Looking Into Electric Cars

Session 3 : Charging

Looking Into Electric Cars

Session 3 : Charging

Breaking news

**EVgo's New Prefabricated DC F
Chargers Cut Installation Time
And Reduce Costs**

Deployment of the first ones are underway at
locations.

InsideEVs

With the media awash in broken charger stories - - EVgo opts to preinstall chargers on a platform to cut costs and improve reliability.

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Session 3 : Charging

Hyundai announces massive $7,500 cash bonus for EVs — but it ends in a few days

by Doric SamJanuary 22, 2024

TheCoolDown

Breaking news

This is only here because it ends on Jan 31. Ioniqs don't qualify for tax credit. Hyundai is going to give it to you anyway. Makes Ioniq 6 less Than $32,000 and the Ioniq 5 less than $35,000. Amazing price for an EV with heat pump and 800 volt battery. (Really fast fast charging)

Looking Into Electric Cars

Session 3 : Charging

Gas vs Electric

Looking Into Electric Cars

Session 3 : Charging

Gas

Most gas pumps transfer the fuel at the same speed. And require and underground tank. The need for a tank restricts where a gas pump can be located. Tank requires proper zoning and limits locations. Time is always the same & you have to stand and watch.

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Session 3 : Charging

Electric

Practically any parking space can be an EV charging space.
But wiring for some is harder than others

Electric chargers have multiple plug types
The most common are Tesla, J-1772 and CCS.

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Session 3 : Charging

Electric

Charging power of the three levels.

Level 1 1.2 kw 1.4 kw

Level 2 3.3 kw 6.6 kw 9.5 kw 11 kw 19 kw

DCFC 20 kw 25 kw 50 kw 62.5 kw 100 kw 125 kw 150 kw . . . 350 kw and up.

and these are just the ones that I am aware of.

Looking Into Electric Cars

Session 3 : Charging

Electric

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Session 3 : Charging

Electric

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Session 3 : Charging

Electric

As EV Drivers get familiar with their cars they will become selective regarding these characteristics. And choose a charger/location combo with the goal of optimizing the balance between convenience and charging speed.

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Session 3 : Charging

A few examples

20 minutes at the grocery store =>

level 1 why bother - DCFC, yes please

At the Movies =>

DCFC need to move car - 6-11kw Level 2, nice

Working 9-5 =>

8 hours on a slow level is a good fit.

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Session 3 : Charging

Electric

Let’s look at them one at a time.

But remember:

The goal is to charge when
==> it is convenient. <==

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Session 3 : Charging

Convenience First

Electric

1). The inconvenience of going to a gas station is why people always fill up.

2). And unlike gas, where you have to watch the gas pump, with an EV you plug in and just walk away.

3) If you have enough charge and you don’t leave, you’re not doing it right. Unless you’re at a good restaurant.

4) Remember your goal is convenience

Looking Into Electric Cars

Session 3 : Charging

Electric

First u evel 1
(B rise)

1

Charging power ne three levels.

Level 1 1.2 1.4 kw

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Electric

First up level 1
(Big surprise)

Charging power of the three levels.

Level 1	1.2 kw	1.4 kw

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Session 3 : Charging

Level 1 plugs in just like a toaster

Looking Into Electric Cars

Session 3 : Charging

Home

Charging is so easy it can be done with one hand while shooting a video

Looking Into Electric Cars

Session 3 : Charging

The Basics

Level one (AC)
yes its a standard 110 outlet
1.3 kw (kilowatt)
10 hours (a good night sleep) =
13 kWh or 40 miles

Most of us go home every night.
Plugging in is soooo easy.
Doing a partial charge each night at home is easier than that weekly trip to the gas station.
Note: 5 nights in a row can equal 200 miles.

And so very convenient.

I charged at home with level one for 15 months

And so very convenient.

But I wanted more flexibility

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Session 3 : Charging

Level 1

This is the home charger that may have cme with the car.

And is plugged into a standard 110 outlet. And not wanting to overload a circuit limits how fast they can be. I have a 15 amp circuit and I think a 12 amp charger is the highest that should be used.

Most of us go home every night.
Plugging in is soooo easy.
Doing a partial charge each night at home is easier than that weekly trip to the gas station.
Note: 5 nights in a row can equal 200 miles.
And so very convenient.

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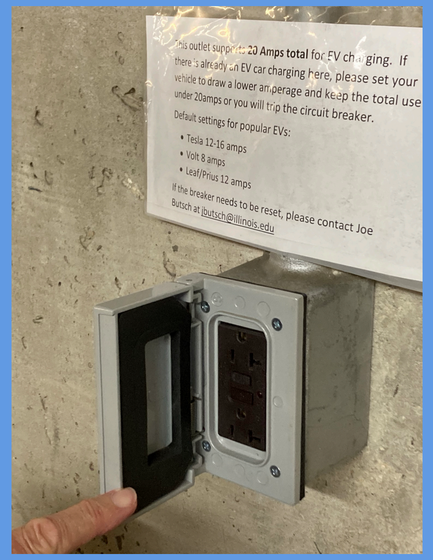
Session 3 : Charging

Level 1

As a public charging station, there will only be a sign and an outlet. BYOC (bring your own charger)

Lots of Hotels do have outlets in the parking lot



Looking Into Electric Cars

Session 3 : Charging

Level 1

The Car determines the charging speed

Note : at all levels (one, two and DCFC) The chargers list how much electricity they can deliver. But each car determines how much it will accept. e.g. I have a car that came with a 10 amp level 1 charger, even when plugged into a 12 amp or higher charger it doesn't charge any faster. The car decides.

Looking Into Electric Cars

Session 3 : Charging

Level 2

Electric

Next ... vel 2
(But ... kn... that)

2

Charging pow... the three levels.

Level 2	3...	...w	9.5 kw
	11 kw	19 kw	

Looking Into Electric Cars

Session 3 : Charging

Level 2

Electric

Next up Level 2
(But you knew that)

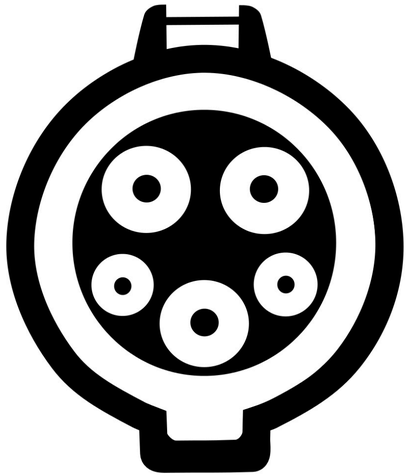
Charging power of the three levels.

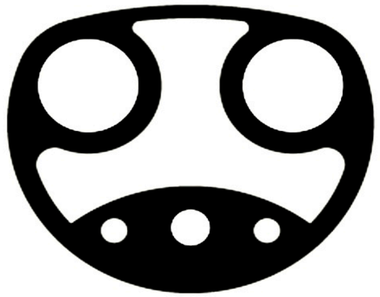
Level 2	3.3 kw	6.6 kw	9.5 kw
	11 kw	19 kw	

Looking Into Electric Cars

Session 3 : Charging

The Basics





Level 2 (AC)
uses a 220 volt connection

6.6 kw (some are higher)
10 hours. =
66 kWh or 200 miles

For those of us with a home charger.
Each night the possibility of adding more than there is room for in the battery. A weekly charge at home beats a weekly trip to the gas station.

And so very convenient.

I have added a 3.5 kw (16amp) charger at home.

It gives more convenience and more flexibility

Looking Into Electric Cars

Session 3 : Charging

Level 2

At home : my $200 charger above (black with red lite)

In the wild : a sampling of public chargers in C-U. Upper right is in Hill St Garage by OLLI.

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Session 3 : Charging

Level 2

Chargers that require fees are accessed by contact free credit cards or phones. There are some that are completely free - just plugin and go. Others, like hotels ask that you checkin at the desk or the business near the charger.

Sometimes charging through their app is easier/bettter.

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Session 3 : Charging

Level 2

ChargePoint at Fields East on the left.
6.6kw $.21 per kWh.

Blink at Prospect Point Apts on the right.
80 amp, should be 19.2 kw (unverified) $.49 per kWh.
Some EVs will only take 11kw.

It can be hard to know the fee before you arrive.

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Session 3 : Charging

Level 2

To add a Level 2 charger at home you need room in the electrical panel. Left one has room, right one does not.

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Session 3 : Charging

Level 2

Part two - it is cheaper and easier if this panel is in the garage.
I recommend a NEMA 14–50 (240-volt outlet)

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Level 2

Don’ts - people don’t plug/unplug their stoves and driers. Don’t do that with and EV charger. Don’t use the breaker as an on/off switch

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Session 3 : Charging

DCFC (level 3)

Electric

And fi DCFC
(Direct C ent F Charging)

DCFC 20 25 kw 50
kw 62.5 kw 100 125 kw
150 kw 350 and up.

3

DCFC is also known as level 3

Looking Into Electric Cars

Session 3 : Charging

DCFC (level 3)

Electric

And finally DCFC
(Direct Current Fast Charging)

DCFC 20 kw 25 kw 50 kw 62.5 kw 100 kw 125 kw 150 kw . . . 350 kw and up.

DCFC is also known as level 3

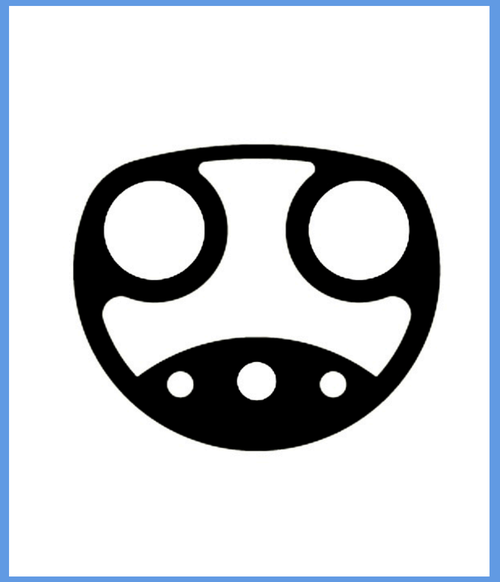
Looking Into Electric Cars

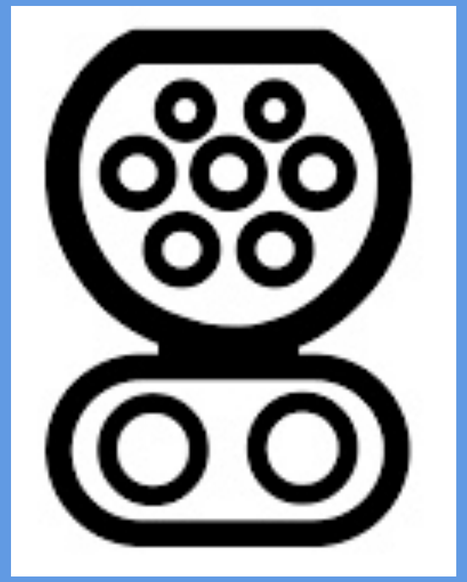
Session 3 : Charging

DCFC (level 3)

DC Fast Charge
(DC current not AC)

sometimes called Level 3
Getting closer to a gas station speed. Most are now 350 kw.
Adds more than 100 mi in 15 min. (Varies by car and state of charge)
10 hour comparison not applicable





The Car determines the charging speed

Looking Into Electric Cars

Session 3 : Charging

DCFC (level 3)

And repeating ! !

Note : at all levels (one, two and DCFC) The chargers list how much electricity they can deliver. But each car determines how much it will accept. e.g. I have a car that came with a 10 amp level 1 charger, even when plugged into a 12 amp or higher charger it doesn't charge any faster. The car decides.

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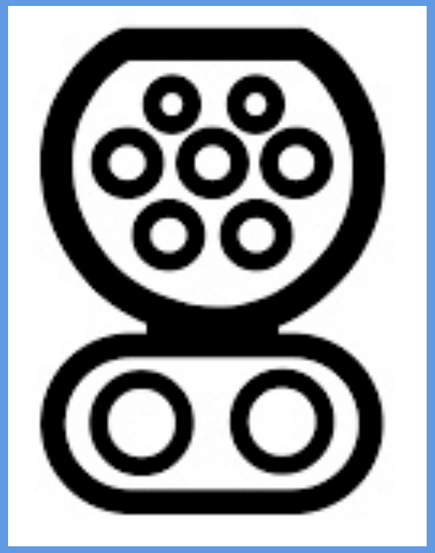
Session 3 : Charging

DCFC - (Level 3)

Electrify America station

The vast majority of these are 150 kw or higher. The two plug types are Tesla and CCS

Tesla Supercharger



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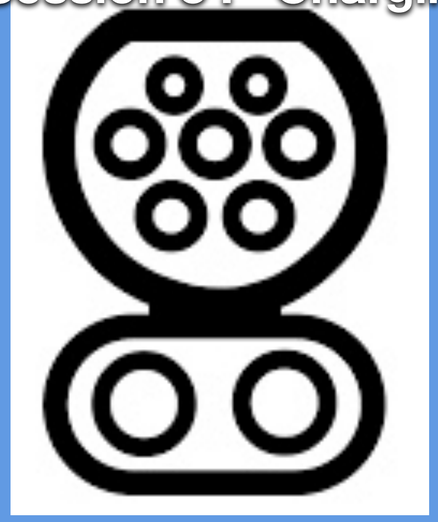
Session 3 : Charging

DCFC - (Level 3)



A common rate is $.45 to .49/ kWh
Charging speed will vary from car to car.

(a few examples)

Ford Mach E	115 kw
VW ID.4	120kw
Chevy Bolt	50 kw
Porsche Taycan	400kw

Don't worry - your car knows and tells the charger what to give. (And sometimes you won't like it.)

Also with all cars - the charging speed slows as the battery fills to avoid damage to battery and extend battery life.

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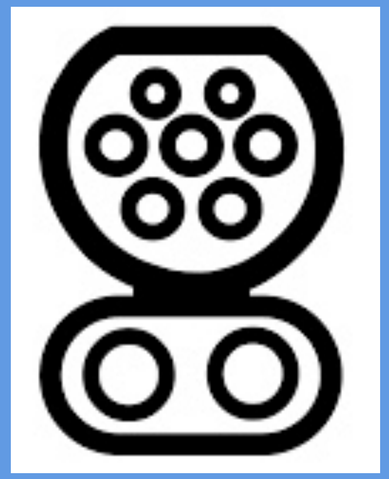
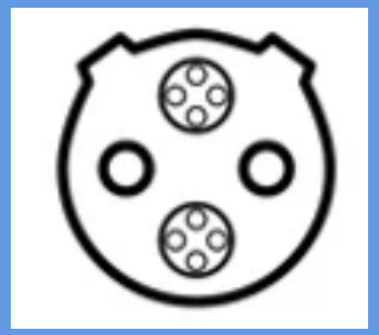
DCFC - (Level 3)





I spent 12 minutes at Target and got 75 miles of charge.

The 60% rule is to only charge between 20% and 80% (the 60% in the middle). This protects battery life and has the advantage of saving time. Time can be saved by charging in the range where DCFC is fastest. More on this later.

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Session 3 : Charging

Electric

Don’t Forget These Tips

Looking Into Electric Cars

Session 3 : Charging

TIPS

Don’t Forget These Tips

When trying to use the network app to start a charge - It is often better to turn your phone WIFI off.

Too many apps like Electrify America DON’T REFRESH THE DATA - if you had the app running before starting a charge, turn it off and back on, to refresh the data.

Sometimes “unavailable” chargers that won’t start with the app will start by tapping credit card.

This one sounds silly but at end of charge the connector won’t release - use you key fob to unlock the doors. (sometimes needs a double click)

It’s my belief that most “broken chargers” do work. “unavailable” on the screen is probably true. With EA I report issues on the app. But if I suspect software issue, I call and suggest a reboot.

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Session 3 : Charging

Electric

Unlike level 1
And level 2
DCFC charges do not charge
at a constant rate.

Occasionally it might seem that
way - but- NO

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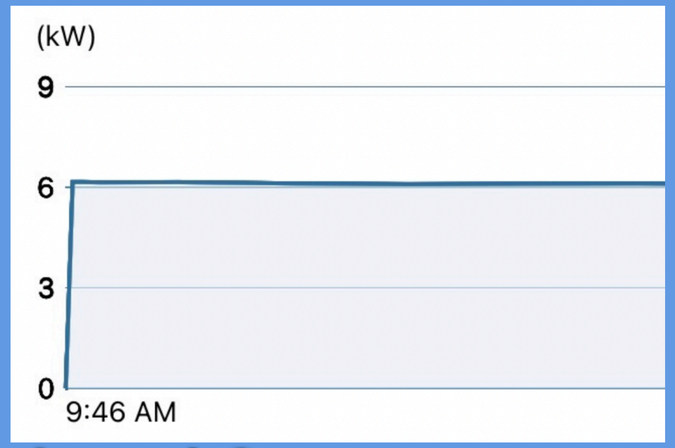
Session 3 : Charging

The Curves

Level 1



Level 2

It is generally believed that all chargers deliver energy at a constant level

Direct Current Fast Charging

Charging for DCFC is usually referred as a certain number of kWh or miles in a 10 or 15 minute time period

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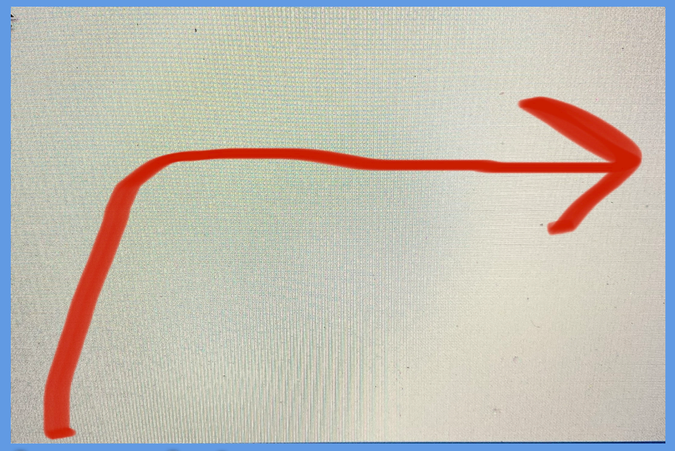
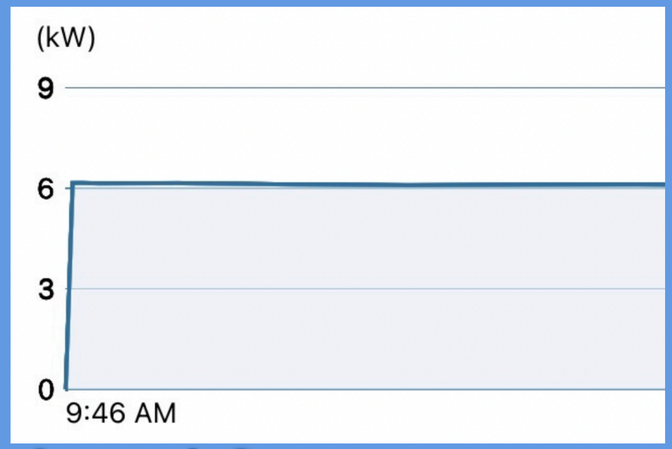
Session 3 : Charging

The Curves



Level 1



Level 2

The level 1 graph was fake.

There is no graphing available with level 1 chargers.

