EVs Early Fall 2022

By John Benson

September 2022

1. Introduction

There is a huge amount of new information coming out on the title-vehicles. Thus, I felt it was best to start and schedule this post before this trove requires a multivolume post.

The last post similar to this one was in late August, and thus was about one month prior to this one. It is described and linked below.

EV Late Summer 2022: *This post is a mixed bag, consisting of new information on various EV manufacturers covered previously, information on federal government actions driving EV volume, new information on EV storage and chargers, a bit of new information on Tesla, and a raft of new reports on new and future EVs.*

https://energycentral.com/c/ec/ev-late-summer-2022

2. IRA Clarifications

The EV Tax Credits parts of this new law are really complicated. Also keep in mind that there are two major groups of actors (the U.S. Federal Government and the EV Manufacturers), both of which will make adjustments as time goes on. I'm reasonably sure that I will be making additional clarifications in the future.

2.1. Which EV and Purchase Price

Some existing EVs that are on the market and available qualify for existing tax credits, and if you are planning to purchase one by the end of this year (good luck), look at the manufacturer's web site and they will have explanations of what tax credits and other incentives apply. So, herein we will look at the IRA Credits starting next year.

…In order to qualify for the $7,500 tax credit, EVs must be assembled in North America… Starting January 1st, the 200,000 vehicle cap is gone. Poof. That means Tesla, GM, and Toyota will once again be eligible for the tax credit...[1]

There will also be limits on which EVs qualify for the credit based on their manufacturer suggested retail price, or MSRP: $55,000 for new cars and $80,000 for pickup trucks, SUVs, and vans. But keep in mind, various options and high-tech features cost extra money, and the final price is what counts for the credit…

As I've pointed out recently, there are quite a few EVs under the above price caps. Even the Tesla Model 3 and Model Y are under it, but just barely, so buyers of these models will need to limit options, expensive variations and add-ons.

Under the new rules, EVs with battery components sourced from "foreign entities of concern," like China, where the vast majority of battery parts and minerals come from, will no longer qualify for the full tax credit if they are put in service after December 31st,

[1] By Andrew J. Hawkins, The Verge, "Yes, The New Electric Vehicle Tax Credits Are Really Confusing, But We Can Help," Aug 17, 2022, https://www.theverge.com/23310457/inflation-reduction-act-ev-tax-credit-act-explainer-how-to

2023. If the battery only contains minerals from these countries, then it will become ineligible for the credit starting December 31st, 2024.

The bill would require batteries to have at least 40 percent of materials sourced from North America or a US trading partner by 2024 in order to be eligible for the tax break. By 2029, battery components would have to be 100 percent made in North America. (Weirdly, this restriction doesn't apply to used-vehicles.)

2.2. Battery Limits

Tesla seems well positioned to meet at least one half of those requirements, having invested in development and production in California and Texas to produce its most recent battery, the 4680-type, for the made-in-Texas Model Y…[2]

Model 3 and Model Y vehicles made in California appear to use 2170-type NCA batteries made at the Gigafactory 1 in Nevada.

The critical minerals component of the new law is a bit more complicated. Tesla did release a list of nine mining companies it does business with worldwide, and just one of those would qualify under the new rules (Vale, in Canada). Many of the sources are mining operators in China, and Tesla signed two new deals with Chinese mining companies in August, 2022, just before the IRA was signed into law.

However, Tesla also appears to have secured its own rights to mine lithium in Nevada in 2020, after a deal to buy a lithium mining company fell through. Tesla also said in January, 2022, that it will buy 75,000 tons of nickel concentrate from Talon Metals Corp's proposed Tamarack mine project in Minnesota, starting in 2026.

The new rules also allow for critical minerals to come from recycled sources. This is great news for Tesla, which already boasts capacity to reuse 92% of the raw materials in its battery packs. Tesla factories have an in-house, closed-loop recycling system that ensures 100% of Tesla batteries received are recycled and up to 92% of their raw materials are used.

