica of an electric powered horseless carriage that was donated to our foundation did not fit our criteria to be included in the museum collection. We decided to raffle it off. Proceeds will be used to enhance displays with photos and historical documents and Some of the funds will pay for upgrades currently being done on the vehicle. No money will be used for administration which has only volunteers. Only 2,500 tickets will be sold. **The raffle will be held on Saturday October 7th at 6:30 PM at the "Chillin on Beale" event in Kingman, Arizona.** You need not be present to win. Our HEVF foundation will assist you in shipping logistics if you should be the lucky winner.

https://raffles.ticketprinting.com/raffle/5800-Hevf-Horseless-Carriage-Raffle/

EV Expectations

continued from page 4

rect government support is robust and redundant and seems the model most likely to succeed. One can easily use superchargers to drive across the country. But of course, most people don't drive such long distances. They fly.

National Drive Electric Week has commenced. You have likely attended or perhaps helped organize an event. What began seven years ago in a few dozen locations as National Plug In Day, has become a weeklong series of locally organized events in over 250 cities, suburbs and towns. The opportunity to test drive different electric cars outside of the dealership with real drivers around to answer questions and dispel myths has been a real sales motivator. I look forward to another post-NDEW bump in plug-in electric vehicle sales.

http://driveelectricweek.org

Nebbenes, Norway 20 Superchargers and 4 Chademo and CCS DCFC

Tesla Model 3: here's the alloy mix of the Model 3 body

Figure 1 (Front quarter exploded view)

By Fred Lambert

With the Model 3, Tesla is moving away from the mostly aluminum chassis that it designed for Model S and Model X with some high-grade steel reinforcements.

Instead, the automaker is adding more steel to the mix for Model 3 and we now get our first look at the alloy mix in the chassis of Tesla's less expensive electric car.

The idea to use primarily aluminum for Model S and Model X was a decision aimed at saving some weight for those rather large vehicles.

Tesla's ~1,000 lbs battery pack gives a boost to their vehicle's weights and the automaker aimed to compensate with a lighter chassis.

At first glance, it's a no-brainer since aluminum is also stronger per pound, but it is also more expensive to build and repair. Aluminum can be more difficult to manipulate and can require expensive specialty equipment.

This was reflected in body work costs for Model S and Model X.

While it can be a pain for some owners, it hasn't become a major issue since Model S and Model X are already high-end expensive luxury vehicles with expected high repair costs.

With a $35,000 base price, the Model 3 is another matter. It pushed Tesla to use an higher mix of steel in the body. Redditor User_Juan got his hands on the Model 3 body repair guide, which includes the alloy body mix. We confirmed the document and got a few more pictures on the next page.

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Figure 1 (Front quarter exploded view)

Aluminum | Mild Steel | High-Strength Steel | Ultra High-Strength Steel

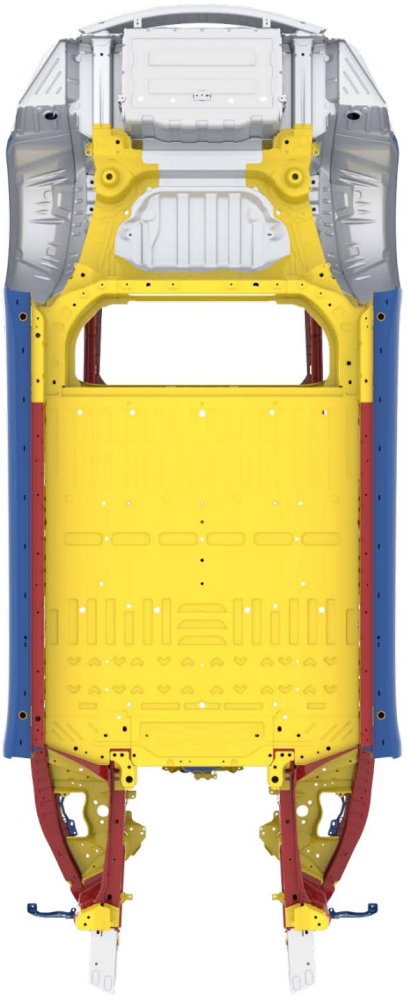
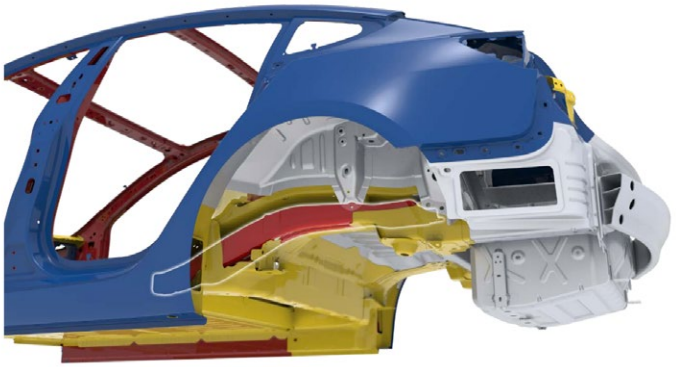


Figure 5 (Front components, exploded view of Shotgun)