Direct Current Fast Charging

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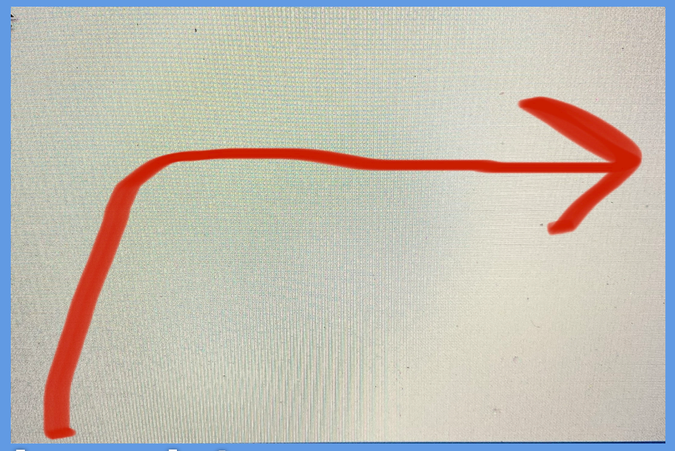
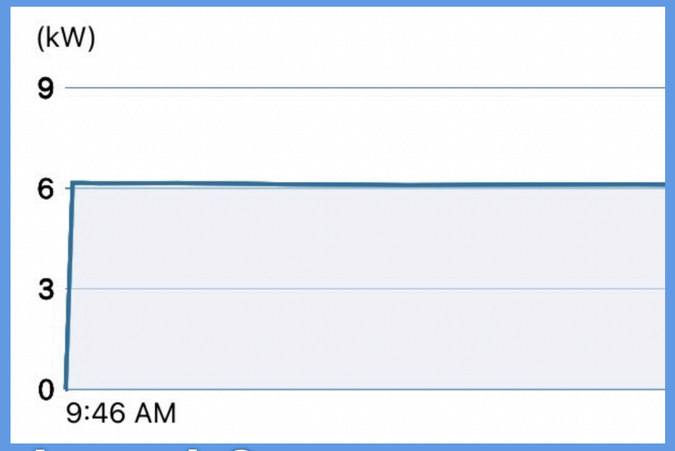
Session 3 : Charging

The Curves



Level 1



Level 2 *ChargePoint screen*

Direct Current Fast Charging

The level 2 graph is from an actual charging screen.

Charging level is constant but might change on a shared power charger. When two cars are charging, the power is split between them.

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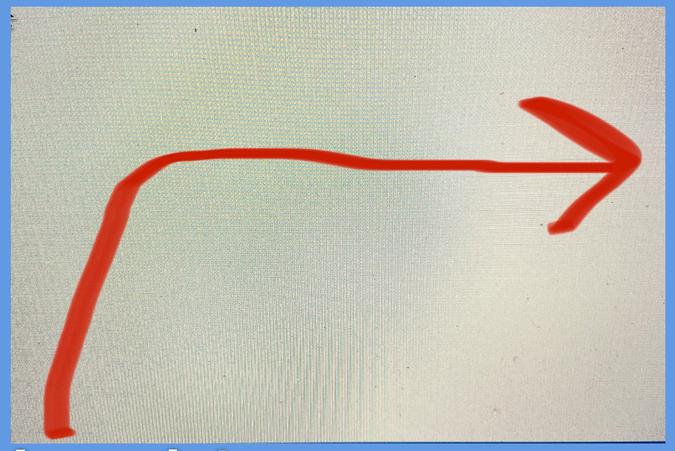
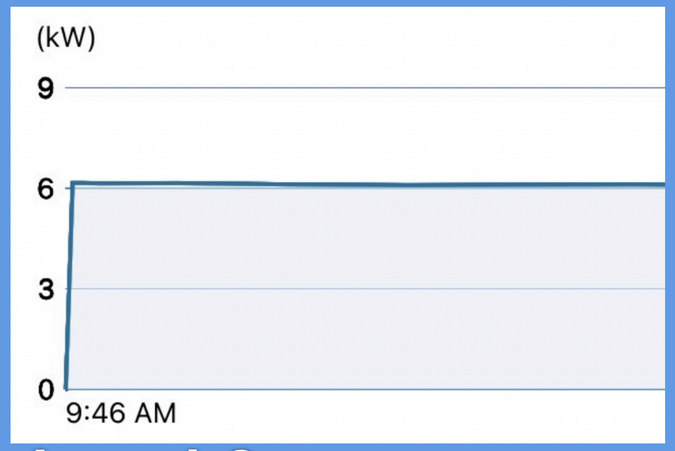
Session 3 : Charging

The Curves

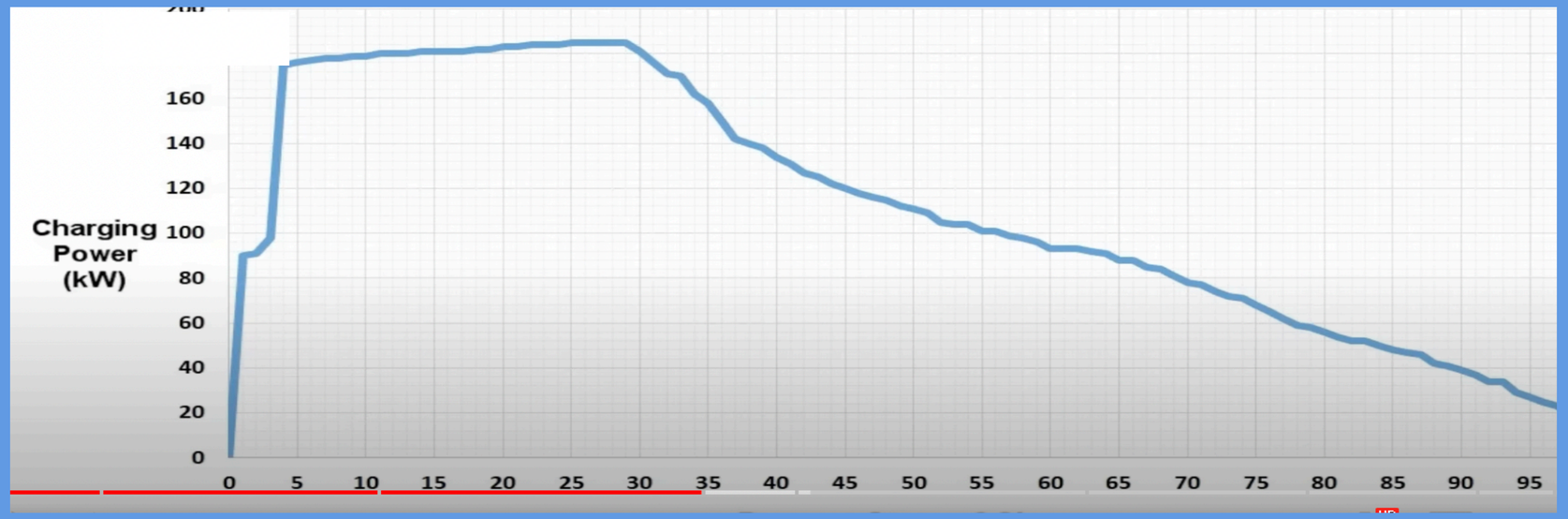


Level 1



Level 2 *ChargePoint screen*

The DCFC graph for a Tesla Model 3 at a Electrify America charger.



Direct Current Fast Charging

Graph was created by “State of Charge”. They do many EV videos on the web.

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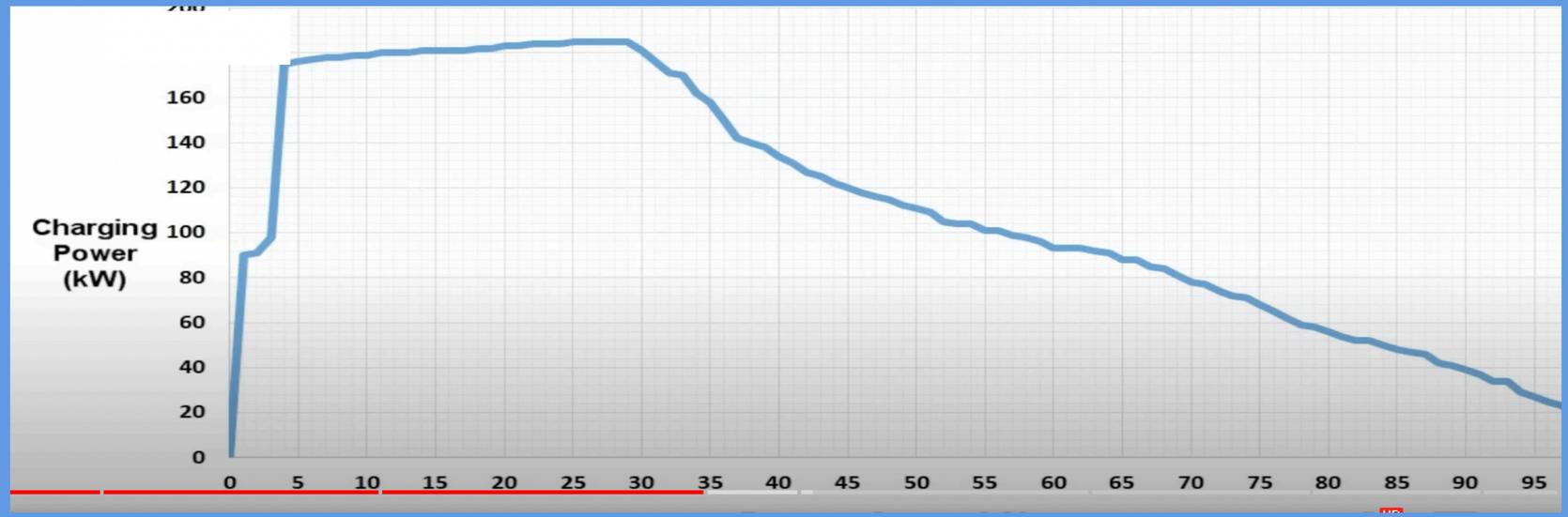
Session 3 : Charging

The Curves

Charging the battery from 5% to 35% at 150 kw or higher would add over 100 miles of range in less than 15 minutes.
This shows us how the speed of the charge is higher early and lowers as the battery approaches 100%. This helps protect battery life.



Direct Current Fast Charging Tesla model 3

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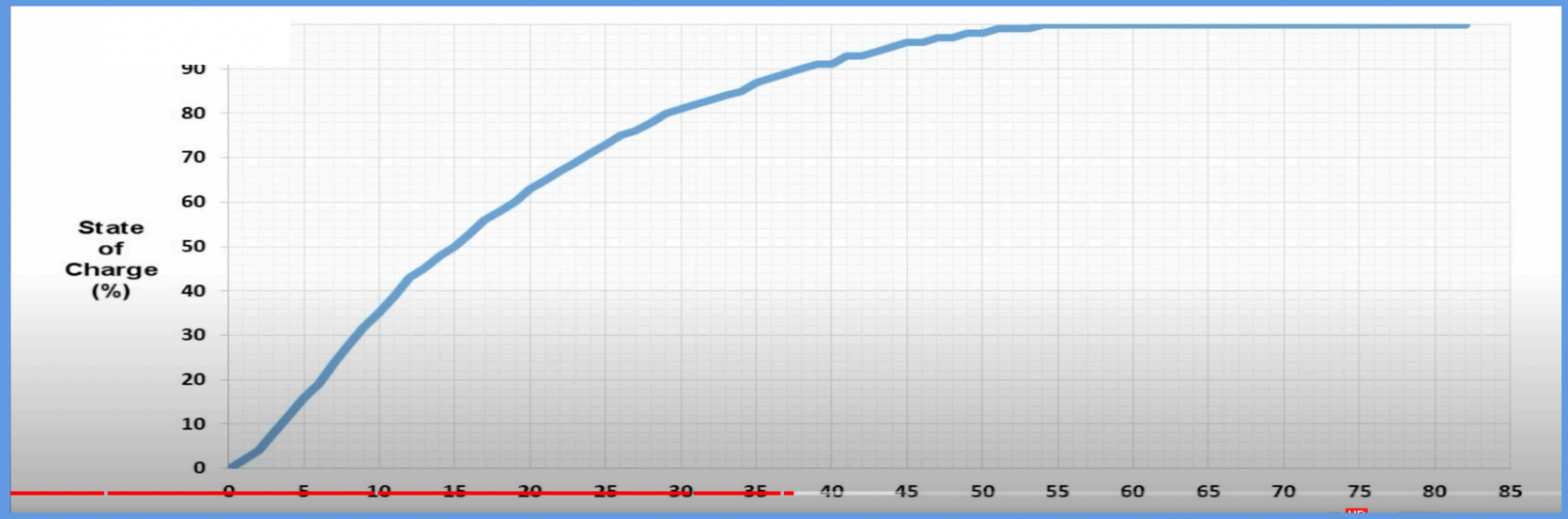
The Curves

This graph shows how the percentage of charge as it changes during the time of the charge. The battery reaches 80% in less than 20 minutes. After that the battery is filling slower & slower & slower and slower.



Direct Current Fast Charging Tesla model 3

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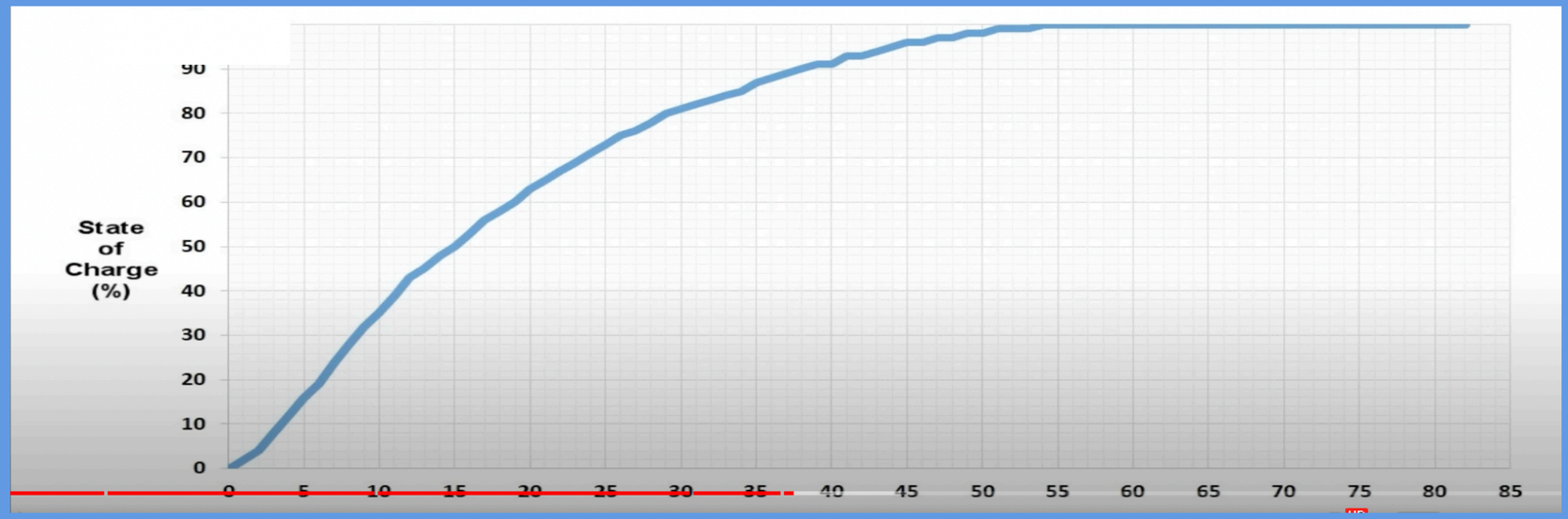
The Curves

This graph shows how the percentage of charge as it changes during the time of the charge. The battery reaches 80% in less than 20 minutes. After that the battery is filling slower & slower & slower. This is where the 60% rule reveals its strategic usability (More later)



Direct Current Fast Charging Tesla model 3

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Session 3 : Charging

Electric

Adapters

Adapters let you use more than one type of charger

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Session 3 : Charging

Electric

Adapters let you use more than on type of charger

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Session 3 : Charging

Using adapters is essentially using a charger designed to work for a different EV.

Some design differences are more important than others

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Teslas come with a J1772 =>Tesla, this adapter costs $50. This allows Teslas to use most public chargers. Adapters ONLY work one way. This is only for Teslas

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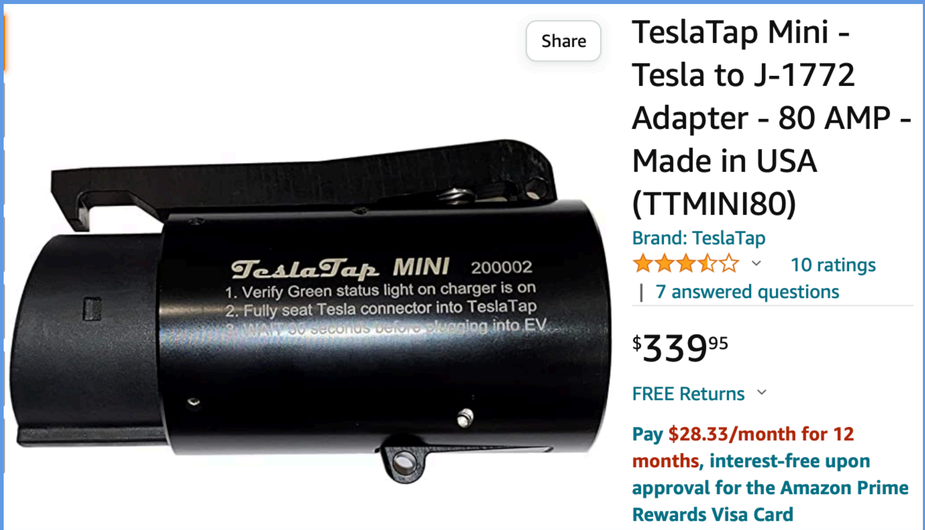
The only adaptor I'm keeping track of



This adapter goes the other way. Allowing other cars to use a Tesla "wall charger" .

Adapter for use ONLY with level 2 chargers. NOT Tesla Superchargers Chargers. Expensive but worth it for some. Drivers who might often be in a situation where a Tesla level 2 charger is the best or sometimes only option. These would mostly be on private property, like a hotel or friends house. Please ask for permission.

Looking Into Electric Cars

Session 3 : Charging

The only adaptor I'm keeping track of

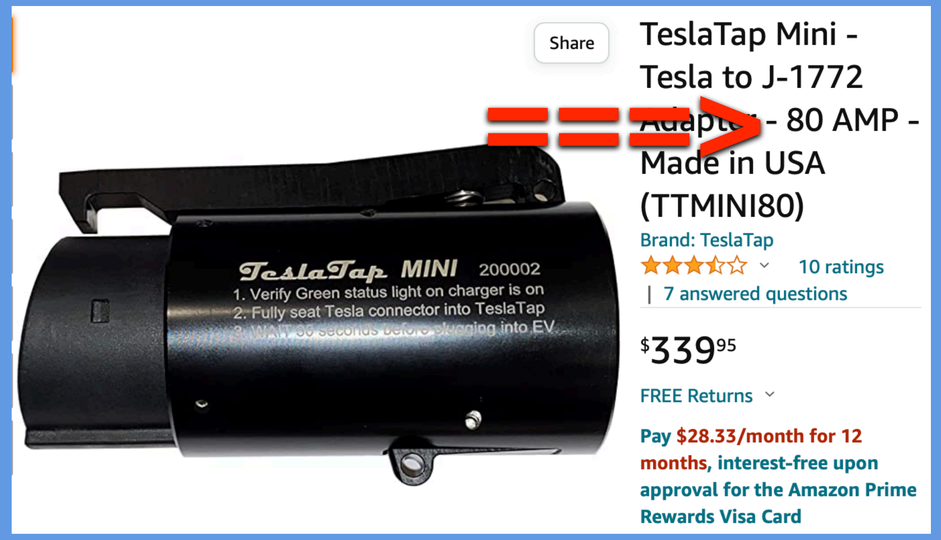
This adapter goes the other way. Allowing other cars to use a Tesla "wall charger" .