Also see section 3 for information on battery makers opening new plants in the U.S. and their EV Manufacturer customers. Also see subsections 4.3 and 4.4 in the last EV post, described and linked in the Introduction.

2.3. Which Tax Credit?

The full tax credit for a new EV is $7,500.

Made in USA manufacturing rules. From January 1, 2024, new EVs not only have to be assembled in the U.S. to qualify at all, they also have to meet criteria for battery components and critical minerals to get the full tax credit. If an EV only meets one of these requirements, it nets you half the tax credit ($3,750).

For the first time, used EVs are eligible for the federal EV tax credit. You could net up to $4,000 or 30% of the purchase price of a used EV, but there are some caveats.[3]

[2] Leigh Matthews, LeafScore, "Which Tesla Models Qualify for the EV Tax Credit in 2023?" Aug 29, 2022, https://www.leafscore.com/auto/which-tesla-models-qualify-for-the-ev-tax-credit/

[3] Leigh Matthews, LeafScore, "15 Used EVs that Qualify for the Electric Vehicle Tax Credit," Aug 29, 2022, https://www.leafscore.com/auto/15-used-evs-that-qualify-for-the-electric-vehicle-tax-credit/

Make sure you choose an EV model that meets the following criteria:

- *Costs less than $25,000*
- *Is more than two years old*
- *Is being sold by the original owner (i.e., the tax credit is only available on the first sale of a used vehicle).*

Note, too, that there are eligibility criteria for the buyer as well as the EV.

- *For anyone filing singly, your income must be $75,000 or less in the year of purchase or the preceding year*
- *For heads of household, the income limit is $112,500*
- *For joint filers or a surviving spouse, the income limit is $150,000.*

3. Battery Moves

This subject was covered in the last post (subsections 4.3 and 4.4), but with the IRA, additional EV battery manufacturers are making additional moves to the U.S.

3.1. Honda / LG Energy Solution

Honda Motor Co., which doesn't sell any autos in the U.S. powered solely by batteries, is accelerating plans for that burgeoning market segment with a $4.4 billion U.S. factory it will jointly operate with LG Energy Solution. The location of the factory would ensure its future electric vehicles can qualify for a revised federal tax credit.[4]

Honda is forming a joint venture with LG for a facility that will produce 40 gigawatt-hours of lithium-ion batteries annually when it opens in 2025, with construction to start next year.

3.2. Toyota Battery Expansion

Toyota announced an additional investment of $2.5 billion in its newest North American facility, Toyota Battery Manufacturing North Carolina (TBMNC). This investment adds capacity to support battery electric vehicle (BEV) battery production and adds 350 jobs, bringing the total employment to approximately 2,100. Scheduled to begin production in 2025, the facility will produce batteries for hybrid electric vehicles (HEV) and BEVs.[5]

3.3. Panasonic Doubles Down

The new $4 billion EV battery plant in Kansas might not be the only one that Panasonic will build in the near future in the US.[6]

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[4] Alan Ohnsman, Forbes, "Honda Is The Latest Carmaker To Plan A Big U.S. Battery Plant," Aug 29, 2022, https://www.forbes.com/sites/alanohnsman/2022/08/29/honda-is-the-latest-carmaker-to-plan-a-big-us-battery-plant-just-in-time-for-new-ev-tax-credit/?sh=349d77c53ea2

[5] Emily Camille Wilemon-Holland, Toyota Newsroom, "Toyota Announces $2.5 Billion Expansion of North Carolina Plant," Aug 31, 2022, https://pressroom.toyota.com/toyota-announces-2-5-billion-expansion-of-north-carolina-plant-with-350-additional-jobs-and-bev-battery-capacity/

[6] Mark Kane, Inside EVs via MSN, "Panasonic Plans Additional $4 Billion Battery Factory In The US," Aug 26, 2022, https://www.msn.com/en-ae/news/other/report-panasonic-plans-additional-dollar4-billion-battery-factory-in-the-us/ar-AA118zil

According to the Wall Street Journal (via Reuters and Bloomberg), the Japanese company is in talks to build an additional battery plant in the country, at a similar cost of $4 billion…

Potentially, the new plant might be built in Oklahoma or Kansas, which were considered also for the first investment. If the first plant will be built in Kansas, then maybe this time Oklahoma will manage to attract Panasonic…

A lot depends on the purpose of the investment - who is the customer, where are the EV plants and what is the battery type (form factor and chemistry).