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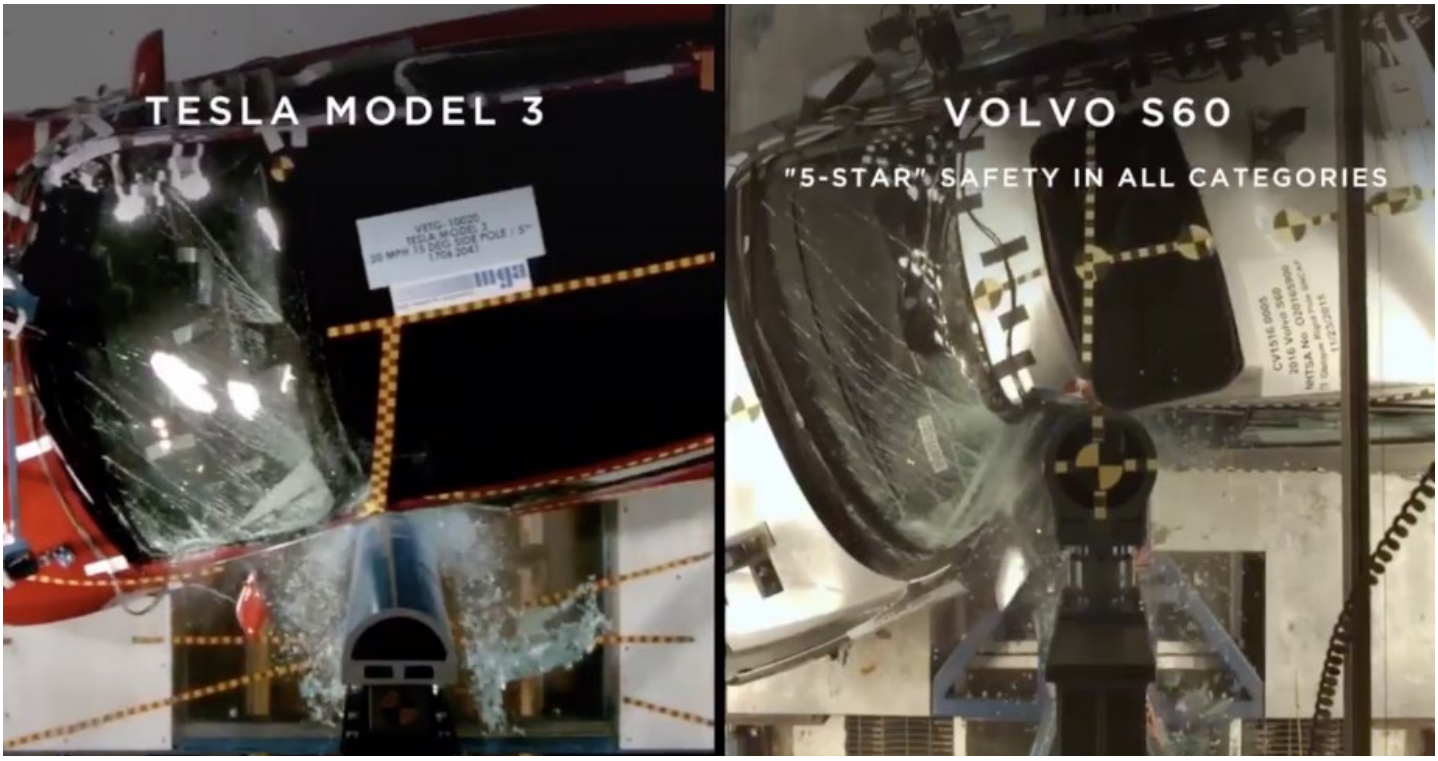
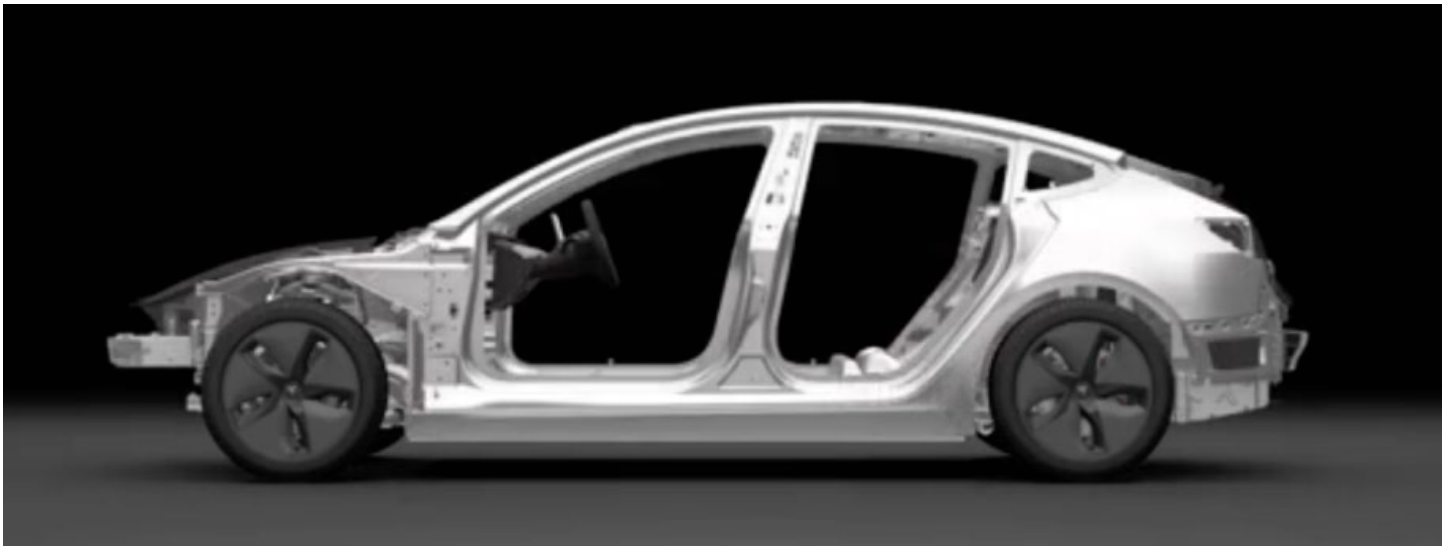
As you can see, the use of aluminum is fairly limited in the Model 3 body. Body repair shops will be able to attempt repairs on everything but "Ultra High-Strength Steel". They still managed to maintain a decent weight of 3549 lbs for the base version (3814 lbs. for bigger battery pack).

Tesla expects that this body will still maintain the company's strong safety track record of beating NHTSA's 5 star rating. They released this impressive image of the Model 3 versus the Volvo S60 on the side-pole impact test.

They expect to not only have 5-star ratings in every category, but also significantly beat the next best vehicle in this case.

With this said, NHSTA has not yet released any official rating for the Model 3.

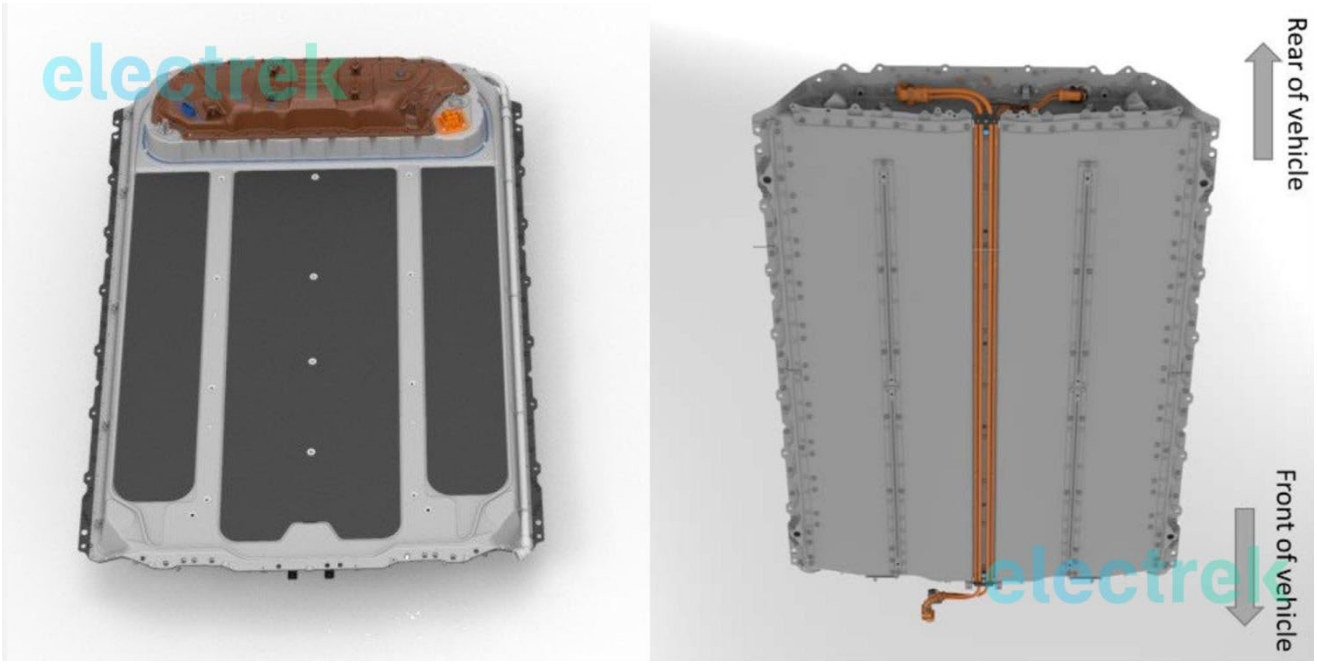




Photos courtesy of Electrek

https://electrek.co/2017/08/22/tesla-model-3-body-alloy-mix/

Tesla Model 3: Exclusive first look at Tesla's new battery pack architecture



By Fred Lambert

With a starting price of $35,000, the Tesla Model 3 is half the price of the vehicles Tesla is used to designing and manufacturing, the automaker's flagship Model S and Model X all-electric vehicles.