Tesla level 2 chargers tend to be double (or more) speed of most J1772 chargers. So the amp rating of the adaptor is very important. Most non-Teslas top out at 11kw for level 2. Current traveling through the adapter shouldn't get higher than that. But some cars might. Don't risk possible damage. Be safe and get the higher amp adapter. One rated at 80 amps which is the maximum amps for level 2.

Looking Into Electric Cars

Session 3 : Charging

The only adaptor I'm keeping track of



OF NOTE:
With Tesla changes, the price of these are dropping.

Tesla level 2 chargers tend to be double (or more) speed of most J1772 chargers. So the amp rating of the adaptor is very important. Most non-Teslas top out at 11kw for level 2. Current traveling through the adapter shouldn't get higher than that. But some cars might. Don't risk possible damage. Be safe and get the higher amp adapter. One rated at 80 amps which is the maximum amps for level 2.

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The only adaptor I'm keeping track of

is

OMG == I made a big mistake. This is NOT an 80 amp adapter. I bought the 48 amp, now I have to be careful that I don't plug into one of the 80 amp Tesla destination chargers. If I bought the 80 amp adapter I wouldn't need to be careful - it would always be correct.

A late change to this presentation - another company, Lectron, makes a similar 48 amp adaptor.

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The only adaptor I'm keeping track of

is

So I have the wrong adaptor and have never used it. Some day I might. Maybe to see what it does. At all times carefully watching the display on the car. IF and ONLY IF the car only accepts 48 amps which would be displayed on the dash as 11kw. Since there are Blink (and others) out there that are over 48 amps and plug directly into a J1772 - the implication is that the 48 amp adaptor would be OK since the car wold protect itself. SO. How much of a gambler are you ?

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The only adaptor I'm keeping track of

[For J1772 EVs Only] Lectron - Tesla to J1772 Charging Adapter, Max 48A & 250V - Compatible with Tesla High Powered Connectors, Destination Chargers, and Mobile Connectors

★★★★★ 4.9 (79)

Lectron

~~$179.99~~
$149.99

Save 17%

Quick shop

Choose options

Tesla to J1772 Adapter-Max 80Amp 250V Tesla Charge Adapter with Security Lock, Safety Certified Tesla J1772...

★★★★½ 146

300+ bought in past month

$89.99 Typical price: ~~$99.99~~

Save 30% with coupon

There has been a lot in the news about Lithium battery fires. The blame goes on cheap **uncertified** equipment. Question : would you trust this adaptor

Tesla Superchargers for everyone

If only it was that easy

History says only Teslas can use the Supercharger system

September 24, 2012

The Supercharger network was introduced on September 24, 2012, as the Tesla Model S entered production, with six sites in California, Nevada and Arizona. As of September 2023, Tesla operates a network of 5,500 Supercharger stations with 50,000 connectors.

The Supercharger system

Designed by Tesla
Designed for Teslas
Software optimized for Teslas

The Supercharger system

Cable location targets Teslas
Cable is only long enough for Teslas
Software optimized for Teslas

Looking Into Electric Cars

Session 3 : Charging

Adapters from Shop. Tesla For use by Teslas That allow use of J1772 chargers (AC L2). And DCFC chargers with CCS plugs.

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Session 3 : Charging

Adapters for use by **non-Tesla EVs**. Left for destination Tesla Destination Chargers (AC L2) Right for Superchargers. (DCFC)

Yes - there is NO adapter that will let **non-Teslas** use a supercharger.

Looking Into Electric Cars

Session 3 : Charging

Adapters for use by **CCS** EVs. Left for destination Tesla Destination Chargers (AC L2) Right for Superchargers. (DCFC)

Yes - there is NO adapter that will let **CCS** use a supercharger.

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Session 3 : Charging

Adapters for use by CCS EVs. Left for destination Tesla Destination Chargers (AC L2) Right for Superchargers. (DCFC)

The adapter on the left will fit but the wiring is all wrong. Bad things would happen if it connected. That is why ALL DCFC chargers “handshake” using the car’s VIN and gets other information from the vehicle to safely charge. Including payment information.

Looking Into Electric Cars

Session 3 : Charging

NONE of these work

These adapters for use by J1772 vehicles at destination Tesla Destination Chargers (AC L2) Not Superchargers. (DCFC)

Looking Into Electric Cars

Session 3 : Charging

Then History changed
About 11 months ago.

Tesla installed and announced V3 chargers adapted to allow CCS cars to use the chargers. The adaptors are awesomely engineered into the charger.

Looking Into Electric Cars

Session 3 : Charging

Then History changed About 11 months ago.

Sadly it was for a mere 10 locations in the entirety of North America. Note: image is from a location in Canada.

Looking Into Electric Cars

Session 3 : Charging

Then History changed
Less than 11 months ago.

Sadly it was for a mere 10 locations in the entirety of North America. Note: image is from a location in Canada.

More have been added.

Looking Into Electric Cars

Session 3 : Charging

Then History changed
Less than 11 months ago.

More than 10 locations.

But a small percentage of the 5500 locations they have. I have no information on new or retrofitted and what might be next.

Looking Into Electric Cars

Session 3 : Charging

Then History changed AGAIN
This time in May 2023

Ford EV Customers To Gain Access to 12,000 Tesla Superchargers; Company to Add North American Charging Standard Port in Future EVs

New Ford EVs will use the NACS (North American Charging Standard or Tesla connector) staring with the 2025 model year.

Looking Into Electric Cars

Session 3 : Charging

Then History changed AGAIN AGAIN
This time in June 2023

General Motors Will Adopt Tesla's Charging Standard Starting 2025

Brian Silvestro

GM was the next to announce use of the NACS (North American Charging Standard or Tesla connector)

Looking Into Electric Cars

Session 3 : Charging

Then History changed MORE
After GM, dominoes fell

After GM others followed in a parade.

Looking Into Electric Cars

Session 3 : Charging

Then History changed
Hard to keep up - but this is close.

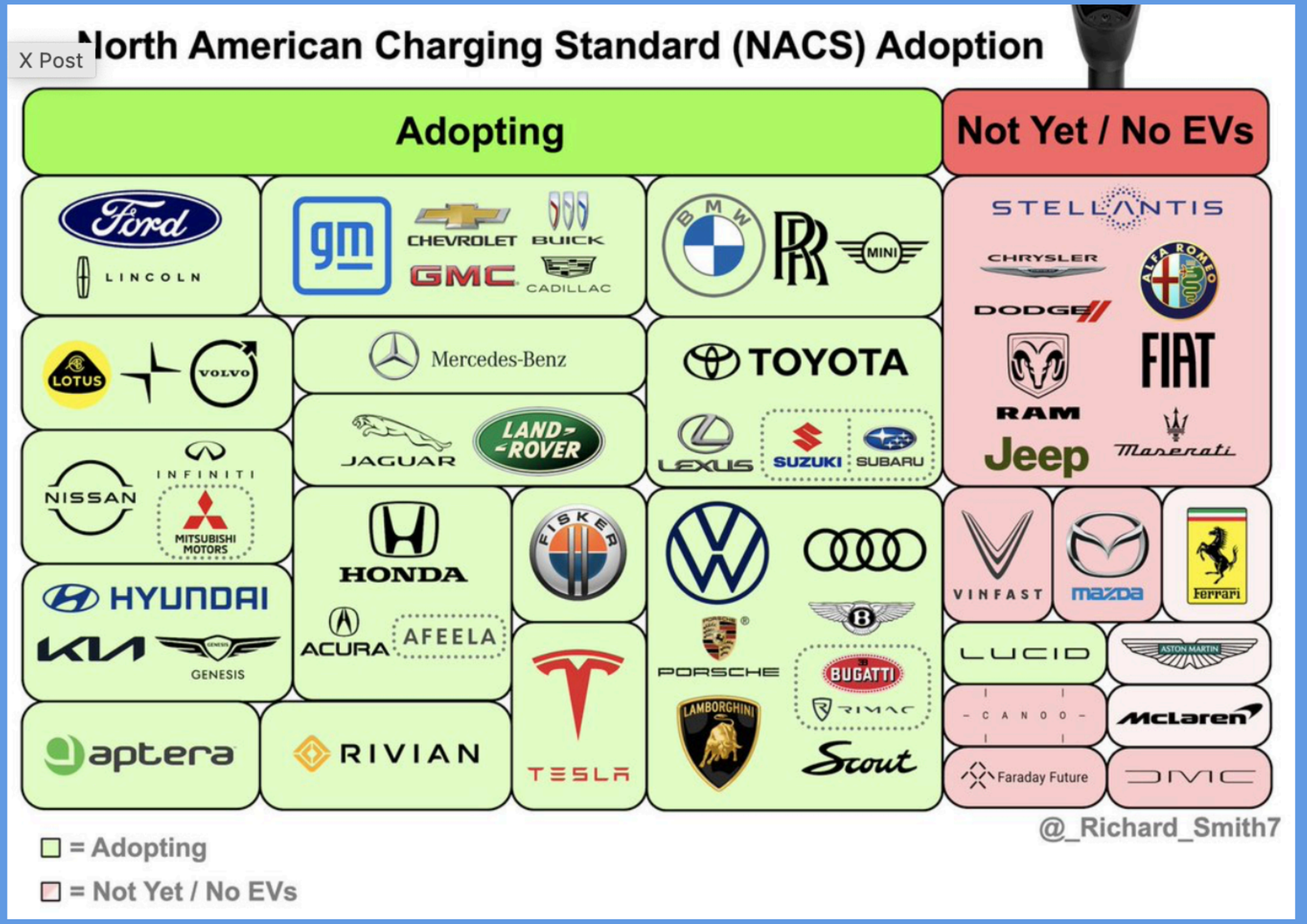
Switching
Ford, GM, Hyundai,
Genesis, Mercedes,
Rivian, Kia, Nissan,
Volvo, Fisker, Honda,
Acura, Jaguar,
BMW,Rolls-Royce,Mini,
Toyota, Lexus, Lucid, VW,
Audi, Porsche

Not-Switching (yet)
Chrysler, Dodge, Ram,

I give up - assume
everybody switches

Looking Into Electric Cars

Session 3 : Charging



Looking Into Electric Cars

Session 3 : Charging

Now all older EVs from these companies need an adapter

Switching
Ford, GM, Hyundai,
Genesis, Mercedes,
Rivian, Kia, Nissan,
Volvo, Fisker, Honda,
Acura, Jaguar,
BMW,Rolls-Royce,Mini,
Toyota, Lexus, Lucid, VW,
Audi, Porsche

Part of the agreement is that existing EVs will get access by means of an adapter.

Newer models will have NACS port

Looking Into Electric Cars

Session 3 : Charging

Now all older EVs from these companies need an adapter

Adapters for use by CCS. Shown is a third party adaptor for Superchargers. (DCFC)

Yes - now there are adapters that will let CCS EVs use a supercharger.

Looking Into Electric Cars

Session 3 : Charging

Now all older EVs from these companies need an adapter

This adapter was announced in late fall. With operational prototypes and availability to noted EV outlets like State of Charge

Left - is one of the first to be approved. Tesla will probably design and manufacture one of there own for the agreements with the manufacturers.

Looking Into Electric Cars

Session 3 : Charging

This adapter was announced in late fall. With operational prototypes and availability to noted EV outlets like State of Charge

By stacking a NACS to CCS and a CCS to NACS, State of Charge was able to prove that the adapter worked.

Looking Into Electric Cars

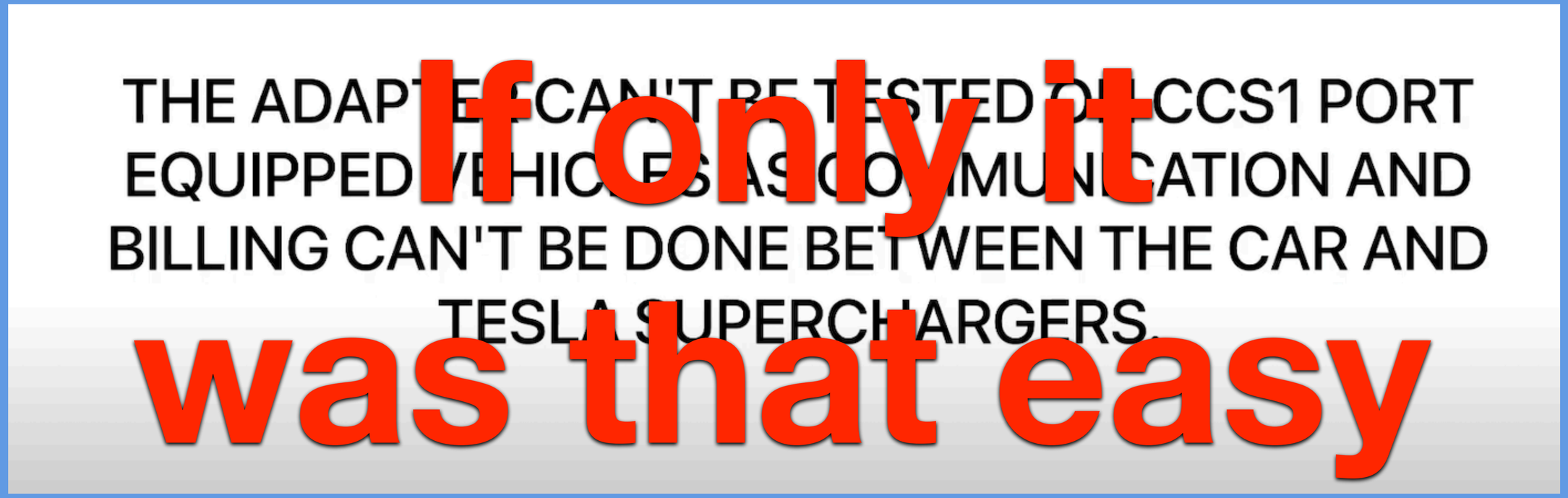
Session 3 : Charging

This adapter was announced in late fall. With operational prototypes and availability to noted EV outlets like State of Charge

Then by just using the NACS to CCS, he demonstrated that it would NOT work for a Ford Lightning at a Supercharger

Looking Into Electric Cars

Session 3 : Charging



Looking Into Electric Cars

Session 3 : Charging

THE ADAPTER CAN'T BE TESTED ON CCS1 PORT EQUIPPED VEHICLES AS COMMUNICATION AND BILLING CAN'T BE DONE BETWEEN THE CAR AND TESLA SUPERCHARGERS.

Looking Into Electric Cars

Session 3 : Charging

So, does adopting NACS mean Ford, GM and Rivian EV drivers will soon experience the same accessibility, convenience and reliability Tesla drivers have come to expect? Not necessarily. Much of the media coverage and debates seem to conflate the NACS connector with the Supercharger network. And while the automaker announcements also cover agreements and collaboration with Tesla that get into charging network access, there is no certainty that a move to NACS equates to a Supercharger-like experience for all drivers.

Forbes

Looking Into Electric Cars

Session 3 : Charging

There are a lot of reasons that letting more cars than just Tesla won't be easy.

The first is Communication.

Tesla has to give permission to use the charger. As Tesla phases in the other brands (probably one at a time) that permission will be granted.

Looking Into Electric Cars

Session 3 : Charging

There are a lot of reasons that letting more cars than just Tesla won't be easy.

The first is Communication.

For myself with a VW, I do not expect to ever get that permission. I won't need an adaptor. And will be limited to Superchargers with the Magic Dock. Not sure if those will continue to be expanded.

Looking Into Electric Cars

Session 3 : Charging

There are a lot of reasons that letting more cars than just Tesla won't be easy.

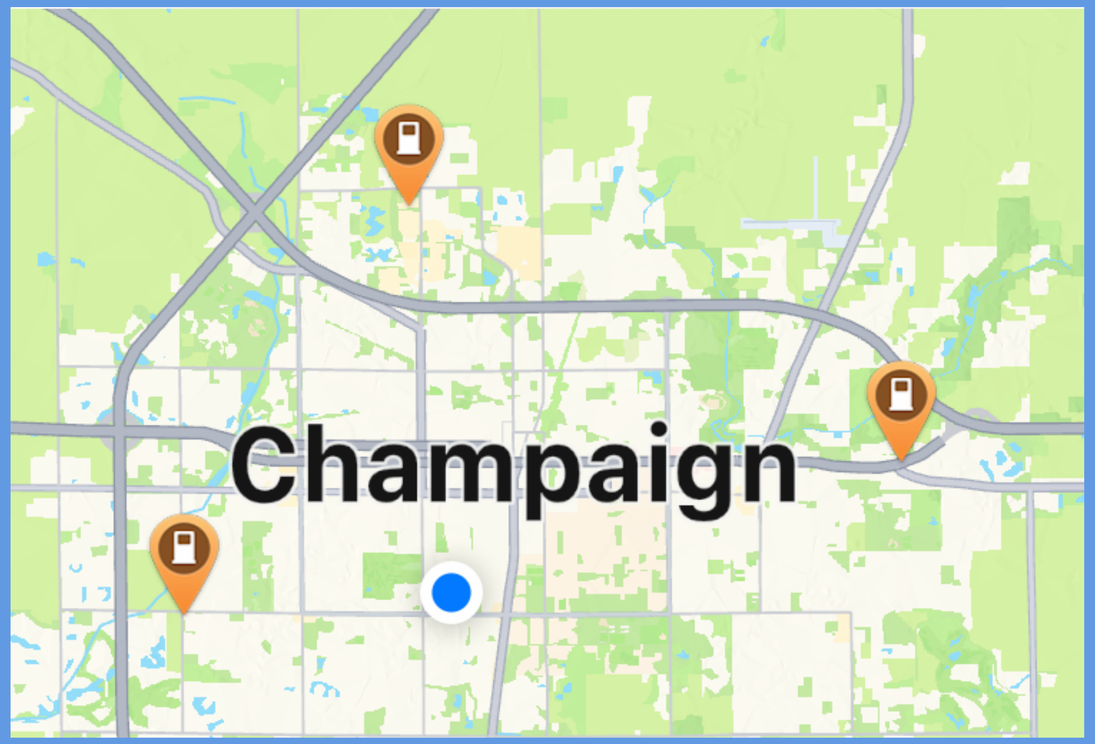
The first is Communication.

Oooops -
I now I change that statement after VW joined in last December.

Looking Into Electric Cars

Session 3 : Charging

There are a lot of reasons that letting more cars than just Tesla won't be easy.