So far, Panasonic's biggest battery customer was Tesla and the second largest was Toyota we believe, but until it's confirmed, we can't really exclude any other automaker.

What is important is that two $4 billion battery plants (on top of the joint project with Tesla at the Giga Nevada plant) would significantly improve Panasonic's position...

4. Heavies

While we are awaiting the first actual production Tesla Semi (see quote from Elon below via an excerpt from the last EV post), the only content I've seen is that more and more production-ready prototypes are being seen on the road.

"Tesla 500 mile range Semi Truck starts shipping this year, Cybertruck next year," the mercurial billionaire tweeted, providing no additional details about specific timing or price.

4.1. Bosch to Make Fuel Cells for Trucks in South Carolina

Bosch, the German conglomerate that makes everything from dishwashers to industrial software and security systems, is investing $200 million in its auto parts factory in South Carolina to produce fuel cell stacks to supply an emerging market for zero-emission trucks powered by hydrogen.[7]

The company expects to add 350 workers to staff the new assembly line and cleanroom in Anderson, South Carolina, Peter Tadros, Bosch's North American head of powertrain solutions, tells Forbes. It will be Bosch's first U.S. fuel cell production site when it's up and running in 2026. Electric truck-maker Nikola, which Bosch has invested in, will be a key customer for the power devices but it will also sell them to other companies in North America, he said.

"Initial interest in this technology is for the large commercial vehicles," Tadros said. Nikola will get fuel cells for its trucks from Bosch's operation in Germany when it starts producing hydrogen trucks next year, but "as a manufacturing partner here with Nikola, Anderson will service them for our regional strategy of local for local," he said…

4.2. More Nikola News

Nikola Corporation has launched the European version of its heavy-duty battery-electric Class 8 truck, the Tre, in Europe today (9/19) in collaboration with its transport partner

[7] Alan Ohnsman, Forbes, "Bosch Is Investing $200 Million to Make Fuel Cells for Hydrogen Trucks in South Carolina," Aug 31, 2022, https://www.forbes.com/sites/alanohnsman/2022/08/30/bosch-to-make-fuel-cells-for-hydrogen-trucks-in-south-carolina/

IVECO. Nikola will officially accept orders for the fully-electric, zero-emissions Tre semi-truck starting today.[8]

Nikola and IVECO announced today at the IAA Transportation 2022 event in Hanover, Germany, that the European 4×2 Arctic version of the Tre BEV is officially available for orders. It features nine batteries for total energy storage of 738 kWh, giving the vehicle a range of 530 kilometers, or roughly 329 miles. The truck also features 480 kW of continuous power to the FPT Industrial e-Axle, Nikola said, giving the vehicle enough torque and power to handle the most grueling hub-to-hub deliveries in a regional setting.

During the company's Q2 Earnings, Nikola said in its Shareholder Deck that it launched a joint venture with IVECO that included engineering and production development...

The Tre is in no way a new vehicle to the global automotive market as Nikola started production and deliveries of the semi-truck in the United States earlier this year. In Q2, Nikola built 50 Tre BEVs at its factory in Coolidge, Arizona, delivering 48 of those units.

4.3. New Platform for Electric Medium-Duty Trucks

It's not a sports car, pickup or SUV, but one of the products to be unveiled at the upcoming North American International Detroit Auto Show may very well be the underpinnings for future electric trucks delivering packages to your front door or supporting the electric recreational vehicle transporting you to campsites around the country.[9]

Los Angeles-based startup Harbinger is taking the wraps off a new chassis for battery-electric Class 4 through Class 7 medium-duty vehicles which include delivery trucks and RVs. The chassis is designed to save money, reduce driver fatigue and injuries and improve performance and safety (see picture on the next page).