In order to achieve this more affordable price, Tesla had to design a whole new platform and battery pack architecture.

Today, we get an exclusive first look at this new Model 3 battery pack architecture.

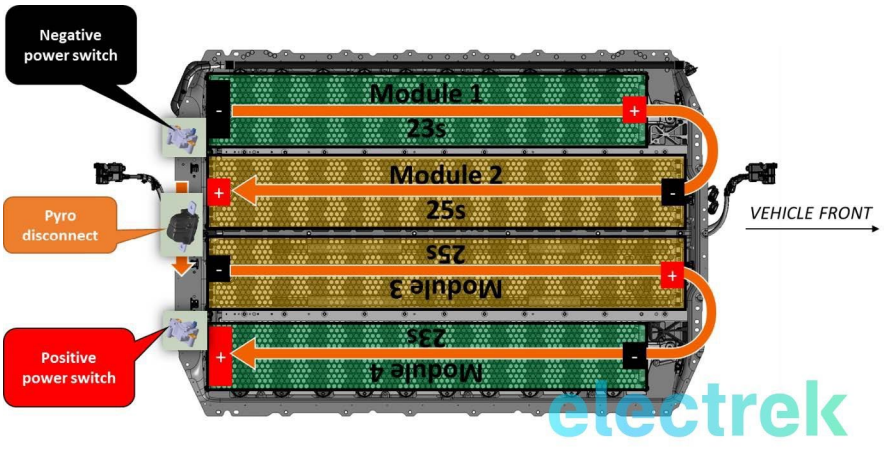
We already know about the new battery cell format, which is arguably the main change. The cells in Model 3 are a different size than in Model S and Model X, which have cells known as "18 650" (18mm in diameter and 65mm long), while Model 3 has larger cells called "21 70" (21mm in diameter and 70mm long)".

The bigger cells enabled Tesla to optimize volumetric energy density.

Now Electrek obtained more details on the battery pack architecture built around those new cells.

The standard 50 kWh Model 3 battery pack is made of 2,976 of those cells in groups of 31 cells per "brick". The bricks go into 4 separate modules (2 modules of 23 bricks and 2 modules of 25 bricks).

That pack is going into production later this year. Currently, Tesla is producing a 74 kWh 'long range' battery pack, which consists of 4416 cells in groups of 46 cells per brick and the same brick distribution in the 4 modules. Here's a diagram of the distribution of the cells in a Model 3 battery pack:



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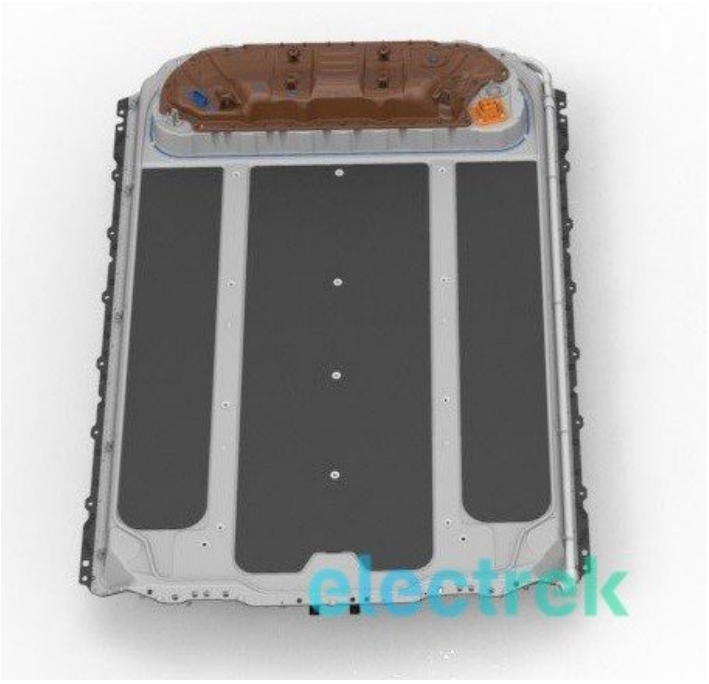
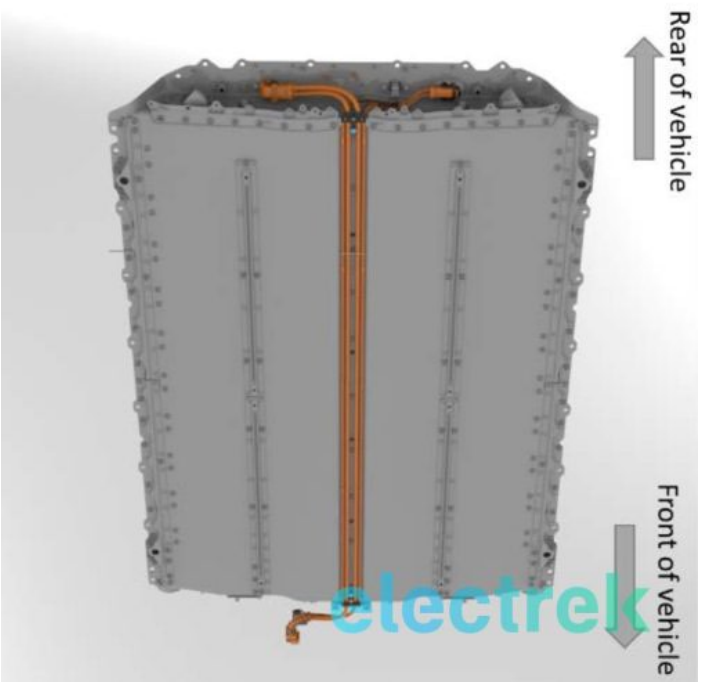
That's a big difference with the Model S and Model X battery pack architecture, which has several more modules per pack.

Tesla's new 100 kWh pack, which is the top-of-the-line for Model S and Model X, has 16 modules with 516 cells for a total of 8,256 cells per pack. You can learn more about the Model S and Model X pack architecture here: Teardown of new 100 kWh Tesla battery pack reveals new cooling system and 102 kWh capacity.

That's the main difference for the core architecture, but there are also several other more subtle changes that can give us some interesting insights into the new all-electric vehicles.





Unlike the Model S and Model X battery pack, Tesla didn't make the Model 3 battery pack to be easily swappable. There are bolts, which are only accessible by removing trims from the interior of the car, that need to be removed in order to eject the pack.

It's probably the last blow to Tesla's battery swap station scheme, which was put on the back burner last year.

Tesla's battery swapping magic revealed in new patent application drawings

Another interesting point is that the Model 3 pack has no externally accessible high voltage connector other than the charge port, which kills the idea of an autonomous charging access point under the vehicle – something that Tesla has been working on: Tesla patent shows new way to automated high-speed charging with external cooling.