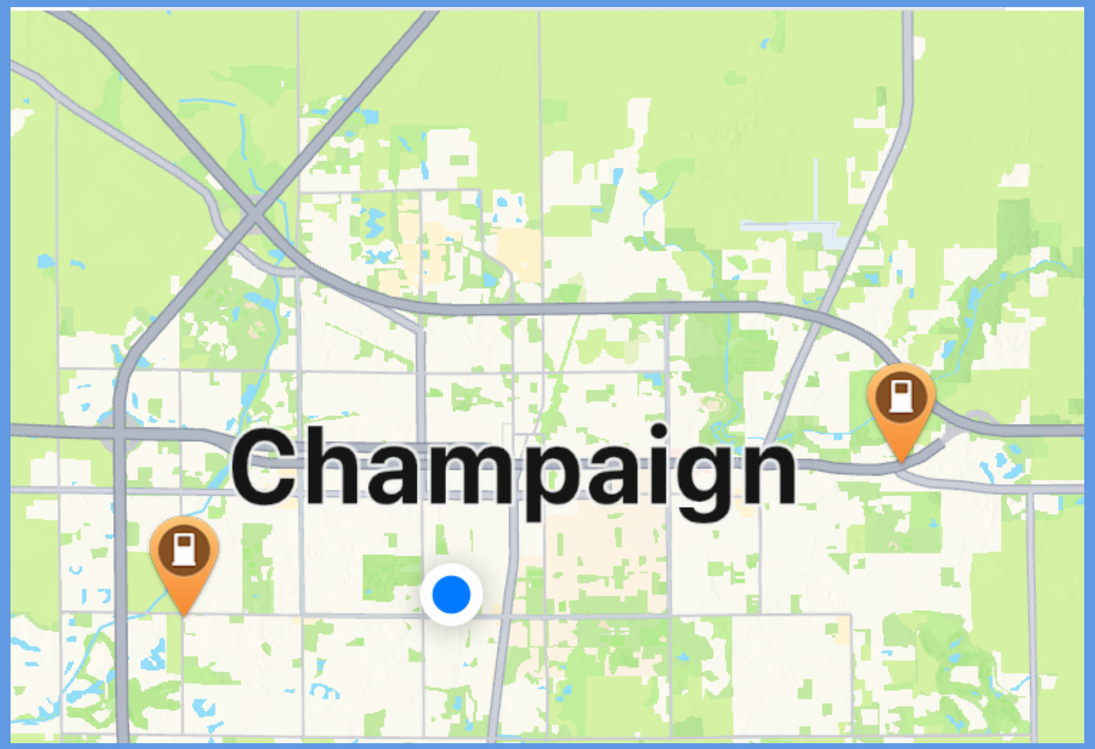
The first is Communication.

This showed up a few weeks ago. This is PlugShare showing all Superchargers in CU

Looking Into Electric Cars

Session 3 : Charging

There are a lot of reasons that letting more cars than just Tesla won't be easy.



After changing a filter. PlugShare now shows all Superchargers in CU that are capable of communicating with CCS cars. V1 & V2 Superchargers can't do it. Only the V3 and the newer V4 chargers. (The 2 in CU are V3)

Looking Into Electric Cars

Session 3 : Charging

There are a lot of reasons that letting more cars than just Tesla won't be easy.

Second is that Teslas are designed with the charge port all the way back in the drivers side corner.

The cables on the chargers are only long enough to reach Teslas.,

Looking Into Electric Cars

Session 3 : Charging

There are a lot of reasons that letting more cars than just Tesla won't be easy.

The EV port pictured on the left is about 3 feet farther away and on the opposite side (another 6 ft). The cable will not reach. This will always be true for the V3 charger (with or w/o Magic Dock). This will be a lesser problem as Tesla transitions to the new V4 . It has a 10+ ft cable and other features that CCS EVs need.

Looking Into Electric Cars

Session 3 : Charging

There are a lot of reasons that letting more cars than just Tesla won't be easy.

EVs with charging port in the center of the front grill should have the easiest access, requiring a short reach.

Nissan Leaf is center front - but with CHAdeMO and max 50kw, I don't expect an adapter

Looking Into Electric Cars

Session 3 : Charging

There are a lot of reasons that letting more cars than just Tesla won't be easy.

EVs with other charging port locations will have problems. Like this Lucid blocking 2 other chargers in order to reach.

Looking Into Electric Cars

Session 3 : Charging

There are a lot of reasons that letting more cars than just Tesla won't be easy.

The handshake is not the complete issue with software. There was an early mismatch between Lucid and a magic dock. Receiving a charge speed of only 20 kw. (possibly related to the 800V battery architecture)

Looking Into Electric Cars

Session 3 : Charging

There are a lot of reasons that letting more cars than just Tesla won't be easy.

Officially this starts in 2025 not 2024. In the end Tesla does have a connector that is much easier to handle. Also Tesla has a strong desire to have Plug-n-Go and a very high reliability rating.

Looking Into Electric Cars

Session 3 : Charging

NEVI

The End

Looking Into Electric Cars

Session 3 : Charging

NEVI

Downloads are coming.

Looking Into Electric Cars

Session 3 : Charging

Convenience First

Some of the information I present is originally worked up as a PDF.

It is or will be put it on the OLLI download site.

And now we'll go over the one on the right.

Gas Vs Elec

Gas

Most gas pumps transfer the fuel at the same speed. And require and underground tank. The need for a tank restricts where a gas pump can be located. Tank requires proper zoning and limits locations

Elec

Practically any parking space can be an EV charger.
But wiring some is harder than others

Electric chargers have multiple plug types
The there most common are Tesla, J-1772 and CCS.

Electric chargers have multiple levels of charging.
120V Level 1
240 V Level 2
Direct Current DCFC - commonly referred to as level 3

Charging power of the three levels.
Level 1 1.2 kw 1.4 kw
Level 2 3.3 kw 6.6 kw 9.5 kw 11 kw 19 kw
DCFC 20 kw 25 kw 50 kw 62.5 kw 100 kw 125 kw 150 kw . . . 350 kw and up.
and these are just the ones that I am aware of.

for home charging = 3.3 and 6.6 kw chargers fit best. With 10 or more hours, the vehicle is fully charged.

for home charging = 19 kw charger finishes too quickly - no benefit for the extra money spent.

for work charging = a shared power 6.6kw could be a good choice. With the varying distances the workers travel.

The Electrify America location at Meijer (under construction) with 150kw and up will be appreciated for travelers and those shopping at Meijer. With shopping trips of 20 minutes or so fits the charging time. On the other hand - if EV driver goes to the movie theater across the street, the EV will finish charging long before the feature is over and the EV driver will be charged extra.

Restaurants might prefer the lower DCFC or fastest level2. Locals might tend to not charge & while those from out of town would like the higher speed to match the distance travelled.

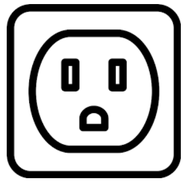
Level 1 speeds are slow but for extended parking, fills a void and for some is adequate for home charging.

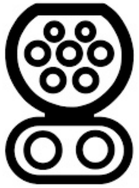
As EV Drivers get familiar with their cars they will become selective regarding these characteristics. And choose a charger/location combo with the goal of optimizing the balance between convenience and charging speed.

2023-03-01

Charging - in a perfect world on the top - more like reality below

Level one (AC)	Level 2 (AC)	DC Fast Charge (not AC)
yes its a standard 110 outlet	uses a 220 volt connection	sometimes called Level 3
		Approaching gas station speed. Most 150 kw
1.3 kw (kilowatt)	6.6 kw (some are higher)	More than 100mi in 15 min
10 hours (a good night sleep)	10 hours	10. Hr -comparison N/A
13 kWh or 40 miles	66 kWh or 200 miles	
		Newest up to 350 kw





Since fees are hard to collect for level 1 - often free. Bad news - slow and you have to bring your home charger with you. With no fees collected, some locations will be poorly maintained.

The usual rate is $.21/kWh. Mostly, you will find a charger that is 6.6 kw. The charger may or may not tell you. Some charging stations that can do two cars at a time can give 6.6 kw to each - some share power and give 3.3 kw to each when two cars are connected.

The usual rate is $.43/ kWh
Charging speed will vary from car to car. (a few)
Ford Mach E 115 kw
VW ID.4 120kw
BMW i3 50 kw
Porsche Taycan 400kw
Don't worry - your car knows and tells the charger what to give. Also with all cars - the charging speed slows as the battery fills to avoid damage to battery and extend battery life.

Considering that most EVs use about 33 kWh to go 100 miles at Interstate speeds and no-one will drain a battery to zero. An EV with a 77 kWh battery will allow you to drive a little more than 2 hours at interstate speeds. (Based on 75% of battery used - drivers braver than me might go farther by driving from 100% - 5%) After two hours, most of us would appreciate a break for a rest room and a snack. At a DCFC location you could be back on the road in less than a half hour.

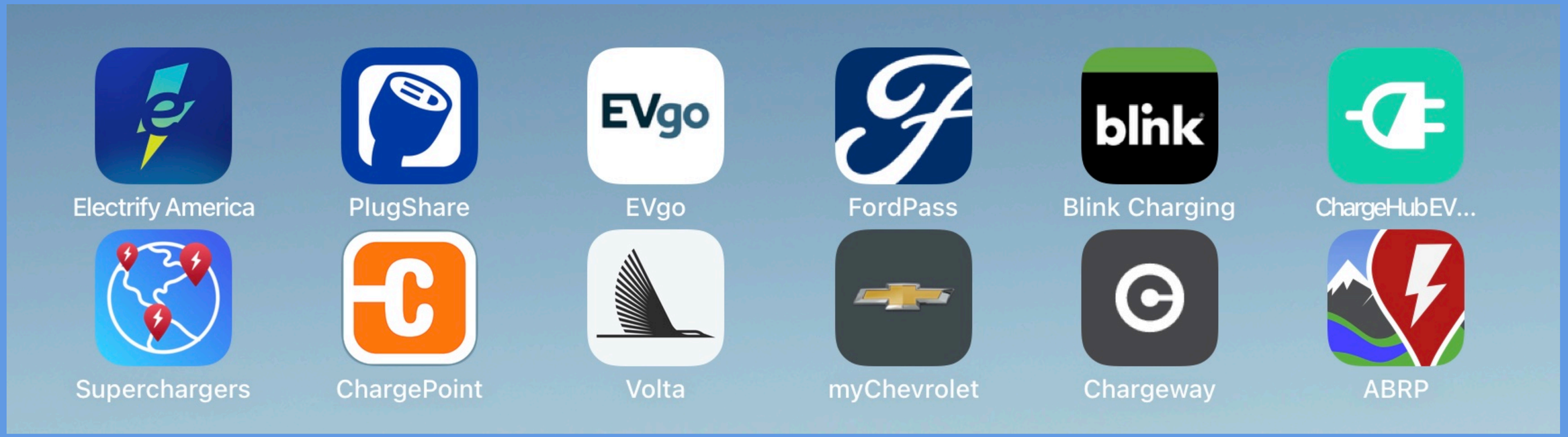
Note : at all levels (one, two and DCFC) The chargers list how much electricity can be delivered. But each car determines how much it will accept. e.g. I have a car that will only accept 10 amps at level one, even when plugged into a 12 amp or higher charger.

How do drivers find them ?
Newer cars include them on the navigation systems.
For myself, I like to look for chargers in the comfort of my home or at a restaurant or coffee shop.
Phone Apps. Plugshare finds the most. Chargepoint. ElectrifyAmerica, EVgo, Blink, Supercharger (Tesla), etc. If there is a charging service you like - there is probably an app.

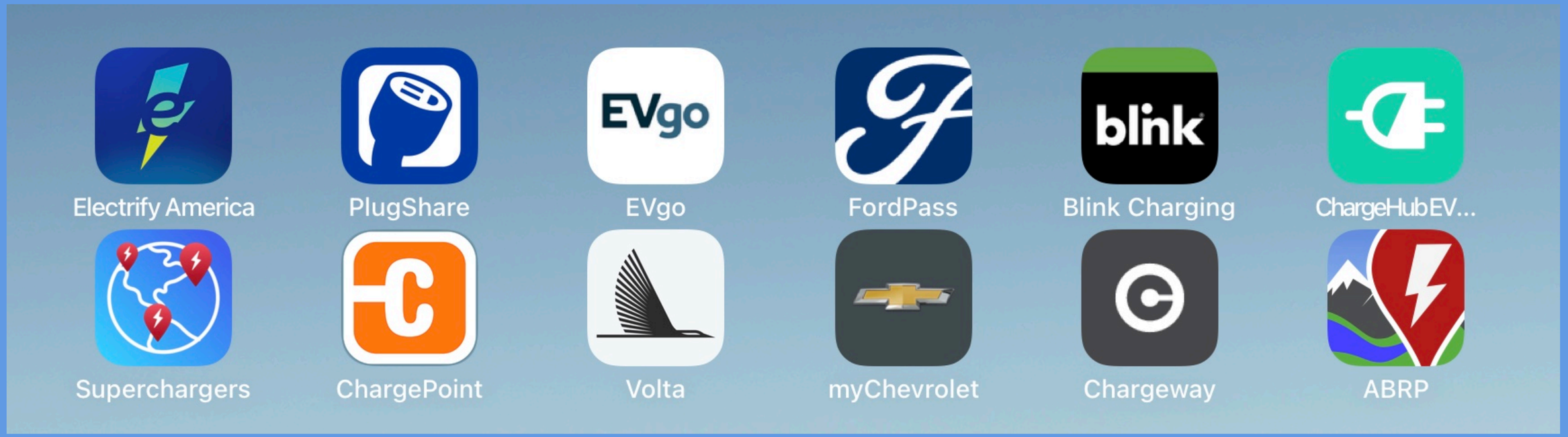
2023-04-04

EV apps Are helpful

Session ??: Charger Apps



Session ??: Charger Apps



There are a lot of apps for charging networks - some actually are charging networks - one in particular - is pretty good at finding chargers regardless of network. Some even claim to be a networks but are really just a list of chargers.

Session ??: Charger Apps

Starting with the ones that I find most useful.

Electrify America

Superchargers

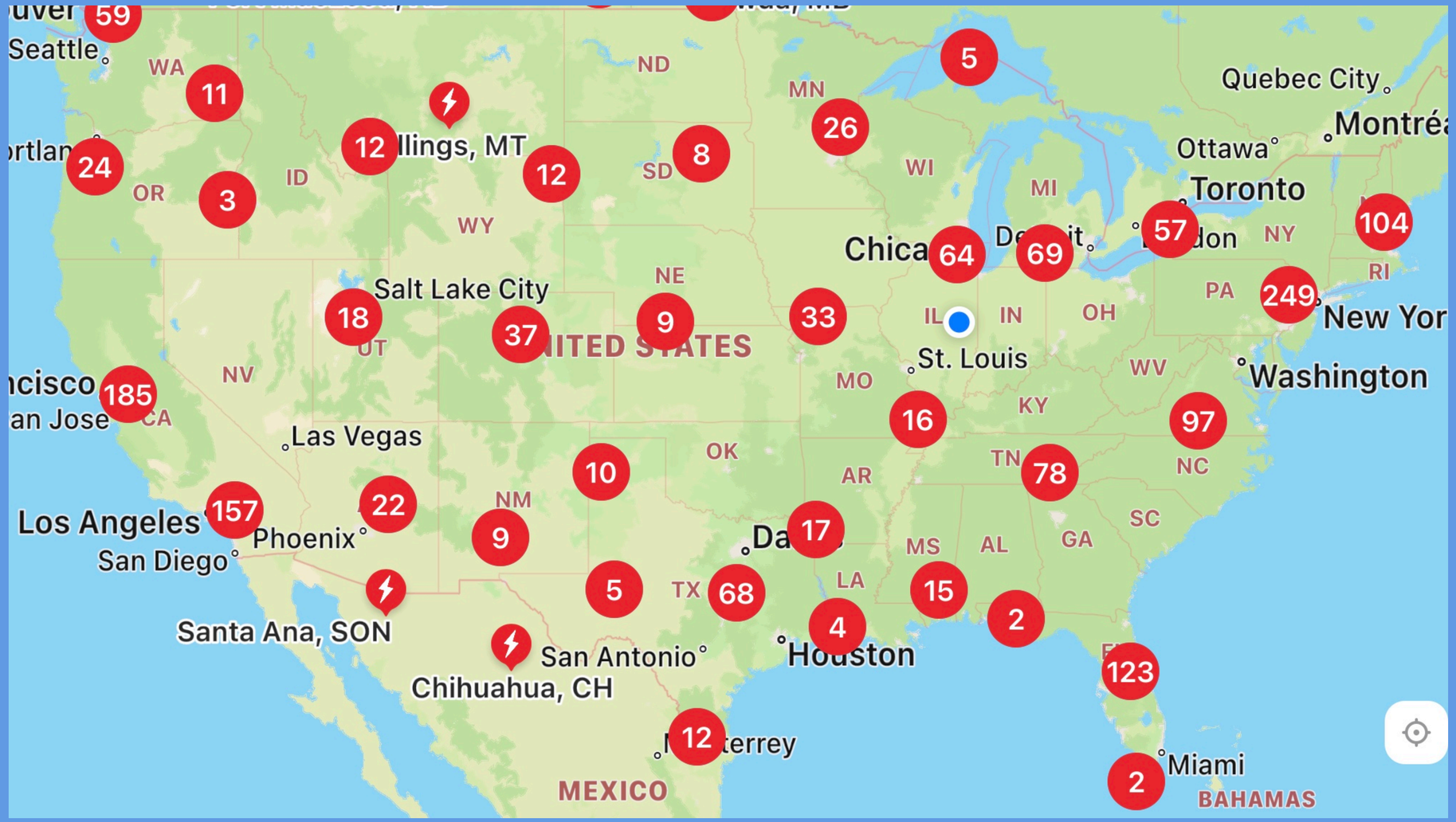
PlugShare

ChargPoint

Session ??: Charger Apps

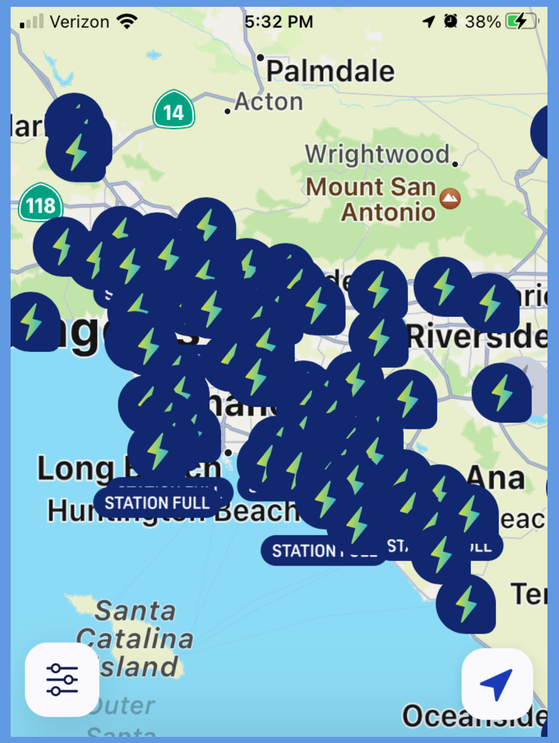
The Electrify America charging network.
Showing every location - looks pretty.