***Update:** Sept. 13, 2022 Harbinger Motors Inc. and Kalyani Powertrain Limited (KPTL), a wholly owned subsidiary of Bharat Forge Ltd. announced Tuesday the formation of a joint venture.*

The new JV, named ElectroForge, will focus on developing electric drivetrain solutions for the commercial vehicle market, the companies said in a statement.

Author's comment: There are a huge number of firms developing products for *Class 4 through Class 7 medium-duty vehicles*. It appears that this new JV is well positioned to address these markets, both in the U.S., in Asia (India), and possibly other UK markets.

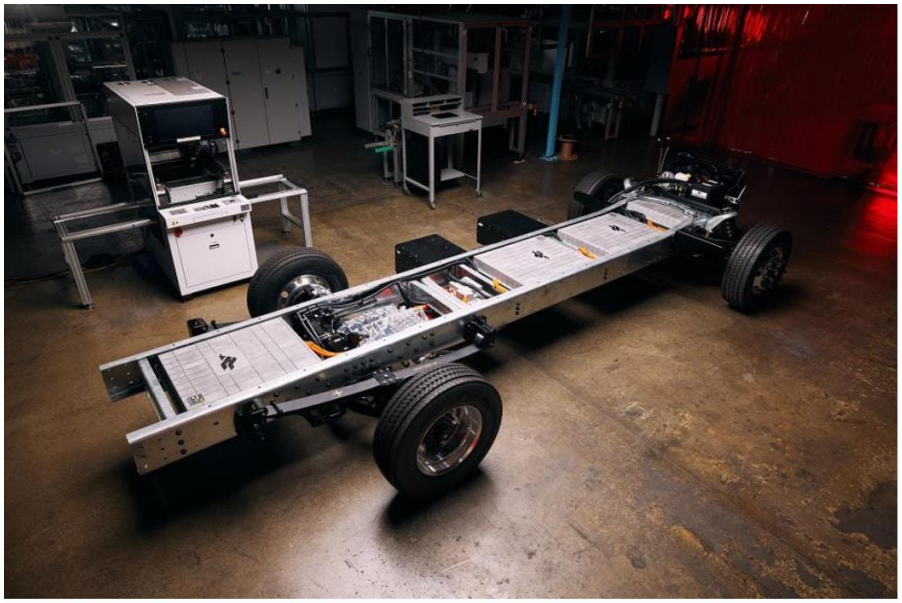
Harbinger appears to have developed the pictured chassis (next page). Their website and the website of ElectroForge are linked below.

https://harbingermotors.com/

https://electroforge.com/

[8] Joey Klender, Teslarati, "Nikola launches orders for the battery-electric Tre in Europe," Sep 19, 2022, https://www.teslarati.com/nikola-tre-bev-europe-orders-launched/

[9] Ed Garsten, Forbes, "Harbinger To Unveil Innovative Platform For Electric Medium-Duty Trucks At Detroit Auto Show, Sep 8, 2022, https://www.forbes.com/sites/edgarsten/2022/09/08/harbinger-to-unveil-innovative-platform-for-electric-medium-duty-trucks-at-detroit-auto-show/



A first-of-its-kind vertically-integrated EV platform introducing improvements in safety, driver ... [+] JACK SCHROEDER

Bharat Forge is an Indian Corporation that is *"…part of the Kalyani Group - A USD 3 billion conglomerate with 10,000 global work force, we have the largest repository of metallurgical know-how, design & engineering expertise, and manufacturing prowess in the region, which has established us as one the leading forging manufacturers in India. We are backed by more than 50 years of experience…*

Bharat Forge has experience in manufacturing many of the components of this chassis. Links to the Bharat Forge and Kalyani Group sites are below.

https://www.bharatforge.com/

http://kalyanigroup.com/

5. Charging EVs

How much does charging impact the grid, and how much does it cost to charge an EV? Some answers are below.