Tesla also designed the Model 3 battery pack to include the charger, fast-charge contactors, and DC-DC converter all in the same package. The packs also already have the necessary connectors for the upcoming all-wheel-drive dual motor option.

The automaker also incorporated some other ingenious designs to save weight and cost.

For example, it got rid of the external battery pack heater and instead, it heats the pack only using heat provided by the powertrain even when the car is parked.

Battery cells need to operate at a temperate core temperature in order to keep their optimal performance, which means that they need to be cooled in warm conditions and heated in cold weather.

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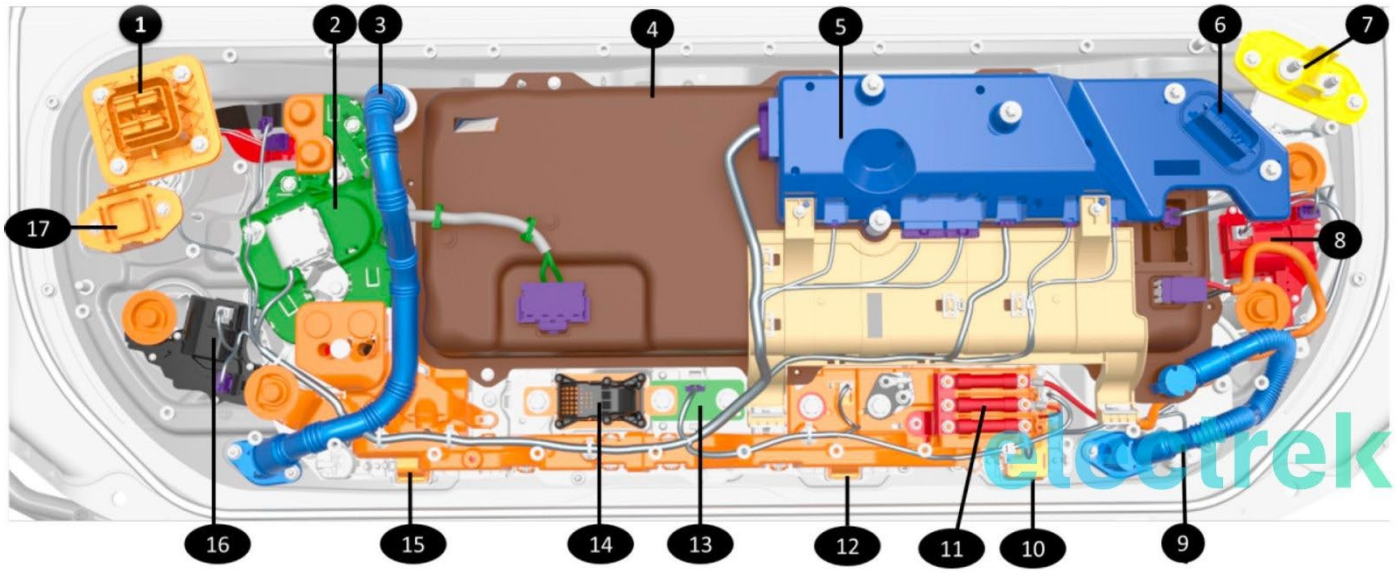
Waste heat from the powertrain can be used when the car is moving, but Tesla designed a thermal controller for Model 3 that can also use heat from the powertrain even when the vehicle is parked, like at a Supercharger for example, which is important since the charge rate drops if the battery pack is too cold.

Even when parked, Tesla's software can send a request to the powertrain inverter to start powering up and pass the appropriate currents to the motor in order to produce enough heat to warm the cells – all while not producing any torque so the Model 3 doesn't move.

Tesla apparently judged the system efficient enough to not include an external battery pack heater in the Model 3 and replaced it virtually entirely through software.

Finally for the more inside baseball stuff, here are the main electronic components of the battery pack:



1. Charge port connector **2.** Fast charge contactor assembly **3.** Coolant line to PCS
4. PCS – Power Conversion System **5.** HVC – High Voltage Controller **6.** Low voltage connector to HVC from the vehicle **7.** 12V output from PCS **8.** Positive HV power switch
9. Coolant line to PCS **10.** HV connector to cabin heater and compressor
11. Cabin heater, compressor and PCS DC output fuse **12.** HV connector to rear drive unit
13. HV pyro fuse **15.** HV connector to front drive unit **16.** Negative HV power switch
17. Connector for 3 phase AC charging

https://electrek.co/2017/08/24/tesla-model-3-exclusive-battery-pack-architecture/

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

A New Lease on Life!

By Dave Hrivnak, Knoxville EVA

How long will the batteries last? That is a frequent question I get on my 8 1/2 year old Tesla Roadster. The short answer is we do not know and thanks to Tesla's 3.0 battery upgrade we may never know. The reason is Tesla is teasing us with a 3.0 battery (80KWh) that is to increase range to an impressive *345 miles*. The longest range of any EV today.

At 8 1/2 years I did see some loss in range as the new 240 "ideal" range had dropped to 211 miles. A loss of about 3.5 miles/year. Still at 211 miles it had better range than most new EVs. Looking at Tom Saxton's battery study data there are 5 Roadsters over 100,000 miles and they were just shy of 200 ideal miles in range mode. I had also noticed a slight drop in performance over the years.

When the car was new to me 6 1/2 years ago I took the car to Bristol's Thunder valley speedway a nice sanctioned 1/4 drag strip. They host an event called "Street Fights" where for $10 you can get as many runs in as you are willing to wait in line for.

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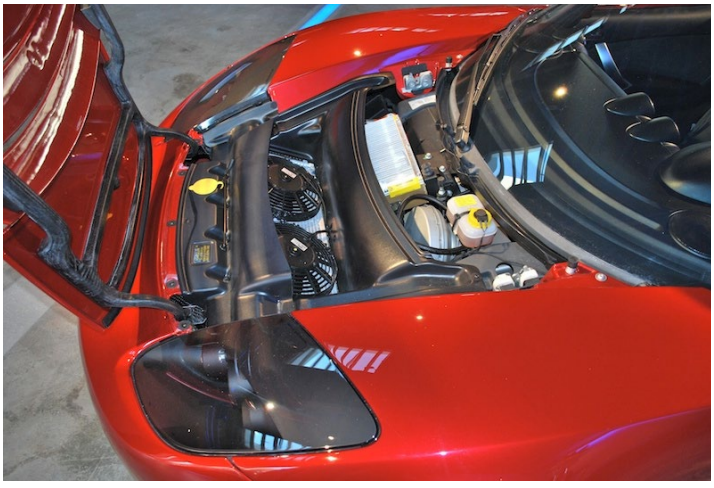

The Roadster is a strong racer, consistently running the 1/4 in 13.15 seconds and 101 mph. My first night there; I ran against three Corvettes, a Shelby Mustang and a Sport BMW just to watch all fade in the rear view mirror. Early this spring I went back to see my times fade slightly as I was running 13.25 seconds and 99 mph. Still not bad for a 8 1/2 year old car with no performance modifications.

The battery upgrade is not cheap at $29k, but with the battery being the only part of the Roadster we cannot repair, we owners have few options.

Assuming at some point over the next 10 years the battery would fail I decided to set some money aside and bought

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some Tesla stock. When it reached $29k I would pull the trigger. I was fortunate as the stock did well so I purchased the upgrade.