Session ??: Charger Apps

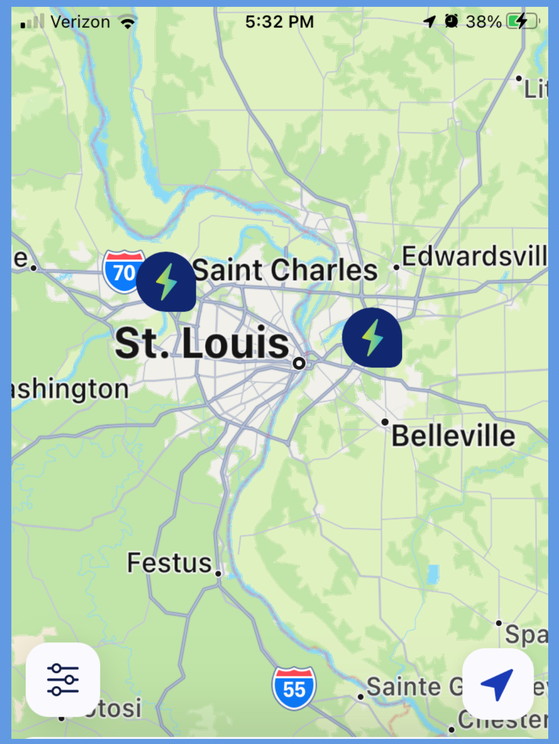


The Tesla Supercharger charging network.
the number in the red circle is how many locations are in an area,
while EA shows every location.

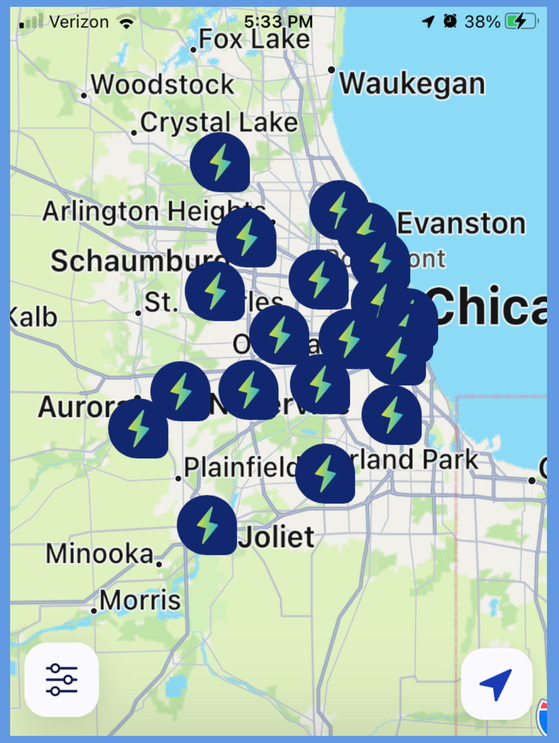
Session ??: Charger Apps



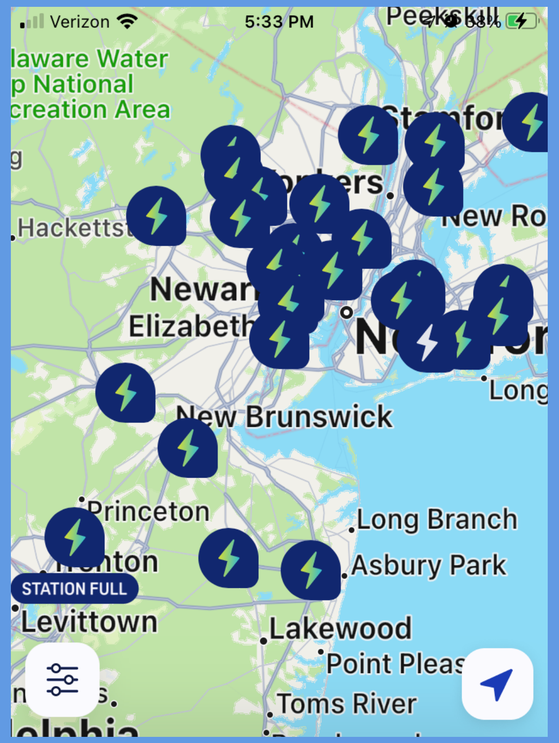
Los Angeles



St Louis



Chicago

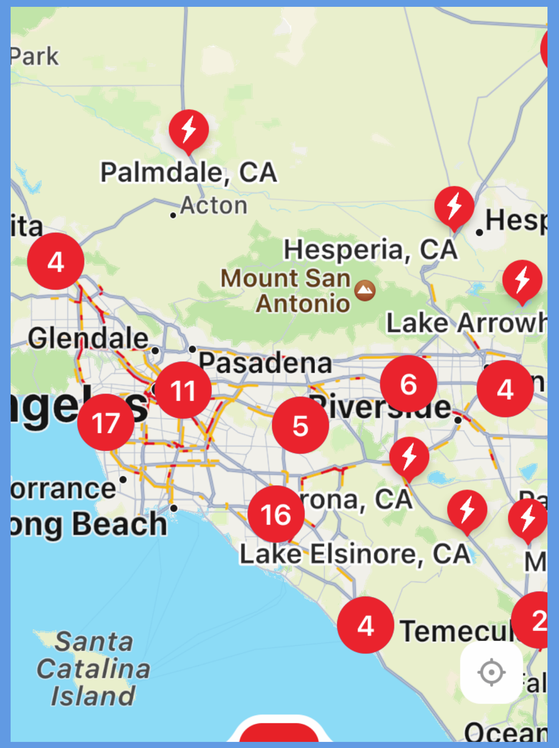


New York

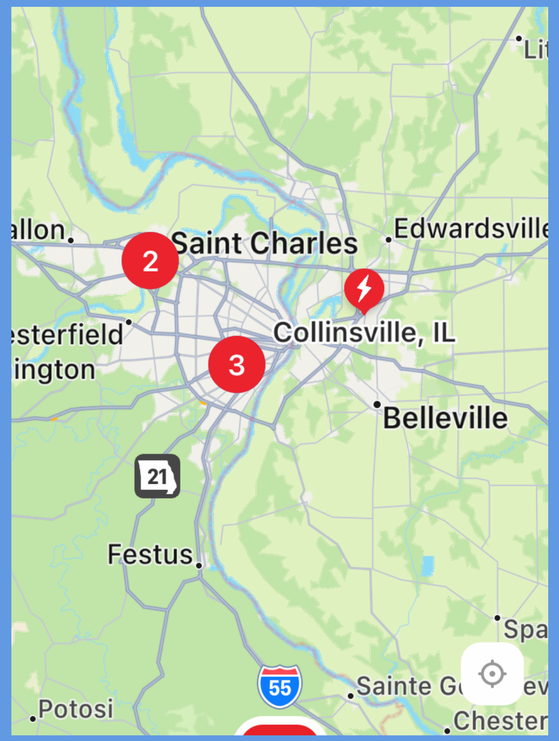
Electrify America
Individual locations

Each map section is the same scale and shows how well each city is served by public charging.
Note: it shows which locations are full.

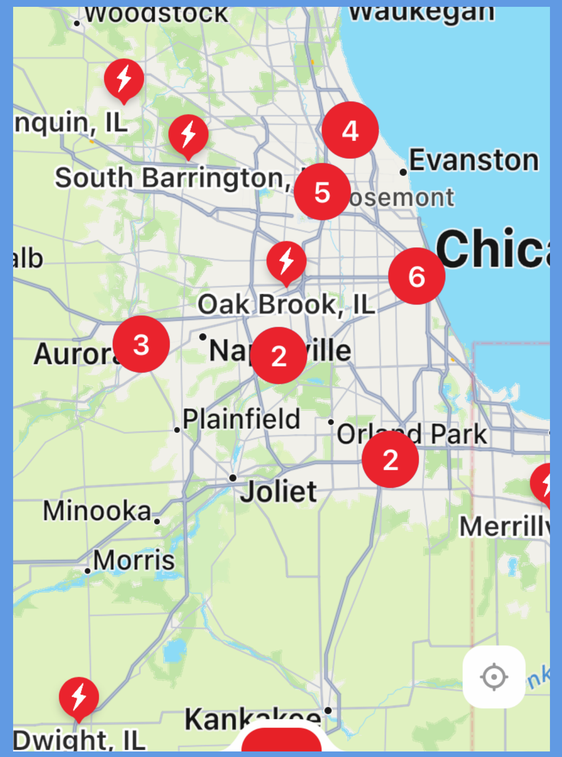
Session ??: Charger Apps



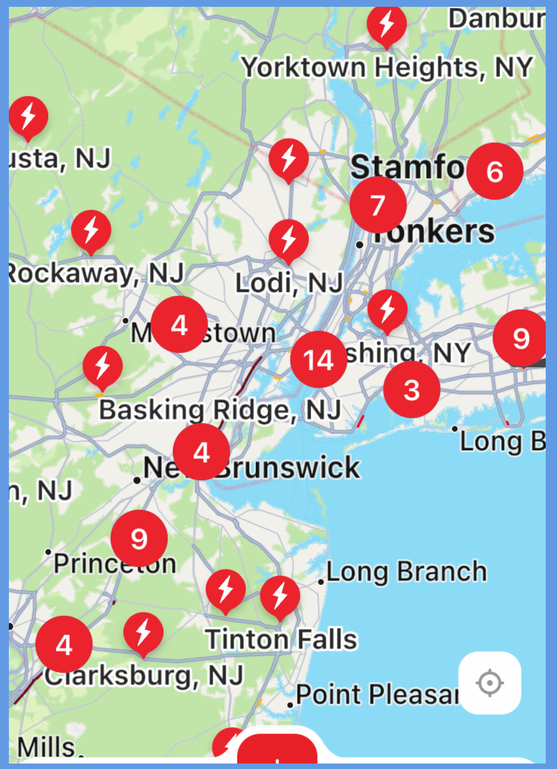
Los Angeles



St Louis



Chicago

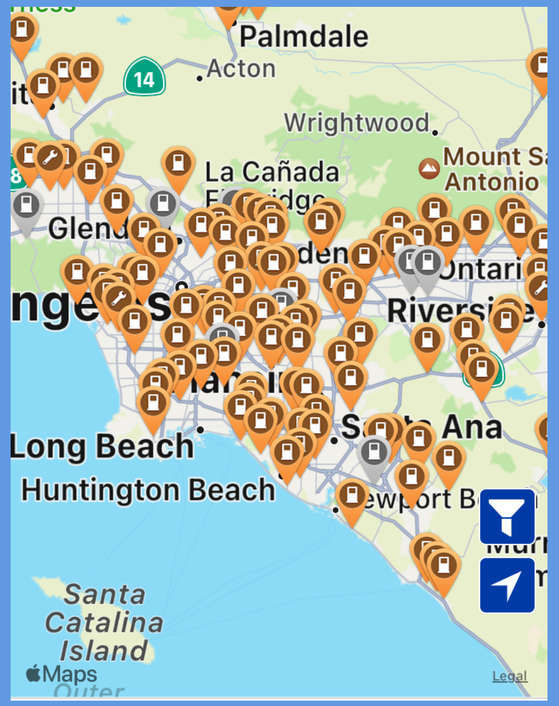


New York

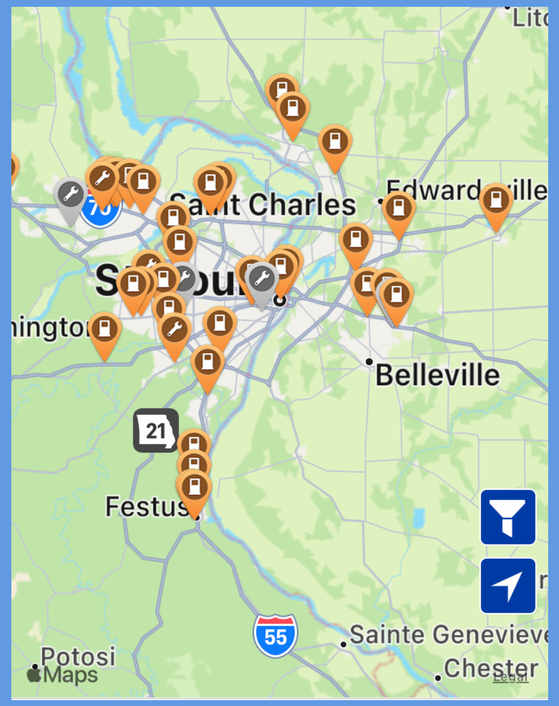
Tesla Superchargers
Groups of locations

Each map section is the same scale and shows how well each city is served by public charging

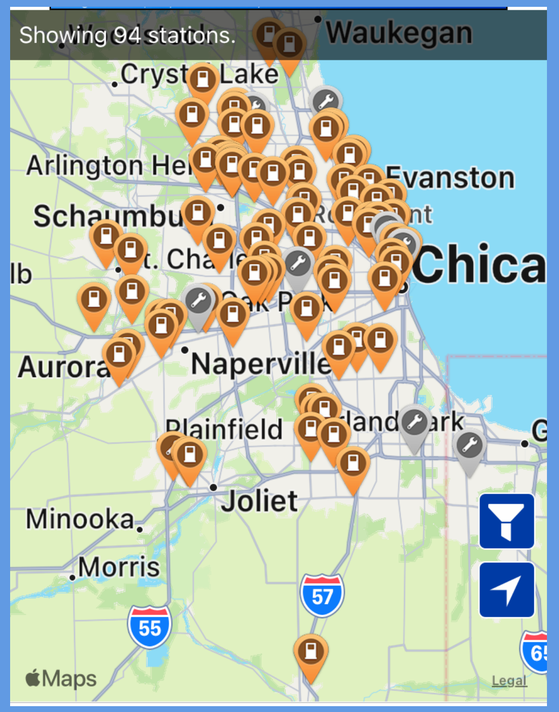
Session ??: Charger Apps



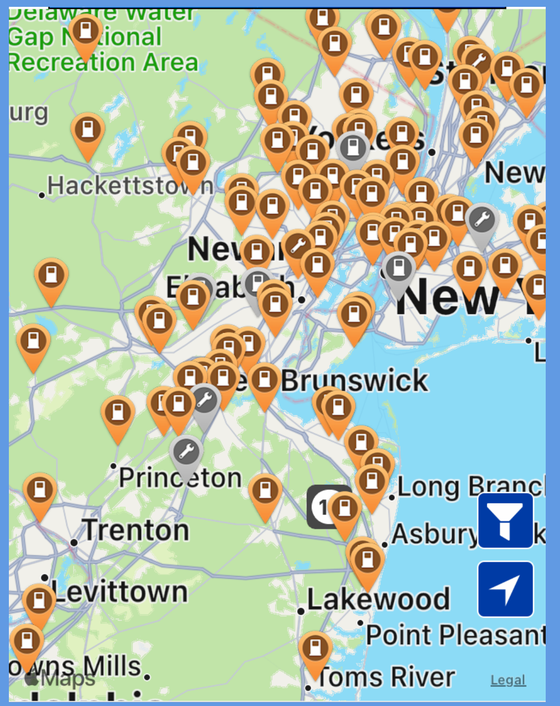
Los Angeles



St Louis



Chicago

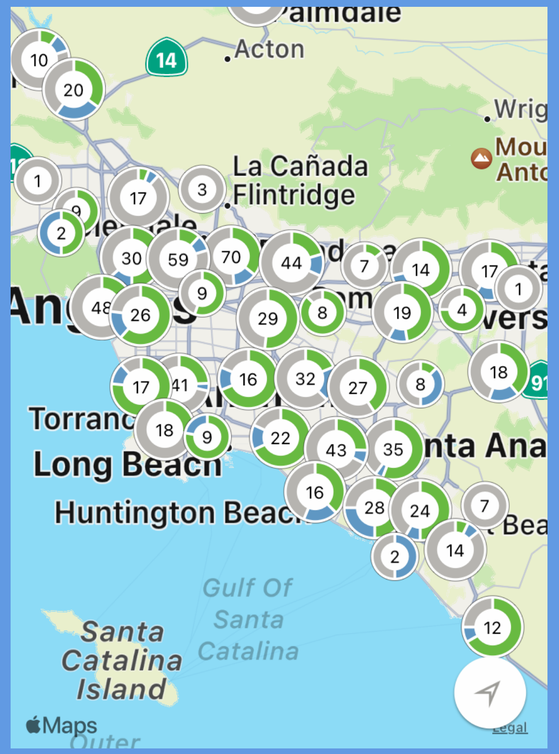


New York

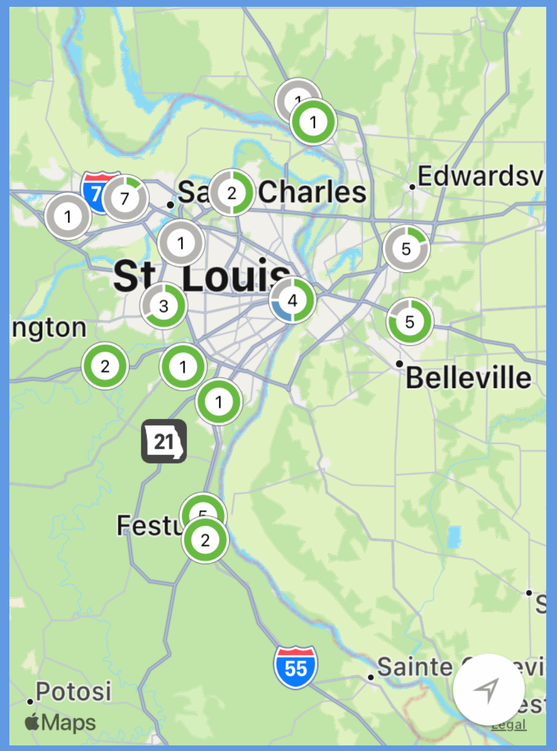
PlugShare
Individual locations

Each map section is the same scale and shows how well each city is served by public charging