5.1. An Old (and Bogus) Argument

I have known for some time that EVs are the ideal load for grids. Most of these charge at night, when other loads on the grid are very low, at least in my home state (California).

In fact my electric utility (PG&E) and, I assume, other investor-owned utilities in our state offer special rates for EVs. These rates are three-tiered time-of use rate, with a very-low off-peak rate (from 11:00 PM until 7:00 AM and these rates are very low "for California"). For more information, see the rate schedule linked below.

https://www.pge.com/tariffs/assets/pdf/tariffbook/ELEC_SCHEDS_EV%20(Sch).pdf

Thus any current arguments that "EVs charging will cause blackouts" is purely bogus, and I'm not the only one that has this opinion:

The U.S. west is suffering a major heat wave which may result in rolling blackouts and reminders not to charge electric cars in the afternoon. With California also ordering that all cars by 2035 be electric, this has resurfaced a common meme often spoken by EV opponents, the idea that the power grid can't possibly handle this.[10]

At the same time it's true that we plan a highly renewable grid, but the key renewables, solar and wind, are intermittent, dependent on the time of day and the weather.

It turns out these two problems can actually somewhat cancel one another out, and combined with some other technologies there's not going to be a problem at all.

It's true that for all cars to go electric, we need to generate more electrical energy. Grid capacity can be measured both in total annual energy production, and also by maximum power, and these are different things. Energy is a commodity like gallons of gasoline or kWh. Power is the instantaneous delivery of energy...

On the grid, power demand and supply fluctuate during the day. They are low at night, but on warm days, the demand keeps climbing as the day wears on and it gets hotter, causing the need for more air conditioning. Air conditioning is the primary driver of peak demand on the grid. The demand tends to peak around 6pm but is still strong until about 9pm and then it declines into the night. In cooler seasons there is only a small peak when it's hottest… At any given time the grid has a power capacity. That fluctuates during the day due to the renewables, but the key goal is to make sure that from 4pm to 9pm, when demand is highest, we have enough supply capacity to meet it. So we spend money to make power plants and transmission lines to provide that supply….

Cars can charge any time of day… Most plug in at night, when there is the most excess power capacity on the grid, and power is the cheapest. In the future, more will plug in at work, but there will be excess capacity until about 2pm for those cars…

5.2. How Much Does it Cost to Charge an EV

Anyone that has a smattering of knowledge about science can guess that a heavier EV is less efficient than a lighter EV, and the same applies to an EV with "barn-door" aerodynamics (I'm talking about you, F-150 Lighting) vs. less aerodynamic drag. This is a "laws-of physics" issue, so there are few work-arounds (see next subsection). However until Forbes published the article referenced below, I didn't how to quantify this.

While they're cheaper to run than their conventionally powered counterparts, some electric vehicles will save their owners more money bypassing the fuel pumps than others. The most frugal in this regard can cost owners an average of $500 a year to drive for 15,000 miles, based on their estimated energy consumption under ideal circumstances, while it can be twice as much with the least-efficient models.[11]

As with any vehicle type, the larger and heavier a vehicle the more energy it requires to get and stay moving, and you may have noticed that many of today's EVs, and

[10] Brad Templeton, Forbes, "EVs Won't Overload The Power Grid, In Fact EVs (And Ice) Are Its Salvation," Sep 12, 2022, https://www.forbes.com/sites/bradtempleton/2022/09/12/evs-wont-overload-the-power-grid-in-fact-evs-and-ice-are-its-salvation/?sh=62b65e9049c5

[11] Jim Gorzelany, Forbes, "By The Numbers: What It Costs To Run And Charge An Electric Car," Sep 15, 2022, https://www.forbes.com/sites/jimgorzelany/2022/09/15/by-the-numbers-what-it-costs-to-run-and-charge-an-electric-car/

especially the battery powered pickup trucks coming down the road, are fairly sizeable rides that are further weighed down by what are hefty battery packs.