It took Tesla three weeks to perform the upgrade — as it was the first battery upgrade — actually the first battery anything my service center had done. But with a loaner Performance Model S P85D I was not complaining about the time. But I was happy to get the Roadster back, as there is nothing like a convertible in the summer.

The car now charges to 351 "ideal" miles in range mode — better than advertised. With family 400 miles away, if I can find a destination charger, I can now easily make it with one stop. Fortunately, with more than 2400 "Destination Chargers," that is no longer difficult. We were told the new battery was a little heavier and it was at 100lbs. But a nice surprise was a small performance boost. I took the car back to Bristol and was pleasantly surprised to do the 1/4 mile in 13.0 and a speed of 107.

Only time will tell if the upgrade was truly worth it but the car now runs better than new, and has an eye popping 350 miles of emission free range. So with many other Roadster owners upgrading, we may never know just how long the batteries will last. ;)

Mini hints at its battery-powered future with the Electric Concept

By Scott Collie

Mini has been playing a long game with its electric vehicle plans. The company dipped its toe into the water with plug-in hybrids and electric teasers, but we don't have a clear picture of how a proper battery-electric Mini would look. It isn't a production reality yet, but the Mini Electric Concept provides some pretty strong pointers.

OK, so it still doesn't provide any powertrain clues, but the electric vehicle-specific touches on the Mini Electric Concept give us a few hints as to what the production version will look like. Without a hungry engine to cool, the radiator grille has been covered over for better aerodynamics, and its shape has been traced in lime green as a hint at the green credentials of its powertrain.

The details are still mostly Mini Cooper but small changes – things like the reworked daytime running lights and matte silver paintwork, along with a few choice decals – make for a showier, more interesting design. Although they're unlikely to make production, we're big fans of the Union Jack motif worked into the brake lights.

Those dark 19-inch wheels are another difference between the Electric Concept and regular Minis. Their shape is similar to that of the older Mini JCW GP, but they're a bit smarter, thanks to 3D-printed air deflectors designed to mimic the shape of the vents on the exterior. Speaking of the vents, their louvered shape is also the result of 3D-printing.

The electric Mini Cooper won't be the first electric car to come from Mini – that was the Mini E – but it will be the first series production model. When it launched in 2008, the Mini E was more of a rolling science experiment. Around 600 were built, before being handed over to real-world users for real-world testing. Lots of the information from the trials was subsequently integrated into the design of the BMW i3.

When it lands in 2019, the new Mini EV will be a fully-fledged production car. Here's hoping it still drives like a Mini, albeit a cleaner and quieter one. The concept is on display at the Frankfurt Motor Show.

There's no doubt it's a Mini, but the Electric Concept has some clever show-car touches, too.

Source: BMW

http://newatlas.com/mini-electric-concept-frankfurt/51115/

ReThinkX: Disruption, Implications and Choices Rethinking Transportation 2020-2030

The Disruption of Transportation and the Collapse of the Internal-Combustion Vehicle and Oil Industries

by James Arbib & Tony Seba

The analysis in this report is based on detailed evaluation of data on the market, consumer and regulatory dynamics that work together to drive disruption. We present an economic analysis based on existing technologies that have well-known cost curves and on existing business-model innovations. We extrapolate data where we have credible knowledge that these cost curves will continue in the near future. The disruptions we highlight might happen more quickly due to the acceleration of the cost curves (such as has been happening in lithium-ion batteries, for example) or because of step changes in these technologies (such as has been happening in solid-state batteries and artificial-intelligence processing units). New business-model innovations may also accelerate disruption.

Our findings and their implications are based on following the data and applying our knowledge of finance, economics, technology adoption and human behavior. Our findings show the speed, scale and implications of the disruptions to be expected in a rational context. Scenarios can only be considered in terms of probabilities. We think the scenarios we lay out to be far more probable than others currently forecast. In fact, we consider these disruptions to be inevitable. Ultimately, individual consumers, businesses, investors and policymakers will make the decisions that dictate how these disruptions unfold. We provide insights that anticipate disruption. Hopefully we can all make better decisions to benefit society based on the evidence that we present.

Executive Summary

We are on the cusp of one of the fastest, deepest, most consequential disruptions of transportation in history. By 2030, within 10 years of regulatory approval of autonomous vehicles (AVs), 95% of U.S. passenger miles traveled will be served by on-demand autonomous electric vehicles owned by fleets, not individuals, in a new business model we call "transportas- a-service" (TaaS). The TaaS disruption will have enormous implications across the transportation and oil industries, decimating entire portions of their value chains, causing oil demand and prices to plummet, and destroying trillions of dollars in investor value — but also creating trillions of dollars in new business opportunities, consumer surplus and GDP growth.

The disruption will be driven by economics. Using TaaS, the average American family will save more than $5,600 per year in transportation costs, equivalent to a wage raise of 10%. This will keep an additional $1 trillion per year in Americans' pockets by 2030, potentially generating the largest infusion of consumer spending in history. We have reached this conclusion through exhaustive analysis of data, market, consumer and regulatory dynamics, using well-established cost curves and assuming only existing technology. This report presents overwhelming evidence that mainstream analysis is missing, yet again, the speed, scope and impact of technology disruption. Unlike those analyses, which produce linear and incremental forecasts, our modeling incorporates systems dynamics, including feedback loops, network effects and market forces, that better reflect the reality of fast-paced technology-adoption S-curves. These systems dynamics, unleashed as adoption of TaaS begins, will create a virtuous cycle of decreasing costs and increasing quality of service and convenience, which will in turn drive further adoption along an exponential S-curve. Conversely, individual vehicle ownership, especially of internal combustion engine (ICE) vehicles, will enter a vicious cycle of increasing costs, decreasing convenience and diminishing quality of service.

Summary of Findings

- The approval of autonomous vehicles will unleash a highly competitive market-share grab among existing and new Pre-TaaS (ride-hailing) companies in expectation of the outsized rewards of trillions of dollars of market opportunities and network effects. Pre-TaaS platform providers like Uber, Lyft and Didi are already engaged, and others will join this high-speed race. Winners-take-all dynamics will force them to make

continued on next page

large upfront investments to provide the highest possible level of service, ensuring supply matches demand in each geographic market they enter.

- In this intensely competitive environment, businesses will offer services at a price trending toward cost. As a result, their fleets will quickly transition from human-driven, internal combustion engine (ICE) vehicles to autonomous electric vehicles (A-EV) because of key cost factors, including ten times higher vehicle-utilization rates, 500,000-mile vehicle lifetimes (potentially improving to 1 million miles by 2030), and far lower maintenance, energy, finance and insurance costs.

- As a result, transport-as-a-service (TaaS) will offer vastly lower-cost transport alternatives — four to ten times cheaper per mile than buying a new car and two to four times cheaper than operating an existing vehicle in 2021.

- Other revenue sources from advertising, data monetization, entertainment and product sales will open a road to free transport in a TaaS Pool model, as private and public transportation begin to merge.

- Cost saving will also be the key factor in driving consumers to adopt TaaS.

- Adoption will start in cities and radiate outward to rural areas. Nonadopters will be largely restricted to the most rural areas, where cost and wait times are likely to be higher.

- High vehicle utilization (each car will be used at least 10 times more than individually owned cars) will mean that far fewer cars will be needed in the U.S. vehicle fleet, and therefore there will be no supply constraint to the speed and extent of TaaS adoption that we forecast.