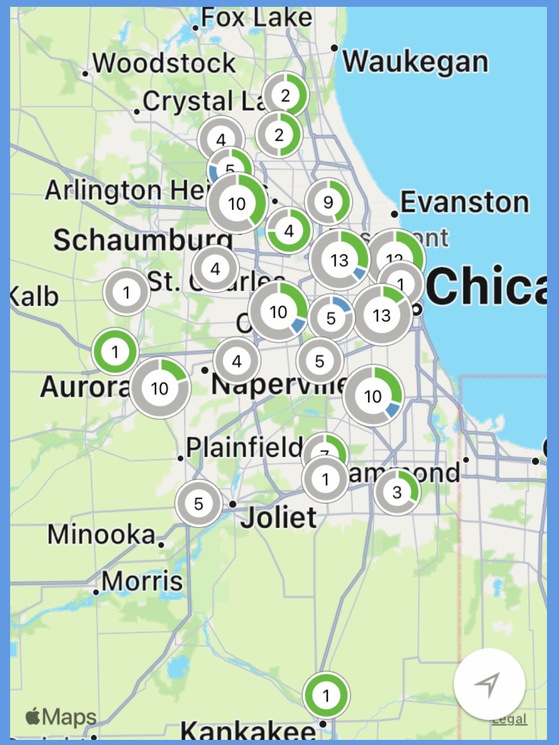
Session ??: Charger Apps



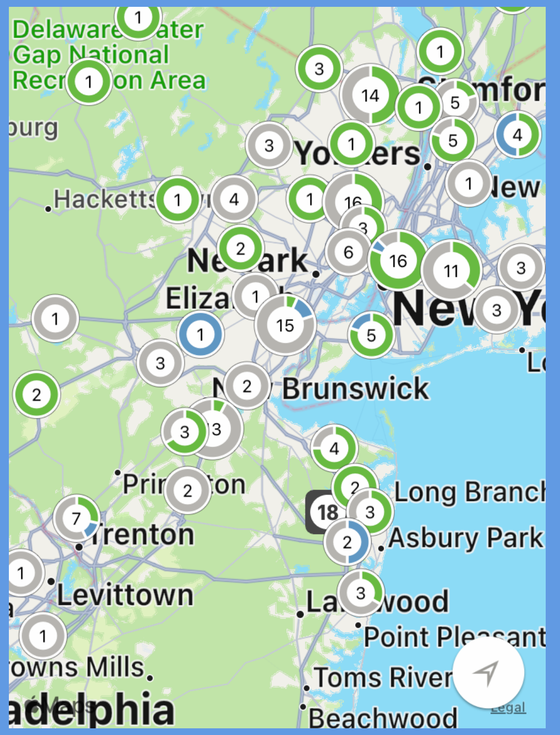
Los Angeles



St Louis



Chicago

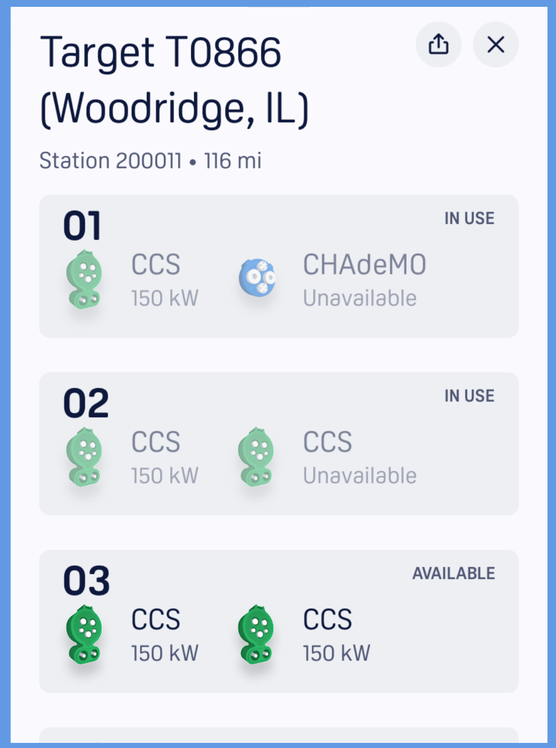


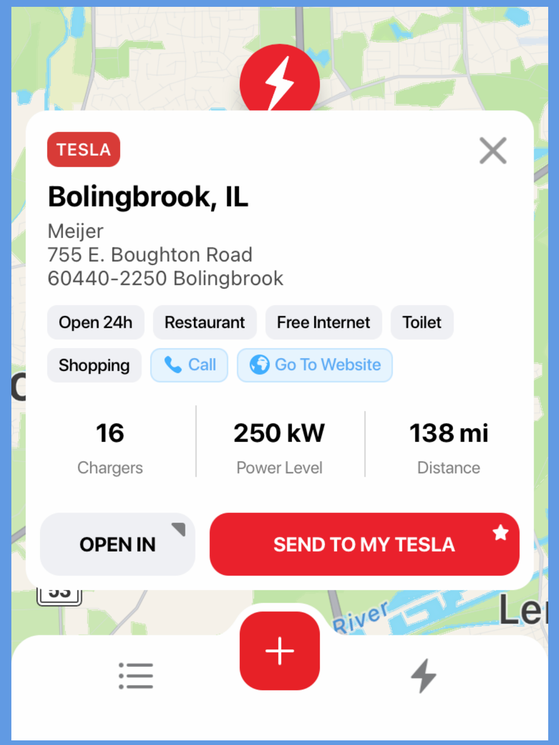
New York

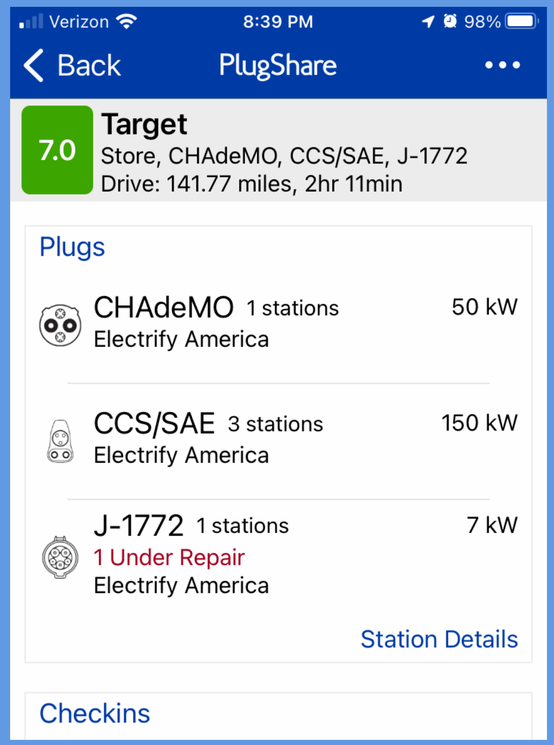
ChargePoint
Grouped locations and current usage.

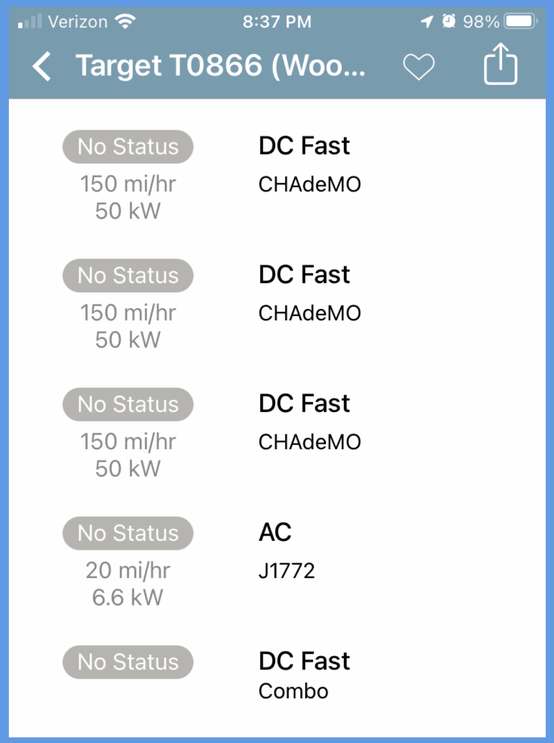
Each map section is the same scale and shows how well each city is served by public charging

Session ??: Charger Apps





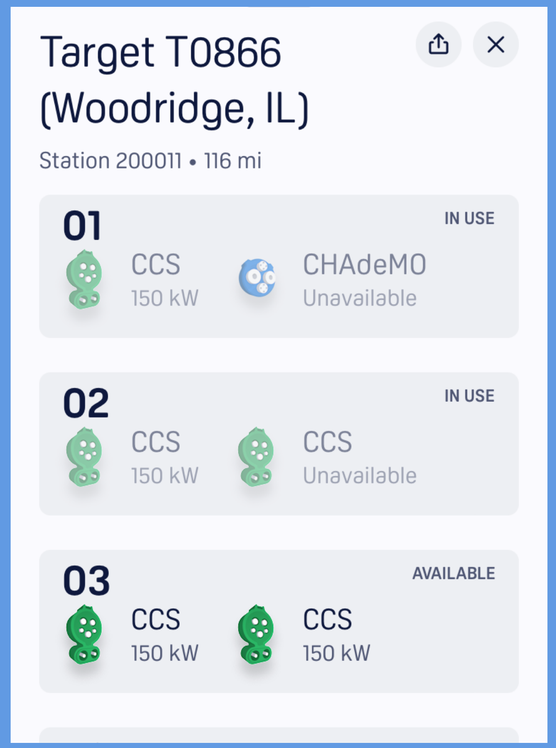


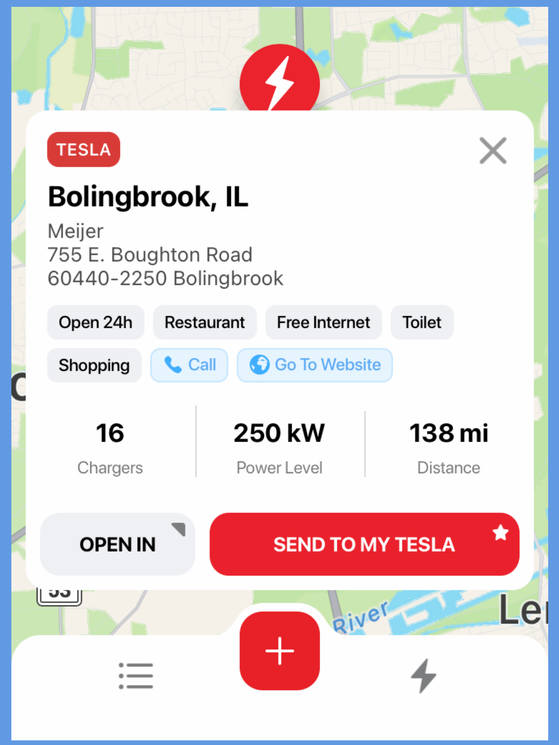


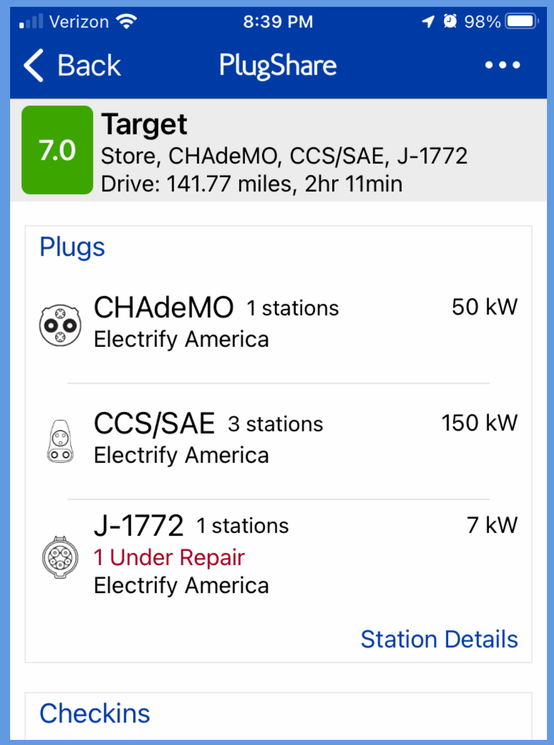
Electrify America Tesla Plugshare ChargePoint

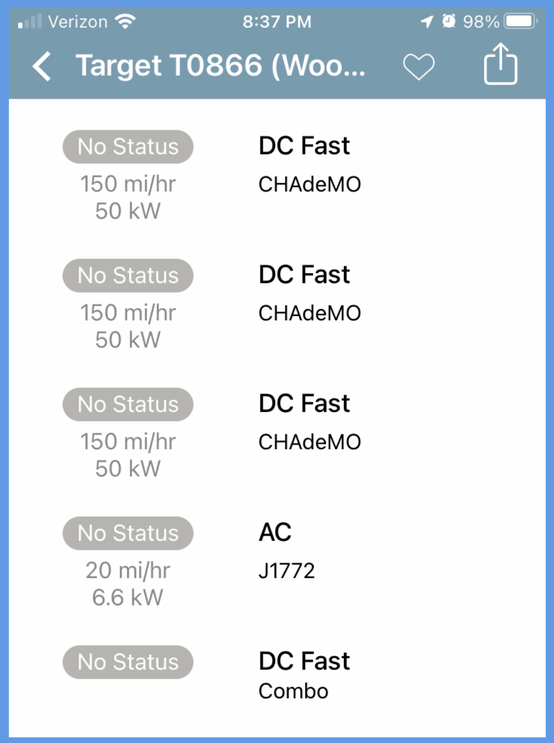
How the four apps display what is available at a location. Electrify America shows charger status and uses a GPS distance (off by 26 miles). Tesla, correct distance and amenities. PlugShare has distance correct, lists correct connectors, shows details with additional tap. (but not status). ChargePoint also does GPS distance, does list the chargers correctly.

Session ??: Charger Apps





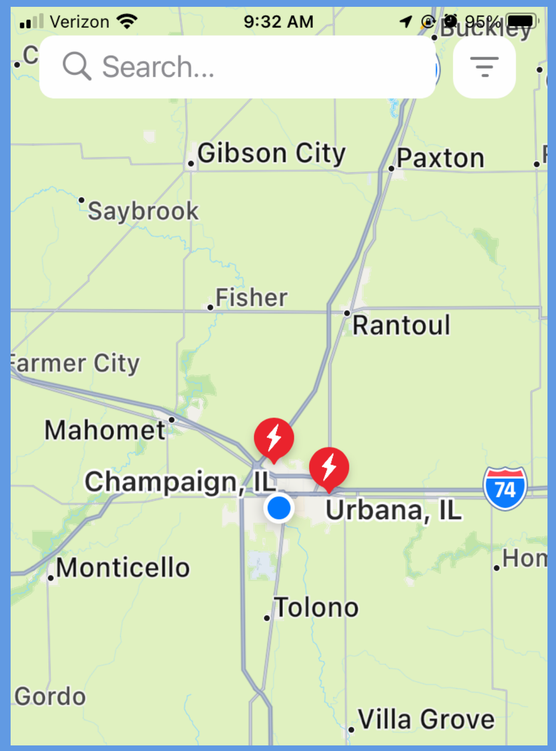


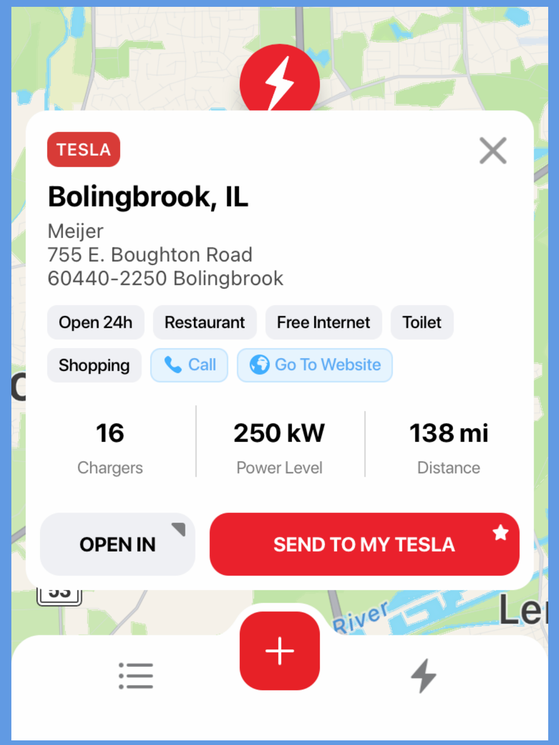


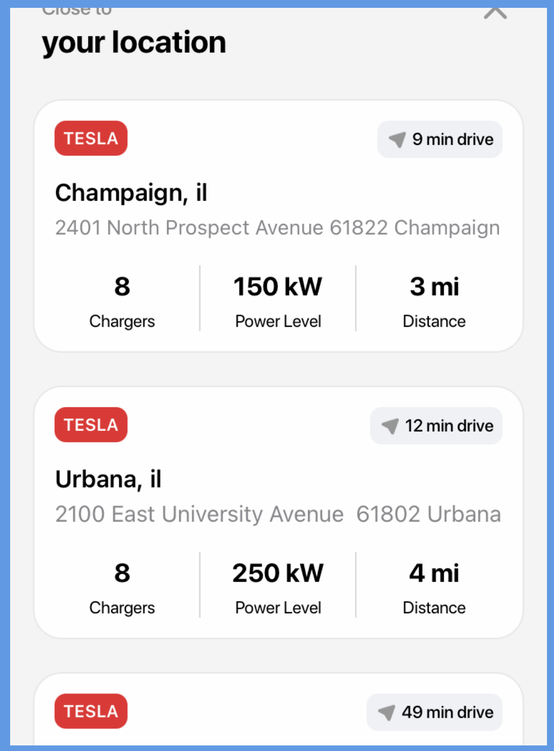
Electrify America | Tesla | Plugshare | ChargePoint

PlugShare is one of the few apps with comments and reviews. Tesla, Electrify America, ChargePoint and others generally will post if a charger is “unavailable” but will not have comments. PlugShare does not have access to network information and will not have information if a charger is currently in use.

Session ??: Charger Apps







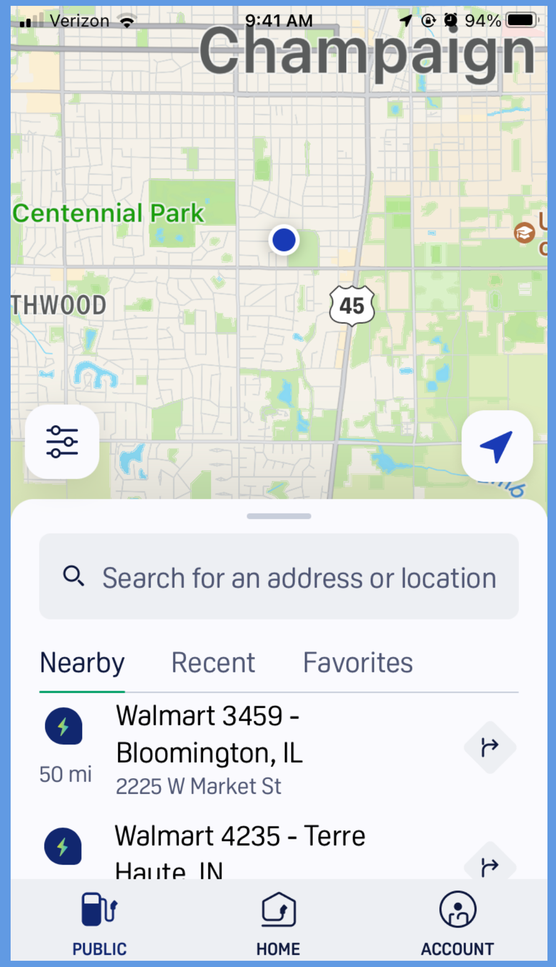
Tesla

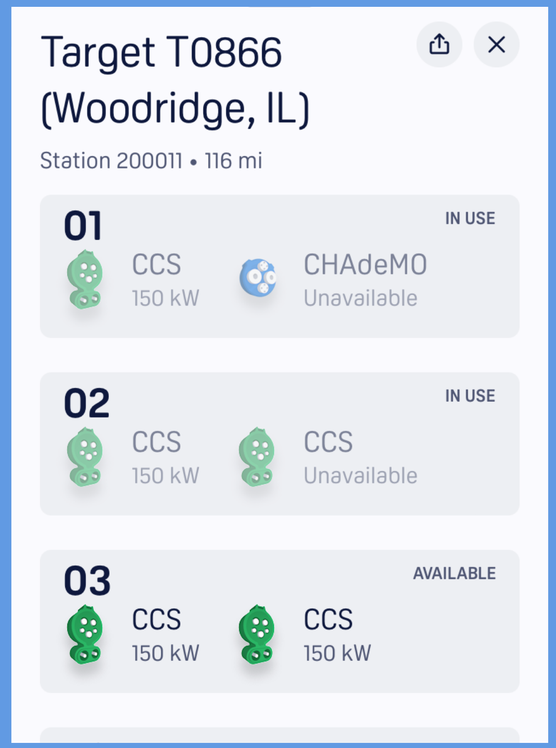
Tesla is its own world - you only need it if you own one.

Left image the start screen if you're in Champaign, center -the location on I355, right - details of current location.