Further exacerbating the matter is the fact that EVs are less efficient running at highway speeds than they are around town, and consume battery power faster in extreme temperatures; this can be anywhere from 25 to 40 percent fewer miles on a charge in cold weather with the heater running. Likewise an electric truck or SUV will go through kilowatts at a (much) *quicker rate when towing a boat or trailer. And the state-of-charge gauge reading drops quickly whenever drivers push the accelerator pedal to the floor to exploit an EV's instant torque for rocket-like launches.*

Here's a list of the 10 most efficient electric cars according to their equivalent "MPGe" ratings and their annual cost to drive 15,000 miles in combined city and highway use, according to the Environmental Protection Agency, based on electricity at a national average of $0.13 per kilowatt hour.

- *Tesla Model 3: 132 MPGe ($500 annual fuel cost)*
- *Lucid Air: 131 MPGe ($500)*
- *Tesla Model Y: 129 MPGe ($500)*
- *Hyundai Kona: 120 MPGe ($550)*
- *Chevrolet Bolt EV: 120 MPGe ($550)*
- *Tesla Model S: 120 MPGe ($550)*
- *Toyota bZ4X: 119 MPGe ($550)*
- *Kia EV6: 117 MPGe ($550)*
- *Chevrolet Bolt EUV: 115 MPGe ($550)*
- *Hyundai Ioniq 5: 114 MPGe ($600)*

Author's comment: Note that the top three models have worked overtime on weight reduction and aerodynamic drag optimization.

And these are the "kilowatt guzzlers" that consume the most energy, based on their EPA ratings, with applicable trims noted:

- *Audi e-tron S: 63 MPGe ($1,000 annual fuel cost)*
- *Audi e-tron S Sportback: 65 MPGe ($1,000)*
- *Ford F-150 Lightning Platinum: 66 MPGe ($1,000)*
- *Rivian R15: 69 MPGe ($950)*
- *Porsche Taycan Turbo S: 70 MPGe ($950)*
- *Rivian R1T: 70 MPGe ($950)*
- *BMW iX M60: 77 MPGe ($850)*
- *BMW i4 M50 Gran Coupe: 80 MPGe (850)*
- *Ford Mustang Mach-E GT Performance: 82 MPGe ($800)*
- *Volvo XC40 Recharge: 85 MPGe ($750)*

Author's comment: Most of the guzzlers are either performance models, really heavy and/or have the aforementioned "barn door" issue.

5.3. How Do We Make an EV More Efficient?

One upgrade stands out as far as making an EV more efficient, especially in colder climates. But the laws of physics here are a bit confusing. Also confusing is that we will need to make the same upgrade to decarbonize our houses going forward.

There are two methods to provide heating in an EV: resistive heating and a heat pump. The former is inexpensive, compact, and 100% efficient. So where is the argument? A heat pump can operate at a higher than 100% efficiency:

Even though electric resistance heating systems are 100-percent efficient because they convert all of the energy consumed to heat energy. Heat pumps take this up by many notches. A heat pump can produce 3kW of thermal energy for every 1kW of electric energy, thus resulting in an efficiency of 300-percent. Since the heat pump uses less energy in heating the cabin, it results in a better range overall.[12]

Your next question is probably: *How do they do that?* The answer is they cheat – they use existing atmospheric, or any other source of heat, and just pump it up to a higher temperature. I recently did a post that included a description of a heat pump's operation, which I will use below and reference here.[13]

A large majority of current "air conditioning" (cooling) technology uses heat pumps. The text below is from the Wikipedia Article on heat pumps as modified by your author.

A heat pump is a device that can heat or cool a facility by transferring thermal energy using a refrigeration cycle. Units that only provide cooling are referred to as air conditioners.