Taken together, this analysis forecasts a very fast and extensive disruption: TaaS will provide 95% of the passenger miles traveled within 10 years of the widespread regulatory approval of AVs. By 2030, individually owned ICE vehicles will still represent 40% of the vehicles in the U.S. vehicle fleet, but they will provide just 5% of passenger miles.

Behavioral issues such as love of driving, fear of new technology or habit are generally believed to pose initial barriers to consumer uptake. However, Pre-TaaS companies such as Uber, Lyft and Didi have invested billions of dollars developing technologies and services to overcome these issues. In 2016, Pre-TaaS companies drove 500,000 passengers per day in New York City alone.That was triple the number of passengers driven the previous year. The combination of TaaS's dramatically lower costs compared with car ownership and exposure to successful peer experience will drive more widespread usage of the service. Adopting TaaS requires no investment or lock-in. Consumers can try it with ease and increase usage as their comfort level increases. Even in suburban and rural areas, where wait times and cost might be slightly higher, adoption is likely to be more extensive than generally forecast because of the greater impact of cost savings on lower incomes. As with any technology disruption, adoption will grow along an exponential S-curve.

Tony Seba's whitepaper is available here:
https://drive.google.com/file/d/0B_ag0VmLvQBnY0IzOVlsWHZlSUE/view?usp=sharing

Tony Seba: Clean Disruption – Energy & Transportation
https://www.youtube.com/watch?v=2b3ttqYDwF0

Stanford University futurist Tony Seba spent the last decades studying technological disruptions. He argues that the Electric Vehicle, battery storage, and solar power, along with autonomous vehicles, are a perfect example of a 10x exponential process which will wipe fossil fuels off the market in about a decade.

Cold Metal Transfer Has a Future Joining Steel to Aluminum

Tests showed good results for tensile strength, corrosion resistance, and limiting fatigue strength when welding steel to aluminum with a modified GMAW process

By Jergen Bruckner

Joining aluminum with steel can improve the characteristics of components used in industrial applications. Especially in the automotive industry, joining of these two metals minimizes energy consumption through a reduction in weight.

Until recently, mechanical joining of these two metals — clinching, screwing, etc. — was mostly used to attach or band them. Thermal joining has been strongly restricted due to the formation of the intermetallic phase. These phases are very brittle and, therefore, deteriorate the mechanical properties of such joints. Another attempt to join steel with aluminum is the use of laser systems combined with pressing devices (Ref. 1). This article describes a modified gas metal arc welding system called cold metal transfer (CMT) being used to join zinc-coated steel with Type 6000 (AlMgSi) aluminum alloys and, with some restrictions, Type 5000 (AlMg) aluminum alloys.

Reducing weight and, therefore, reducing energy is an important task that can be fulfilled by the use of materials with different characteristics. All the benefits of the two materials can be obtained such as weight reduction and high thermal and electrical conductivity. Joining of steel with aluminum can lead to economic advantages. Aluminum is already used in many fields because of its good corrosion resistance and good weldability. The low specific weight is also a very important property of aluminum, as it helps to decrease weight and fuel consumption in the aviation and automotive industries. Many cars already have an aluminum spaceframe. When joining aluminum with steel, the specific advantages of each of these materials can be utilized. Until now these materials were mostly joined by mechanical processes, such as clinching or riveting. Thermal joining processes such as friction welding (Ref. 2), spot welding, or explosive welding (Ref. 3) can only be used for very specific joint geometries and with many restrictions. Laser beam welding (Ref. 4) or laser press-welding (Ref. 1) requires much effort.

To read the rest of this technical article follow the link here:
https://app.aws.org/wj/2005/06/038/

What is Cold Transfer?

In the context of welding, "cold" is a relative term. In the cold metal transfer process (CMT), the workpieces to be joined and, especially, their weld zones remain considerably "colder" than they would with conventional gas metal arc welding.

Developed by Fronius International GmbH, Wels, Austria, the CMT process is based on short circuiting transfer, or rather, on a deliberate, systematic discontinuing of the arc. The result is a sort of alternating "hot-cold-hot-cold" sequence (see figure). This "hot-cold" process greatly reduces the arc pressure. In a normal short circuiting transfer arc, the electrode is deformed while being dipped into the weld pool, and melts abruptly at high transfer arc current. In contrast to this, the CMT process is characterized by a wide process window and by the resulting high stability. The process is designed for automated and robot-assisted applications.

The principal innovation is that the motions of the wire have been integrated into the welding process and into the overall control of the process. Every time the short circuit occurs, the digital process control both interrupts the power supply and controls the retraction of the wire. This forward and back motion takes place at a frequency of up to 70 times per second. The wire retraction motion assists droplet detachment during the short circuit.

The conversion of electrical energy into heat is both a defining feature and a sometimes critical side effect of arc welding. By ensuring minimal current metal transfer, the CMT process greatly reduces the amount of heat generated. The controlled discontinuation of the short circuit leads to a low short-circuit current. Owing to the interruption in the power supply, the arc only inputs heat into the materials to be joined for a very short time during the arcing period.

The reduced thermal input offers advantages such as low distortion and higher precision. Benefits include higher-quality welded joints, freedom from spatter, ability to weld light-gauge sheet as thin as 0.3 mm, and the ability to join both galvanized sheets and steel to aluminum.

Great Scott! There's a new DeLorean flying car in the works

By Brett Williams

The DeLorean brand is synonymous with the flying car/time machine of the Back to the Future film series — but in our actual future, the DeLorean name could soon be even more recognizable because of IRL personal flying machines.

The DeLorean name could soon be back in the air. IMAGE: DELOREAN AEROSPACE

DeLorean Aerospace, a company started by Paul DeLorean (nephew of DeLorean Motors mastermind John) is creating a pilotless vertical takeoff and landing (VTOL) vehicle bearing the family name. VTOL designs aren't meant for the road, but we still often call the vehicles "flying cars," evoking images of the classic DMC-12 rising from the road into the air in the movies.

The younger DeLorean discussed his company's plans with *Wired*, outlining his vision to bring personal aircrafts to the masses. The two-seater VTOL, the DeLorean DR-7, doesn't look or sound anything like the DMC-12 of old, but its sleek design and next-gen specs could put the new craft in a class of its own if it eventually takes to the skies.

The 20 foot long, 18.5 foot wide DR-7 will have four wings, with a design the company says is built like an F1 race car. The all-electric craft will depend on what DeLorean is calling an "industry-first" centerline twin vectoring propulsion system for lift-off and flight, with two large fans positioned at the front and rear of the craft that can adjust their alignment.

The company is working on two scale models of the design now, which are much smaller than the final version of the craft. Paul DeLorean told *Wired* the next step is building a full-size, piloted prototype with a range of up to 120 miles, which will be flown at high altitudes to increase efficiency.

The company is aiming to create the prototype within a year from now, which will then be tested extensively with remote-controlled flights before a human pilot steps into the cockpit. There are no other details about an eventual commercial release for the DR-7, with no price estimates or target dates provided.

DeLorean has instant name recognition, but it's far from the first company working on an autonomous VTOL design. Airbus' Vahana project, the Ehang 184, and Uber's expansive flying car project are just a few of the efforts underway. The city of Dubai is even starting a pilot program for for its autonomous aerial taxi service during the fourth quarter of this year with Volocopter, a German aviation company, providing the crafts.