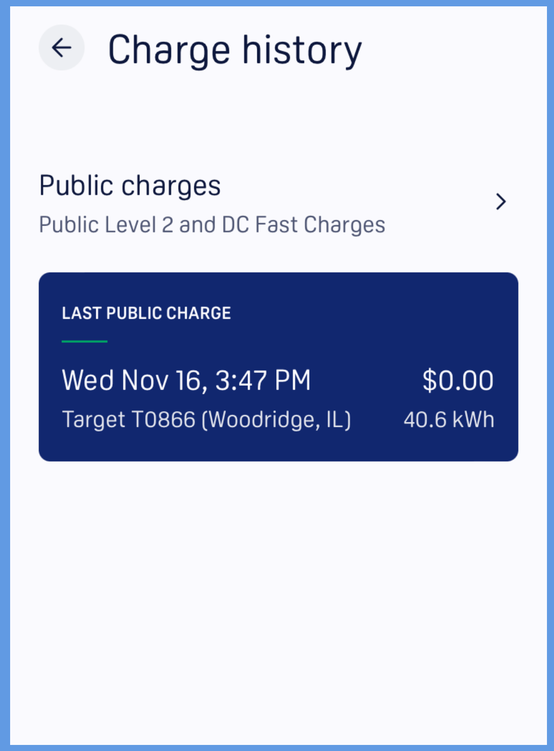
Both Tesla and Electrify America only show Fast Chargers

Session ??: Charger Apps





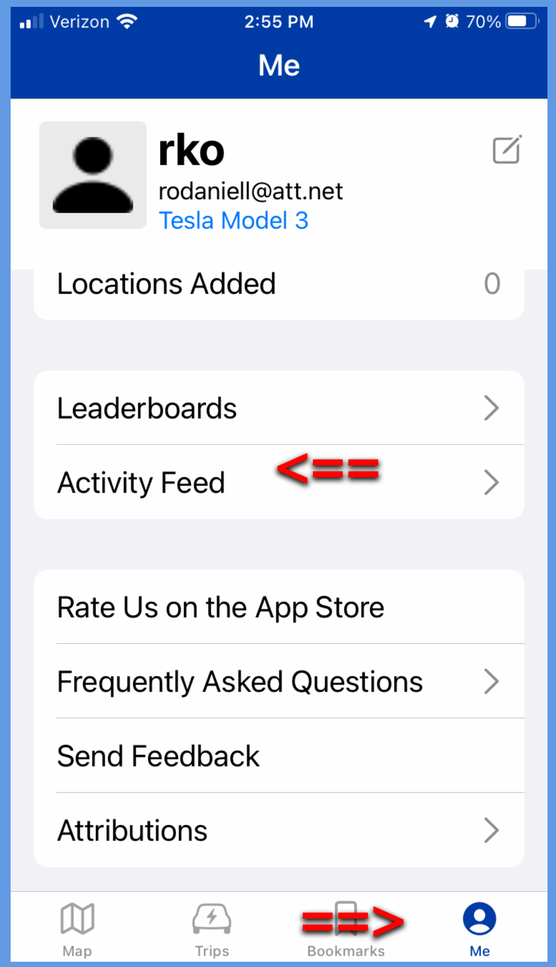
Electrify America



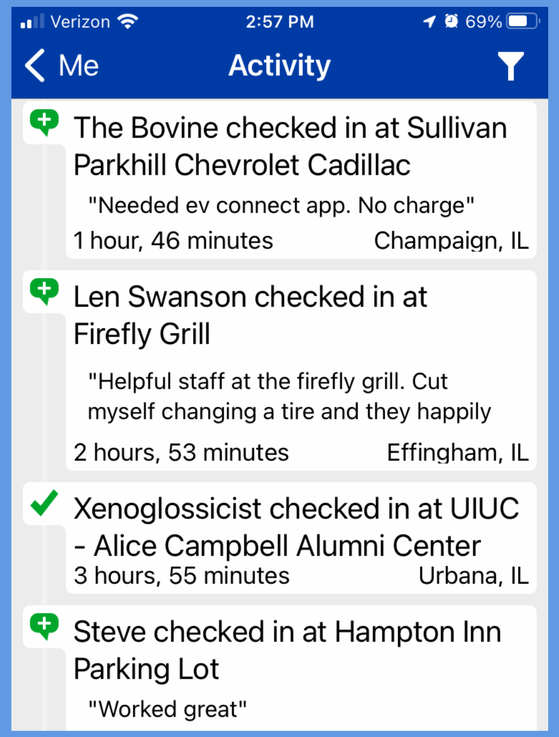
EA- I find very useful because its the best high speed charging network. Left image the start screen if you're in Champaign, center -My go to location in the Chicago area, right - I like the charging history .

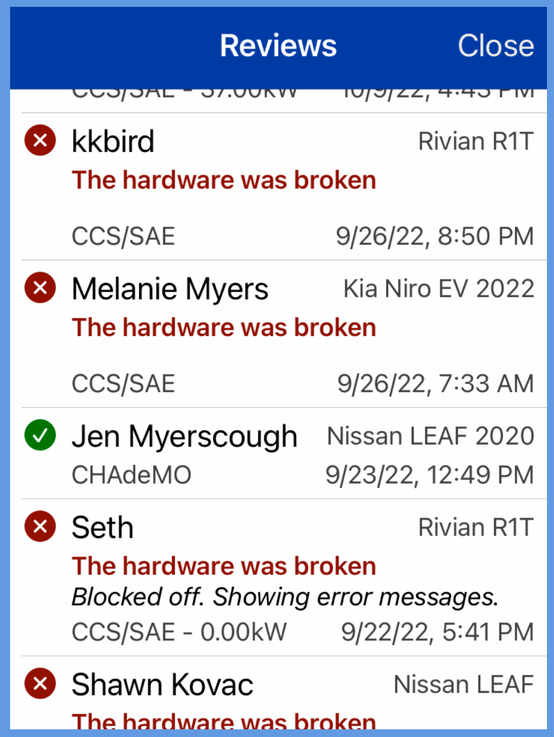
Both Tesla and Electrify America only show Fast Chargers

Session ??: Charger Apps



Plugshare



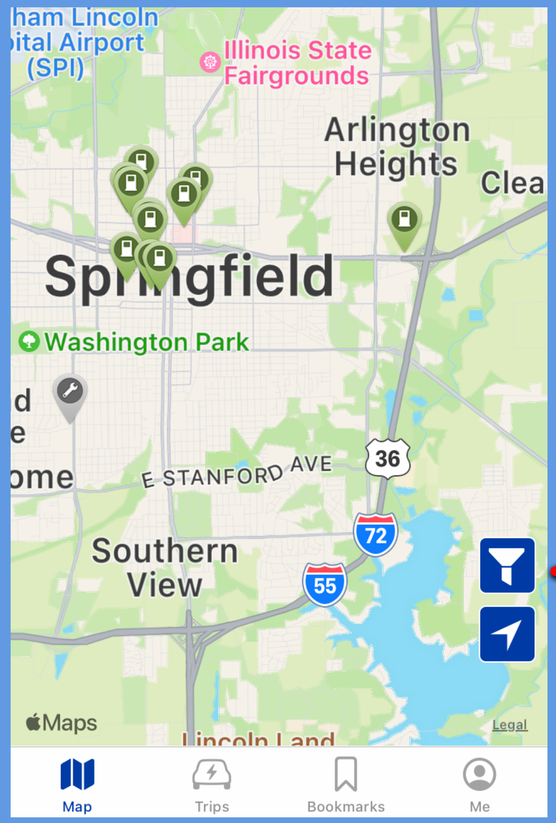


The “reviews” are checkins posted directly to a specific charger location, in this case the Wally’s in Pontiac, still having charger problems.

Plugshare is a crowd source App

EV users locate, comment on, describe, add photos and review public chargers. Click on the “me” at the bottom, then “activity feed” (red arrows) and you will get the most recent checkins from an area within 50 miles or so from your current location.

Session ??: Charger Apps

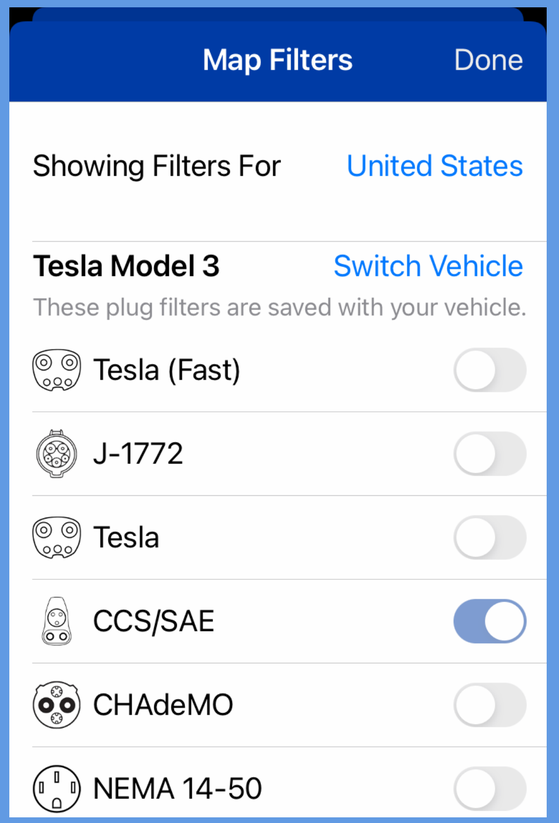


Plugshare

Icon to change to current location

<==

Icon to change to charger type



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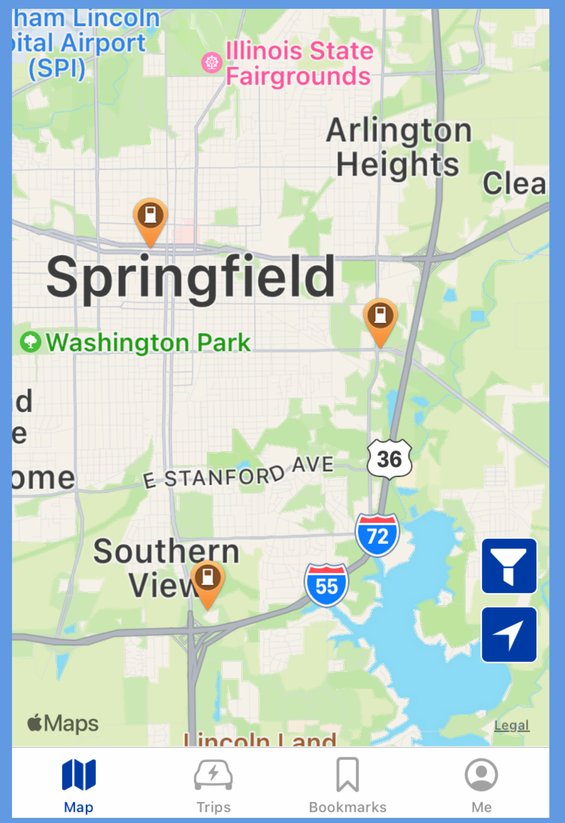
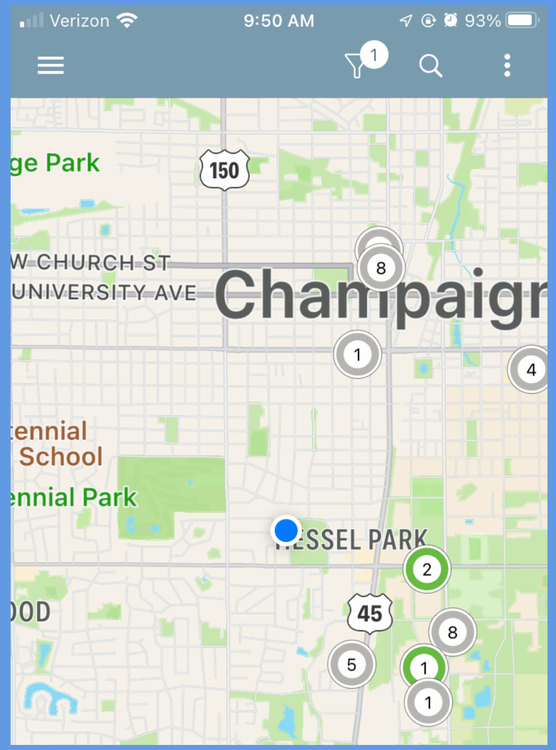
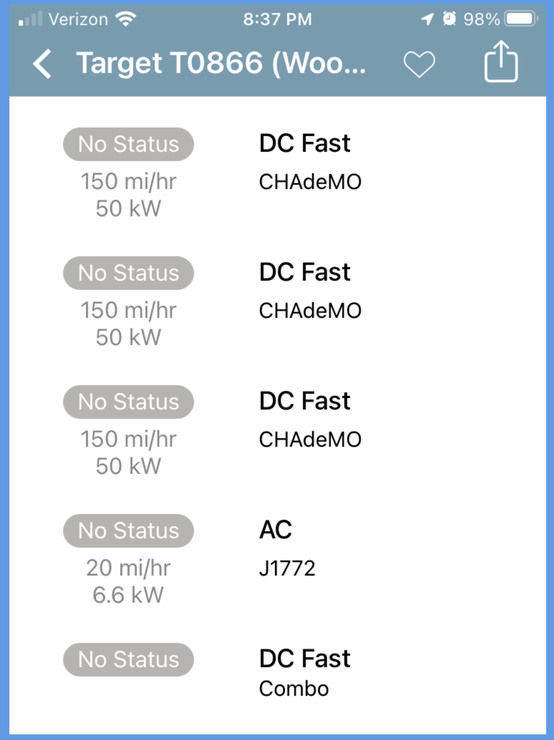
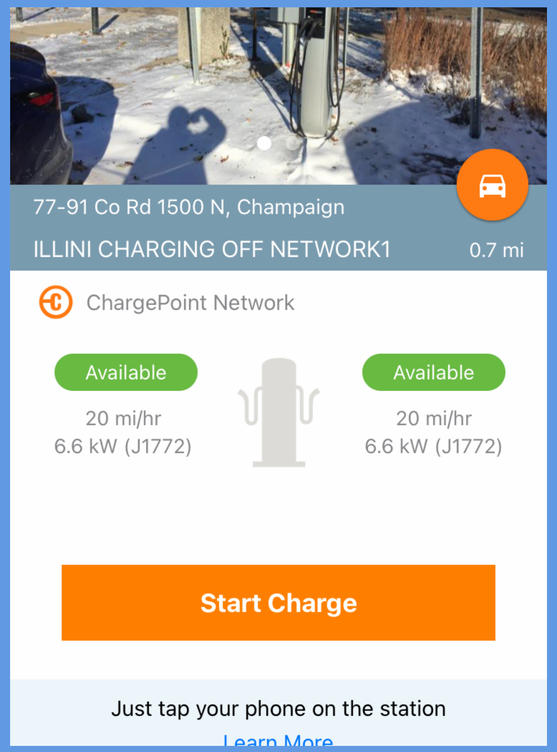


On some apps you can select which type of charger is bing searched . On the left app shows lots of level 2 locations. Click on the charger type icon. Select type of charger you want to see. Save and now the map shows CCS DCFC locations.

Session ??: Charger Apps



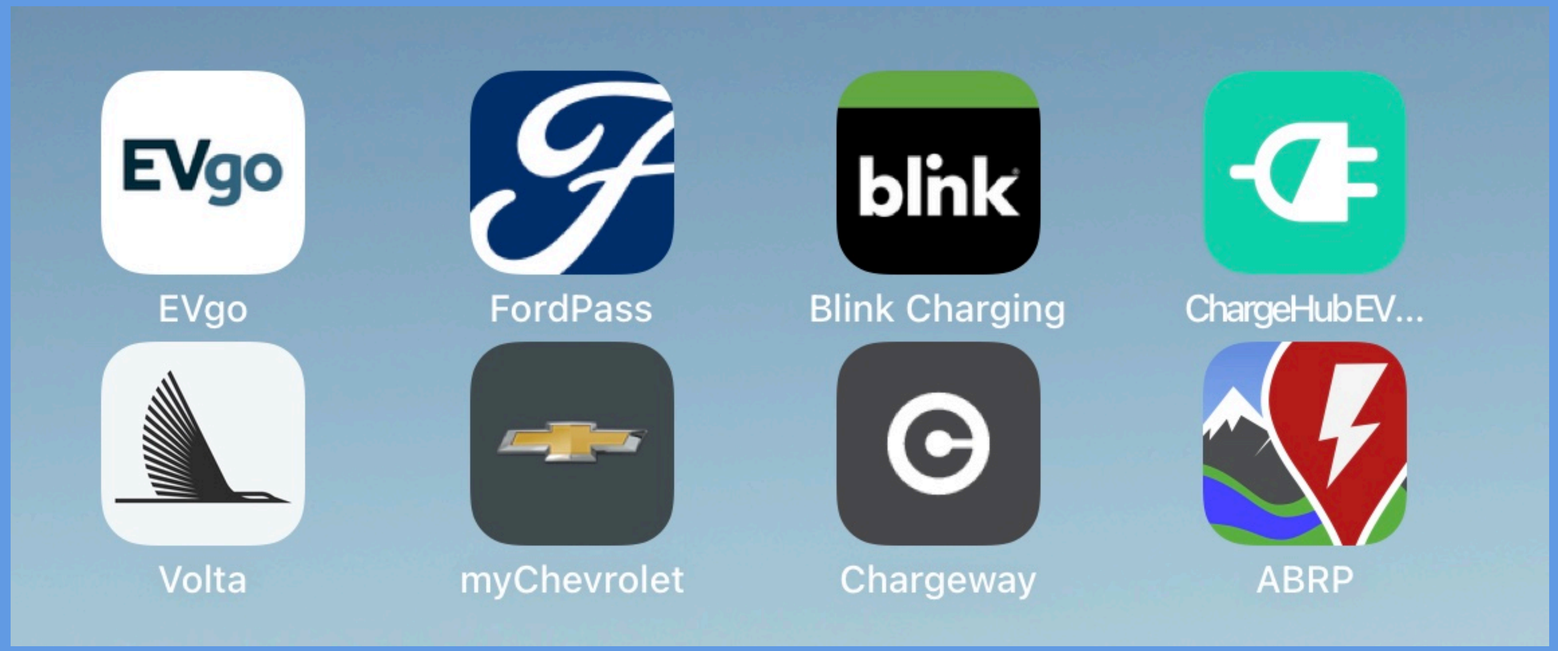




ChargePoint

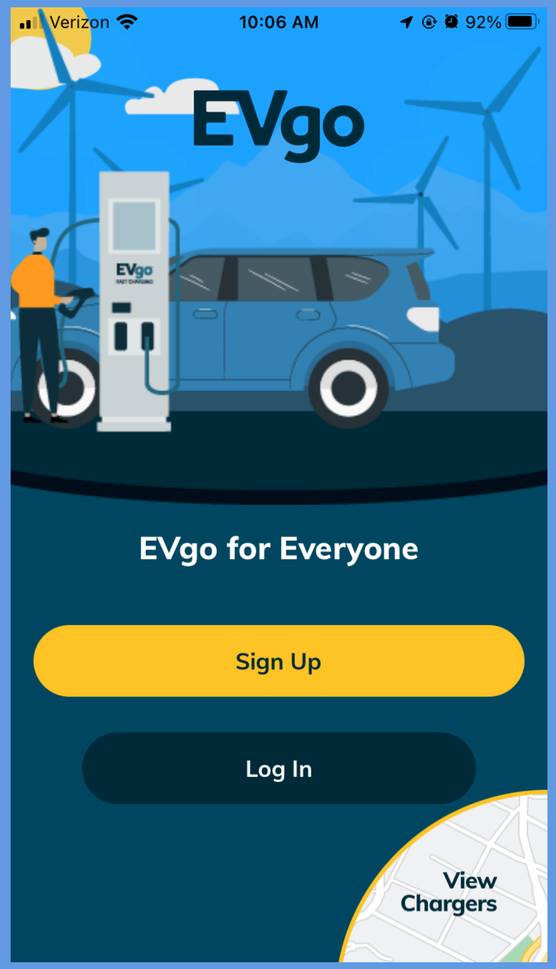
I don't find very useful except for using the app to when using a charge station (right screen) Left image the "home" screen if you're in Champaign, center - a description of an Electrify America location. I prefer to find Level2 stations with PlugShare , then switch to Chargepoint app if its one of theirs.