When in the heating mode, a refrigerant at outside temperature is pressurized. As a result, the refrigerant becomes hot (boosts the temperature by adding the pressurization energy). The heat can then be used by an auto interior heating system.

After being moved outdoors again, the refrigerant is decompressed (evaporated). It has lost some of its energy and becomes colder than the environment. It can now take up heat-energy from the atmosphere or other source before the process repeats. Compressors, fans, and pumps run with electric energy…

Note the text in the above: "*It can now take up heat-energy from the atmosphere or other source before the process repeats."* There are two good points here – all EVs already have a heat pumps (a.k.a. air conditioning), a small amount of additional hardware and control system modifications are required in order to also add a heating mode. Then there is the "other source" of heat. EVs intrinsically produce heat as they operate, mainly in the batteries and motors. If this is used to supplement the atmospheric heat when the heat pump is in the heating mode, it could increase the efficiency further. In fact many EVs use the air conditioning (a.k.a. heat pump) to cool batteries when fast charging.

Finally, one other hack for really cold-weather areas. It gets colder during the night. Most EVs are plugged in to a charger at night. Why not program the EV to preheat the cabin

[12] Sidd Dhimaan, Top Speed, "Heat Pumps, the next big efficiency hack in EVs," June 30, 2021, https://www.topspeed.com/cars/heat-pumps-the-next-big-efficiency-hack-in-electric-vehicles-ar192036.html

[13] Energy Central, "Electricity Past & Future," subsection 3.4, Aug 2022, https://energycentral.com/c/cp/electricity-past-future

(including defrosters, seat warmers, etc. using energy from the charger just before the EVs first trip is scheduled.

Note that reference 13, subsection 3.3 covers upgrade to our houses mentioned in the first paragraph of this subsection, and section 3 in reference 13 covers some other interesting EV issues.

6. Future EVs

I just noted that I'm running out of words to go before I will need to break this paper into multiple posts. Thus, I will keep the subsections below short.

6.1. Vans

Rivian already makes a Van. It currently has just one customer: Amazon (see below).

Amazon and Rivian plan to bring thousands of custom electric delivery vehicles to more than 100 cities by the end of this year, and 100,000 across the U.S. by 2030.[14]

Customers across the U.S. will begin to see custom electric delivery vehicles from Rivian delivering their Amazon packages, with the electric vehicles hitting the road in Baltimore, Chicago, Dallas, Kansas City, Nashville, Phoenix, San Diego, Seattle, and St. Louis, among other cities…

The vehicles are designed from the ground-up with safety, sustainability, and comfort in mind, and have been thoroughly tested by drivers across the country. They are the product of Amazon's partnership with Rivian, which the companies announced in 2019 when Amazon co-founded, and became the first signatory of The Climate Pledge—a commitment to reach net-zero carbon across our operations by 2040. As part of the

[14] Amazon Staff, Amazon, "Amazon's electric delivery vehicles from Rivian roll out across the U.S.," July 21, 2022, https://www.aboutamazon.com/news/transportation/amazons-electric-delivery-vehicles-from-rivian-roll-out-across-the-u-s

Pledge, Amazon is creating a more sustainable delivery fleet, and its work with Rivian is an important part of decarbonizing its last mile logistics as well as accelerating innovation that can help others reach net-zero carbon. With its commitment to have all 100,000 electric delivery vehicles on the road by 2030, Amazon will save millions of metric tons of carbon per year.

So Rivian clearly knows how to build vans. Who else build's vans? I covered Ford's E-Transit in a post early this year.[15] Mercedes certainly builds lots of vans. What if Rivian and Mercedes formed a partnership? Well guess what:

Rivian, the electric vehicle startup backed by Amazon, and Mercedes-Benz are forming a joint venture to make battery-powered vans in response to increasing demand for cleaner commercial vehicles.[16]

As part of the agreement, the companies will share investment costs to produce large electric vans that will be sold under both the Mercedes-Benz and Rivian brands. The joint-venture company they're forming will also set up a factory in Europe at an existing Mercedes-Benz site within a few years. The factory will aim to build vehicles based on the electric vans both companies currently produce…

"We are sharing investments and technology because we also share the same strategic ambition: accelerating the electrification of the van market with sustainable and superior products," Mathias Geisen, who leads the Mercedes-Benz Van unit, said in an emailed statement.