These "flying cars" might be coming a few years later than the ultra-futuristic vision of 2015 in *Back to the Future Part II* — but if DeLorean and its peers can fulfill their potential, it could be worth the wait.

Read the rest of this article, see another photo and watch the video below.

An all-electric "flying car" just made its first flight and it's as cool as it sounds.

http://mashable.com/2017/08/14/delorean-flying-car-vtol/#Is8poQInWiqc

Keep Up on all Auto Shows & EV Related Conferences

US and International Events

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

ELECTRIC VEHICLES INTERNATIONAL CONFERENCE AND SHOW
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

SAE 2018 HYBRID & ELECTRIC VEHICLE TECHNOLOGIES SYMPOSIUM
SAN DIEGO–MISSION VALLEY, CA
2/20/2018 - 2/22/2018

http://www.batteriesevent.com

http://www.sae.org/events/hybridev/

11th Annual International Conference
Podcar City & Advanced Transit – Smart City, Smart Transit, Smart Energy

Read the latest news about what's happening in podcar development and find details about the conference by downloading our first conference newsletter:
http://podcarcity.org/wp-content/uploads/2017/08/PodcarCity-Las-Vegas-Newsletter-1-August-2017.pdf

Closing Plenary Speaker: ***Neil Degrasse Tyson on November 10***

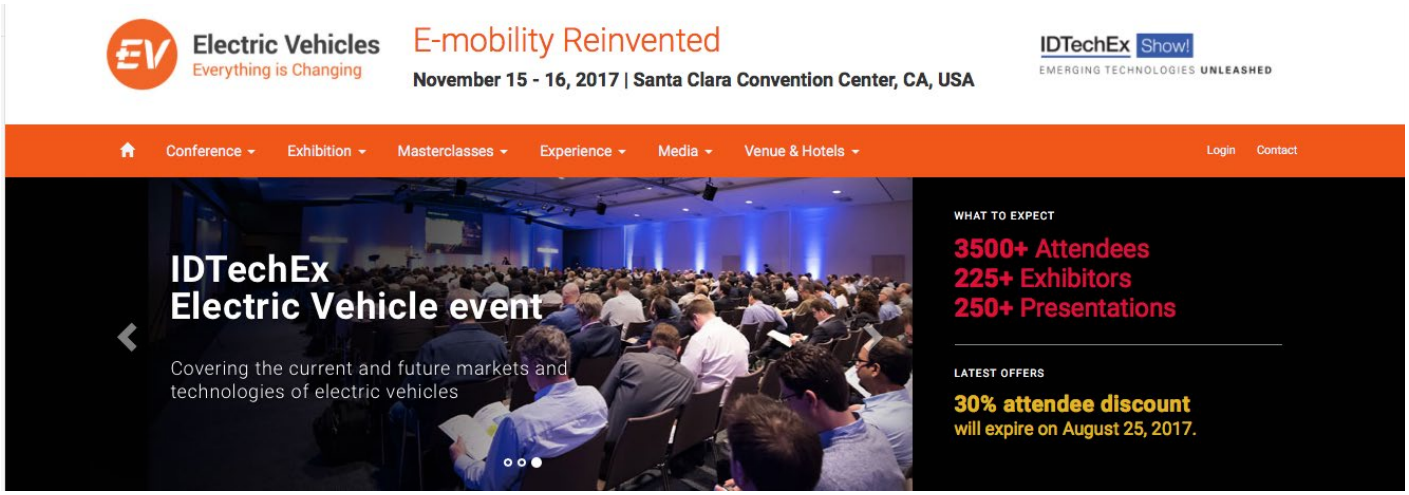
https://www.greenbuildexpo.com/en/home.html

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

PG&E is hosting its 3rdAnnual 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.sfautoshow.com/special-attractions/plug-in-electric-vehicle-test-drives-presented-by-experience-electric-in-partnership-with-pge/



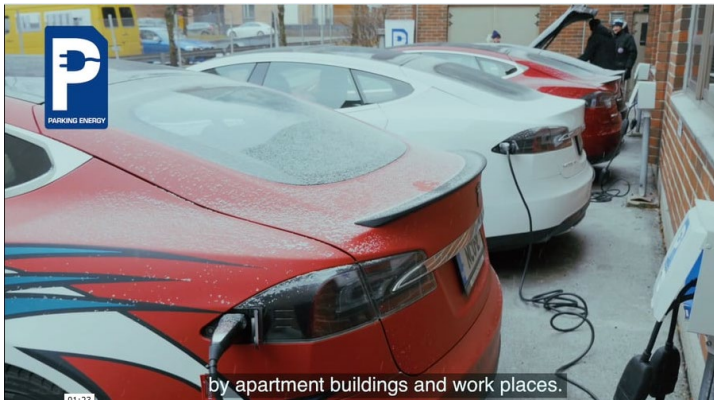
http://www.idtechex.com/electric-vehicles-usa/show/en/

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.

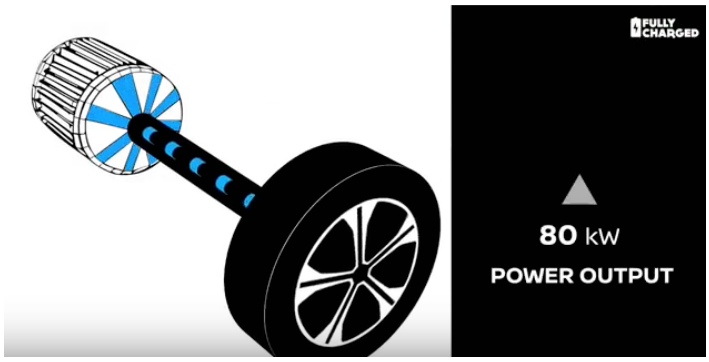
Videos & Articles of Interest

Elon, Finland is Ready!



Finland has a breakthrough innovation for one Million EV chargers.
https://vimeo.com/225762430

New LEAF on Fully Charged



Robert travels to Japan to see the launch there, while we had one in Las Vegas, but 2000 journalists attended this. Claimed 150-160 miles as a realistic range this vehicle will define the economy box, coming in well under the Bolt EV and Model 3. It features "Pro-Pilot" which keeps a safe distance from the car in front of you, and many other new to Nissan features. It's a large step forward for Nisssan. *https://www.youtube.com/watch?v=H9Megx8hBBo*

Manufacturing Process of Model S in TESLA Factory

A new video of the manufacturing process of the Tesla cars

More details of how steel and aluminum are joined to become the lightweight body of a Model S are revealed in this video of the robots in action in Fremont. This covers more assembly processes than have been seen in the past and is worth the 18 minutes of viewing to see how they manage the volume of vehicles produced today.
https://www.youtube.com/watch?v=AVCCroN7vS0&t=9s

New Electric Superbike Lightning LS2??