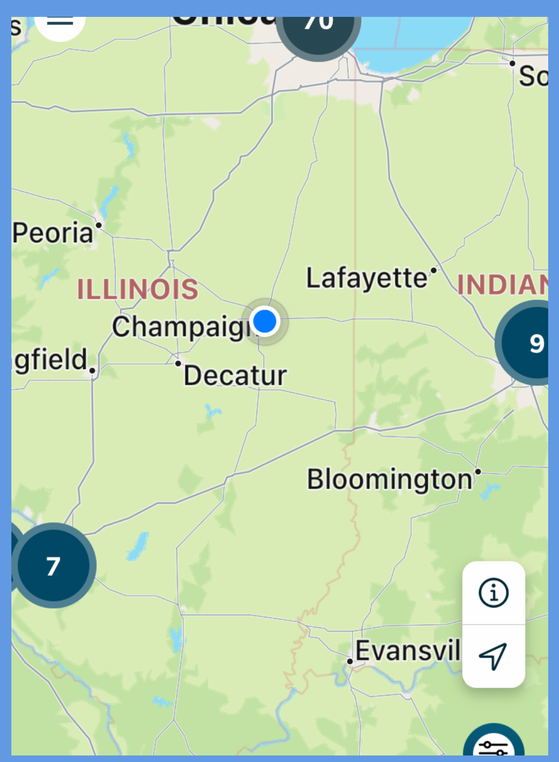
Session ??: Charger Apps

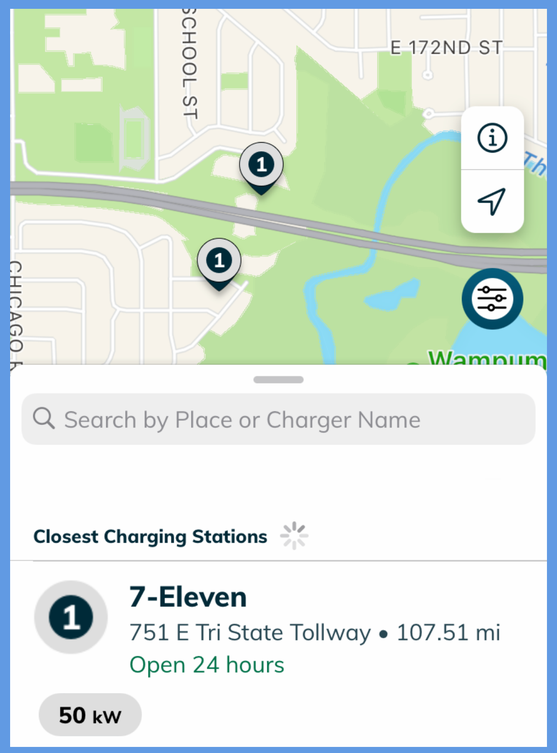


A quick run-through of the others.

Session ??: Charger Apps





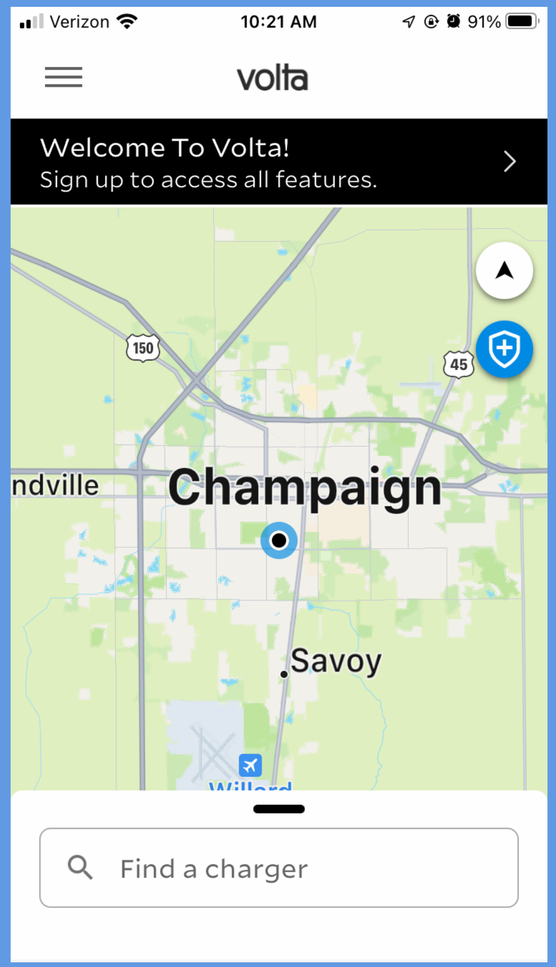


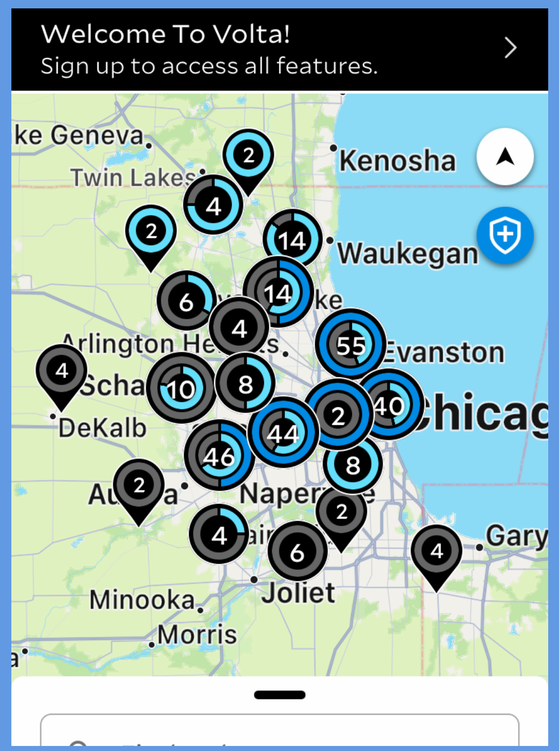
Left image the start screen, center -very few locations in Illinois, right - details of a typical location with only one 50 kw charger.

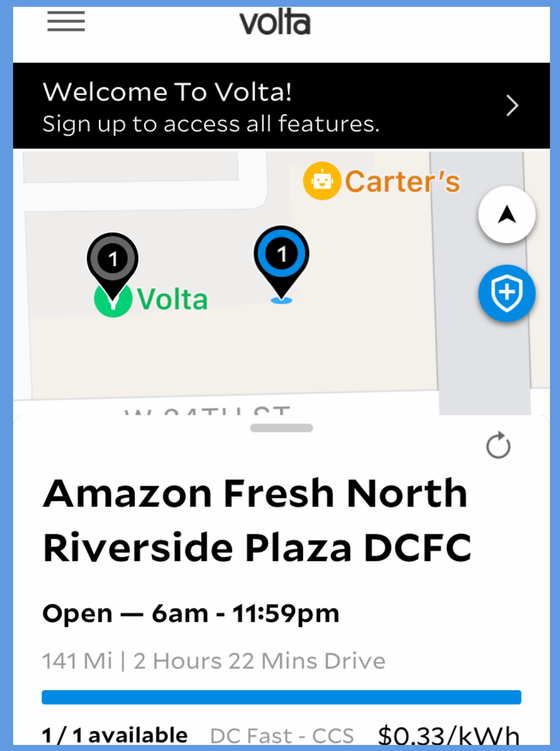
EVgo

EVgo used to be somebody - until 2020. Their growth stalled and Electrify America was started with $2 billion dollars of VW “Dieselgate money”. EA rapidly outpaced them with locations with a minimum of 4 150kw chargers. EVgo is just beginning to grow again, adding locations with multiple chargers of 150 and 350 kw.

Session ??: Charger Apps



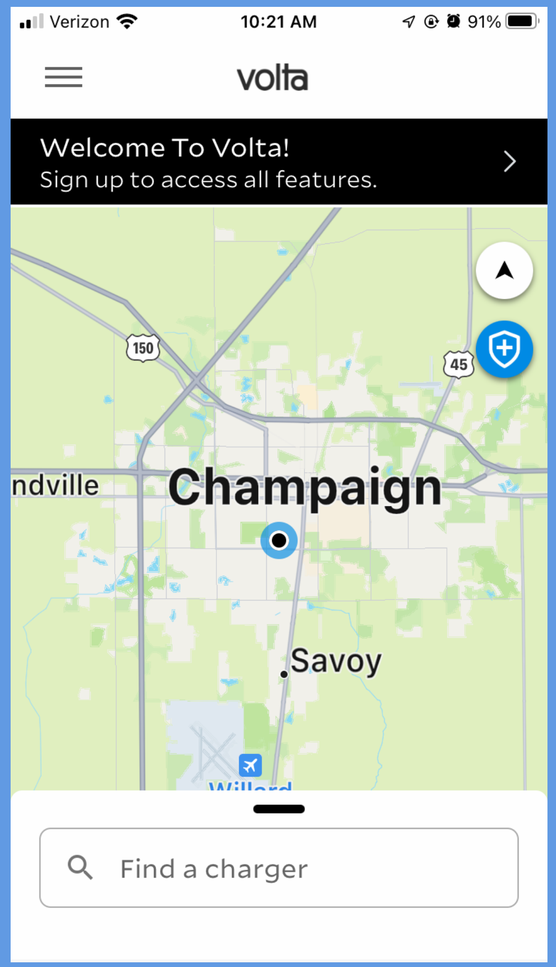


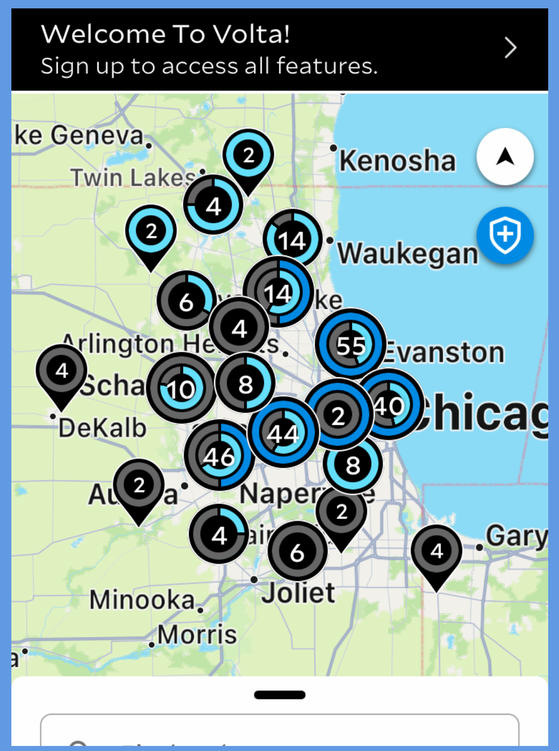


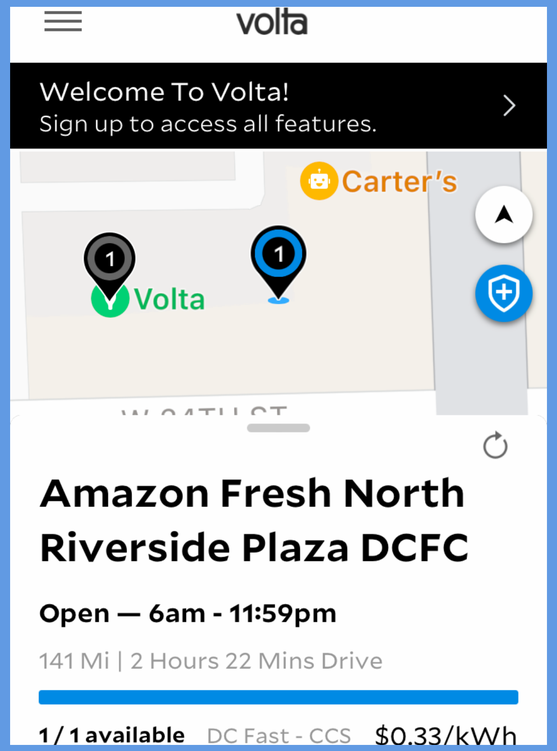
Volta

Mostly level 2 chargers that are FREE. They approach shopping sites, install chargers free to the stores, let EV drivers charge for free and make all of their money advertising on the Charger cabinet. Branching into DCFC, but those have a fee.

Session ??: Charger Apps







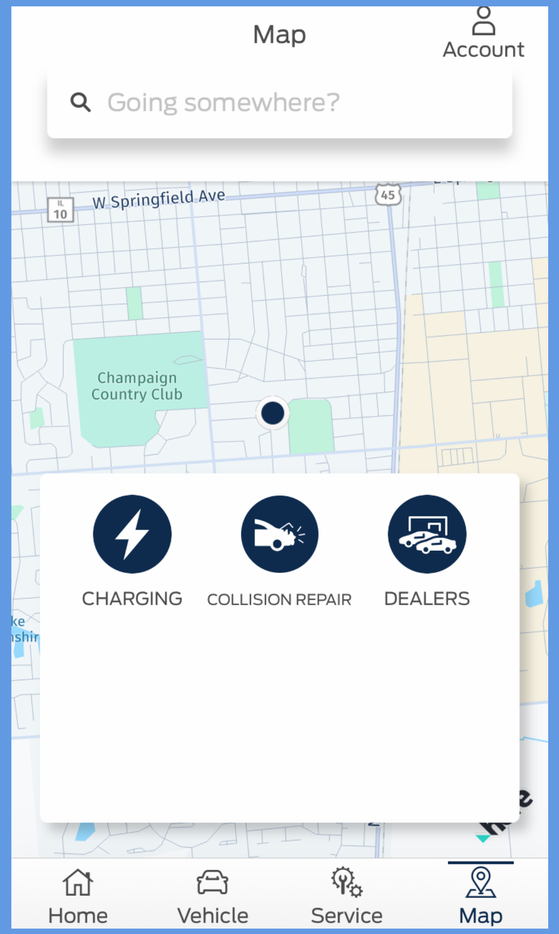
Left image the start screen, , center -Chicago locations, right - details of a location with DCFC charger. Volta DCFC are usually between 50-100 kw.

Volta

I LOVE Volta - I bought some stock, lost 90% of my money. Excellent charging experience, excellent business plan. Made every prudent long term move and the stock market hammered them. They deliberately slowed growth to wait for Jan 1st federal money.

Session ??: Charger Apps

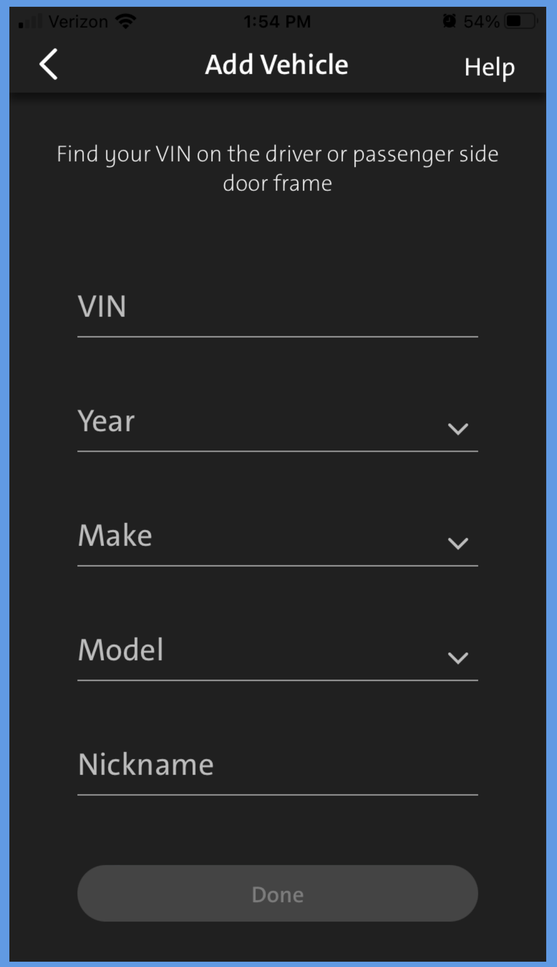
Electrify America

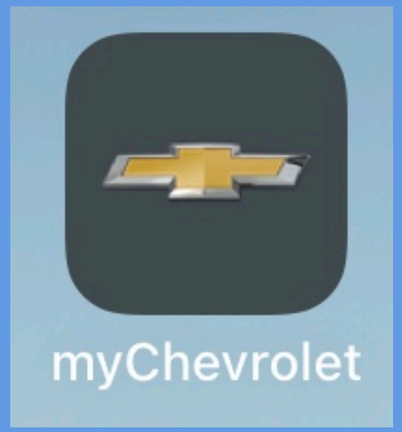


FordPass

Its an app aimed at Ford owners. It has links to services other than charging. Ford does not have a network. When companies like them claim and name a network, almost always it is a partnership with actual charging networks.

Session ??: Charger Apps





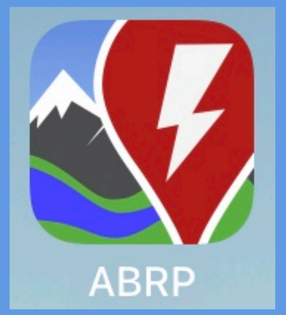
Chevy an app is so aimed at Chevy owners you need a VIN to sign up.

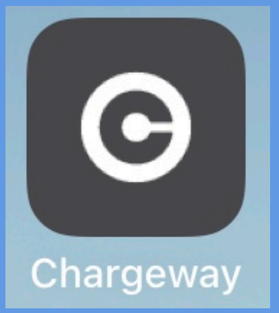
Ford and Chevy apps are likely mediocre at finding chargers. Dedicated apps do a better job of giving information about the chargers and allow better decisions to be made.

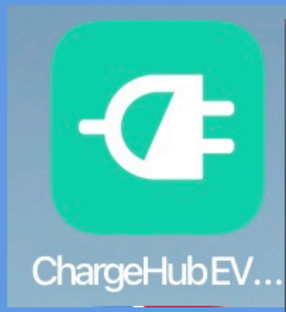
Session ??: Charger Apps

I mentioned before that Blink charger fees are high. Blink would be my last choice for a charger. But sometime it might be the only charger. If so consider signing up on the app to get discounted fees.

Shell is starting a program to install DCFC at gas stations. App call ShellReCharge. Charging network is Greenlots renamed. Planning installation of 500,000 chargers by 2025. Currently this app has little use (IMO)







ABRP (a better route planner) ; Chargeway; EVConnect; and ChargeHubEV. Primarily early attempt to make route planning easier. Interesting concept - try them. I personally will do most of my planning with Electrify America and use PlugShare to fill in the gaps. Both work quite well on the dining room table with a cup of coffee. (Or at a coffee shop)