The partnership with Mercedes "gives Rivian added credibility in the (European) marketplace and should enable it to leverage Mercedes' established supply chain and manufacturing footprint in Europe, providing the OEM a short-cut to entering a new market with a very credible partner," Deutsche Bank equity analyst Emmanuel Rosner said in a research note.

Production of R1T pickups and R1S SUVs at Rivian's Normal, Illinois, plant has improved this year, along with output of electric vans for Amazon. The company expects to build 25,000 vehicles this year. In December 2021 it also announced plans to build a second plant in Georgia, a $5 billion facility that will have capacity to produce 400,000 vehicles annually when it opens in 2024.

Rivian CEO RJ Scaringe says the company stands to gain from the recently enacted Inflation Reduction Act, which has new incentives for buying electric vehicles.

"The commercial segment, in particular, will benefit from the strong incentives for fleet operators to electrify and our (Rivian Commercial Van) platform has been developed for a wide range of applications," he said in the company's earnings call last month.

[15] https://energycentral.com/c/ec/electric-trucks-buses-early-2022

[16] Alan Ohnsman, Forbes, "Amazon-Backed Rivian And Mercedes-Benz Are Partnering To Make Electric Vans," Sep 8, 2022, https://www.forbes.com/sites/alanohnsman/2022/09/08/amazon-backed-rivian-and-mercedes-benz-are-partnering-to-make-electric-vans/

7. California Bets Big on EVs

Citing an urgent need to address climate change while cutting back on air pollution, the California Air Resources Board voted Thursday (8/25) to require all new cars and light trucks sold by 2035 to be zero-emission vehicles.[17]

California has led the nation in auto emissions regulation since CARB was created in 1966 to combat the toxic yellow-brown smog that hung over Los Angeles. The state's large population meant automakers could not ignore the state's mandates. Congress gave California permission to set its own rules under the Federal Air Quality Act the same year. California's emissions and fuel efficiency rules have been adopted by more than a dozen other states…

If automakers fall short, they could be charged $20,000 per noncomplying car..

Electric cars are rapidly gaining popularity in California. In 2012, less than 2% of new vehicles sold were electric. That grew to 7% in 2018.

But demand has surged since, and now 16% of new cars sold in the state are plug-in vehicles… There are now 1.13 million zero-emission vehicles registered in California, according to CARB — 43% of the nation's total…

Under the new rules, 35% of new cars must be zero emission by 2026, 68% by 2030, and 100% by 2035…

The effects of the 2035 mandate will be far-reaching, CARB said. It "will essentially end vehicle emissions altogether," CARB Chair Liane Randolph told reporters.

Not quite. As Randolph herself noted, owners of internal combustion cars can continue to drive them after 2035. It will still be legal to buy and sell used fossil-fuel cars and light trucks…

And even the zero-emission vehicle mandate includes vehicles that are not zero-emission. Up to 20% of a carmaker's sales can be plug-in hybrids, which have both electric motors and gas engines, and still count as zero-emission, as long as the minimum battery range is 50 miles or more.

Final author's comment: The above article had some questions about how much of the electricity used to charge vehicles will be carbon-free and by when. The current answer for California (2020 data) is about 55%, and this (by statute) goes to 100% by 2045, but this may be reeled in. There is much talk and some modeling that suggest that 2035 is doable. I'm working on a post on this subject scheduled for September 29.

[17] Russ Mitchell, LA Times via MSN, "California bans sales of new gas-powered cars by 2035. Now the real work begins," Aug 25, 2022, https://www.msn.com/en-us/autos/news/california-bans-sales-of-new-gas-powered-cars-by-2035-now-the-real-work-begins/ar-AA116IAN