The electric Lightning LS-218 remains to this day the fastest street legal production motorcycle on the planet. But not for long. Tired of hearing how the track-only Kawasaki H2R managed to beat it by 2 mph at Bonneville, Lightning has made another bike that's much, much faster.
http://newatlas.com/lightning-ls218r-el-mirage-land-speed/50766/

Videos of Mercedes Benz SL 230 conversion

Introducing EV4U's latest video series as he converts this 1964 Mercedes 230SL from gas to electric. Currently powered by a small block Ford, when converted in will be powered by an HPEVS AC-35x2 3-Phase AC Induction Motor. Stay tuned for parts 3 and possible more as disassembly and conversion begins. Visit their website at: *http://www.ev4unow.com*

Part l: Introducing our latest video series vehicle. Follow as we convert this 1964 Mercedes 230SL from gas to electric.Currently powered by a small block Ford, when converted in will be powered by an HPEVS
https://www.youtube.com/watch?v=EJYf4IIjYOY

Part 2: 1964 Mercedes 230SL Electric Conversion Update. Update on motor mount, battery racks, and electric power steering.
https://www.youtube.com/watch?v=HVJD-25DxiA

Save the Date...

iTEC2018
COMPONENTS, SYSTEMS, AND POWER ELECTRONICS-
FROM TECHNOLOGY TO BUSINESS AND PUBLIC POLICY
JUNE 13 TO 15, 2018

IEEE | pels IEEE POWER ELECTRONICS SOCIETY | IAS IEEE INDUSTRY APPLICATIONS SOCIETY | IEEE PES Power & Energy Society

Nissan Sport Cars
Nissan Leaf Nismo RC Concept


BMW I8
Plug-in hybrid electric vehicle

Save The Date! ITEC 2018 Will Be Held At The Long Beach Convention Center In Long Beach, California.
The Conference Will Be Held From June 13-15th, 2018.

http://itec-conf.com/

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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.

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Single-lens, light field 4D camera to give robots and autonomous cars better vision

Two 138-degree light field panoramas (top and center) and a depth estimate of the second panorama (bottom)(Credit: Stanford Computational Imaging Lab/ Photonic Systems Integration Laboratory at UC San Diego)

A robot is only as good as its sensors, so researchers at Stanford University and UC San Diego have developed a new "4D" camera that greatly enhances robotic vision. Billed as the first-ever single-lens, wide field of view, light field camera, the new system uses a spherical lens and advanced algorithms to capture information across a 138-degree field of view to allow robots to not only navigate, but also better understand their environment.

Ever since modern robots started to emerge in the 1970s, the problem of how to give such machines vision has confronted engineers. Over the years, various solution have been tried, like stereoscopic cameras, laser imaging, color analysis, pixel counting, and deep learning. Now the Stanford/UC San Diego team is turning to a new type of camera using spherical lenses developed for DARPA's Soldier CENtric Imaging with Computational Cameras (SCENICC) program.

These lenses were produced to provide a field of view encompassing nearly a third of the circle around the camera to create 360-degree images at a resolution of 125 megapixels per video frame. In the original version, the video camera used fiber optic bundles to convert the spherical images into flat focal planes. It worked, but it was also expensive.

The new camera dispenses with the fiber bundles in favor of a combination of lenslets developed by UC San Diego and digital signal processing and light field photography technology from Stanford, which is what the team say gives the camera a "fourth dimension."

This light field technology takes the two-axis direction of the light entering the lens and mixes it with the 2D image. As is the case with consumer light field cameras from the likes of Lytro, this means that the image now contains much more information about the light position and direction and allows images to be refocused after they've been captured. In addition, it allows a robot to see through things that could obscure their vision, such as rain. The camera is also able to improve close-up images and better ascertain object distances and surface textures..

"It could enable various types of artificially intelligent technology to understand how far away objects are, whether they're moving and what they're made of," says Gordon Wetzstein, electrical engineering professor at Stanford. "This system could be helpful in any situation where you have limited space and you want the computer to understand the entire world around it."

The camera is presently a proof-of-concept device, but the researchers believe that when the technology is mature, it will help robots to navigate in small areas, land drones, aid self-driving cars, and enable augmented virtual reality systems to produce seamless, integrated rendering. The next step will be to install a more compact prototype in an actual robot.

The research was presented in July at the 2017 Conference on Computer Vision and Pattern Recognition (CVPR).

Source: UC San Diego

http://newatlas.com/4d-camera-robot-vision/50961/

International

CANADA

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Web Site: www.evco.ca
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VANCOUVER EVA
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TaiwanElectricVehiclesAssociation
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Web Site: http://www.saceva.org
Contact: Guy Hall, 916-717-9158

SAN JOSE EAA
Web site: rotordesign.com/sjeaa
Contact: George Stuckert
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Contact: Tom Sidle, 408-446-1538

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Contact: Karen Jones

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Web Site: michiganEAA.org
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MINNESOTA EAA
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MISSISSIPPI EAA (MSEAA)
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601-981-6925

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GATEWAY EV (GEVA)
Web Site: gatewayev.org
Contact: Wayne Garver, 314-359-9626

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NEW MEXICO EVA (NNMEV)
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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)
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EAA OF NORTHWEST OHIO
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GREATER DAYTON EV ASSOCIATION (GDEVA)
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OREGON

OREGON EVA
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OREGON SOHEVA
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PENNSYLVANIA

THREE RIVERS EVA
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TENNESSEE

CHATTANOOGA EVA
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KNOXVILLE EVA
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TEXAS

ALAMO CITY EAA
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AUSTIN AAEAA
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HOUSTON EAA
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NATIONAL ELECTRIC DRAG RACING ASSOCIATION
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NORTH TEXAS EAA
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VIRGINIA

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RENEWABLE ENERGY & EVA, DIY PROJECT CLUB
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WASHINGTON

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NORTH SOUND EVA
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SEATTLE EVA
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TACOMA EVA (TACEVA)
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WENATCHEE EVA (WEVA)
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WASHINGTON D.C.

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WEST VIRGINIA

WEST VIRGINIA ELECTRIC AUTO ASSOCIATION (WVEA)
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Volkswagen confirms the Microbus is coming back as an EV

By Marc Carter

For years Volkswagen has teased us with the idea of bringing back the much loved, iconic Volkswagen Microbus. The automaker unveiled the I.D. Buzz concept earlier this year, which combined the styling of a Microbus with a fully electric powertrain. After several rumors and reports, Volkswagen has confirmed that the Microbus will officially return in 2022.

Volkswagen made the announcement at the Pebble Beach Concours D'Elegance, in Monterey, California.

"After the presentations at the global motor shows in Detroit and Geneva, we received a large number of letters and emails from customers who said, 'please build this car'," Volkswagen CEO Dr Herbert Diess said. The Board of Management chose Pebble Beach as the location to make its announcement because, as Diess explained: "The Microbus has long been part of the California lifestyle. Now we're bringing it back by reinventing it as an electric vehicle."

Although we have to wait five years to get the new Microbus, Volkswagen has confirmed that it will feature a fully electric powertrain. Since the batteries will be mounted in the floor and the compact size of its electric drive components, the new Microbus will have a spacious interior, despite its compact exterior.

"The vehicle looks like a compact commercial van on the outside, even though it offers the generous interior space of a large SUV."

Volkswagen has also announced that the production version of the I.D. Buzz concept will be offered in a cargo version. The cargo version will be ideal for delivering packages and services in the inner city. The new Microbus will also be offered with Level 3 autonomous driving capability.

Read the source article and see the slide show at:
http://inhabitat.com/volkswagen-confirms-when-the-microbus-is-coming-back-as-an-ev/

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