Looking Into Electric Cars

Session 2 : Range (and its anxiety)

"Which is more important," asked Big Panda, "the journey or the destination?"

"The company." said Tiny Dragon.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

2.0 mi/kWh & 60% rule still gets you to Bradley

Breaking news

Teslas and cold weather.

Chicago EV charging reports.

I'll reveal interesting details at the end of this session.

Knowledge is power & too bad they weren't informed.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Breaking news

Toyota confirms 750 mi range solid-state EV battery plans to catch up to Tesla, but when?

Peter Johnson | 29 seconds ago | 0 Comments

Electrek

New batteries and especially new types of batteries usually take 5 + years to reach the market. So maybe 2027? (VW has one also)

The Guess-o-Meter

Past performance does not guarantee future results

Anxiety can make you do strange things

Range anxiety = not knowing how far you can actually drive. And is there enough charge to drive to the next adequate charger.

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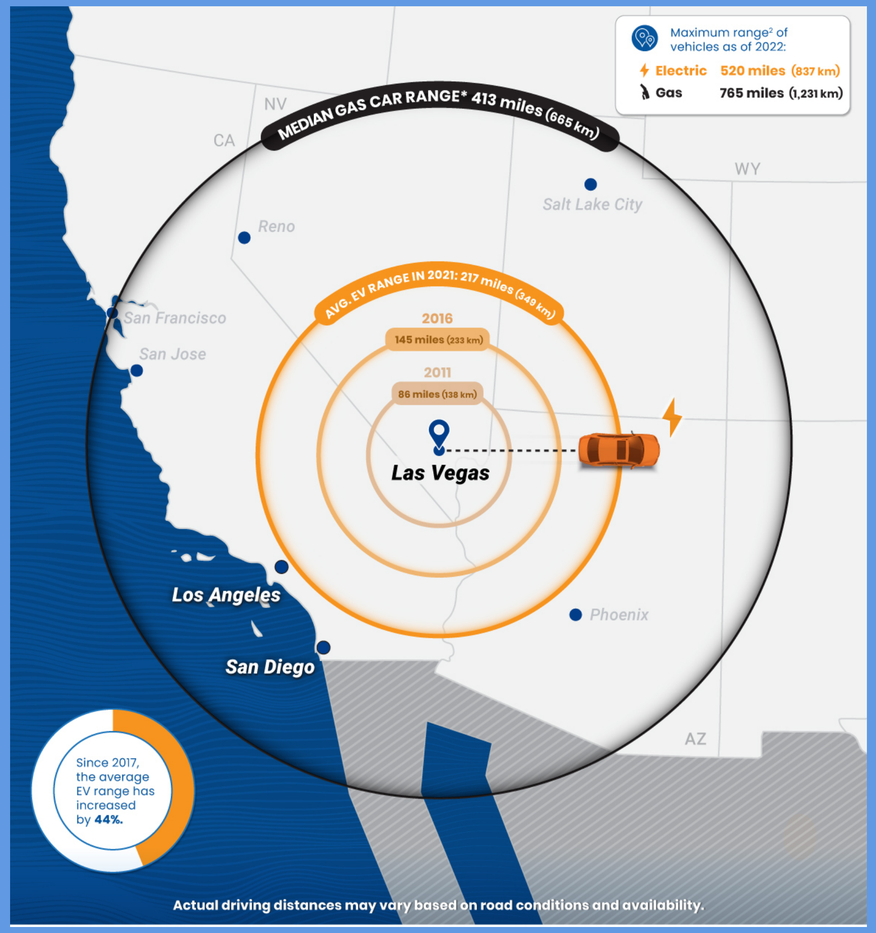
Session 2 : Range (and its anxiety)

Past Performance vs Future Results



Possibly some anxiety is the result of how recently EVs with the longest range still didn't go that far. And still recently, there are a lot of horror stories out there. Some from people who just bought a car and took off down the road. Some from automotive press writers with a short time with a vehicle and little to no real life EV experience.

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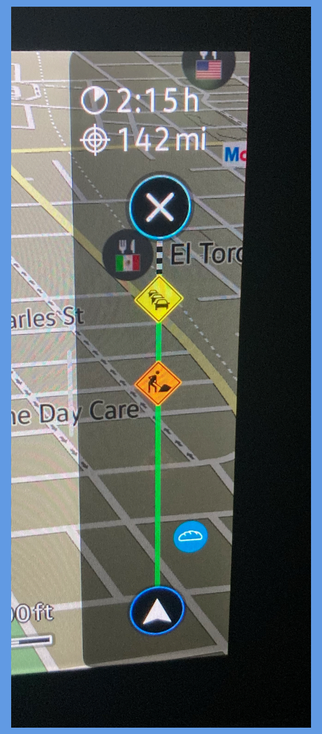
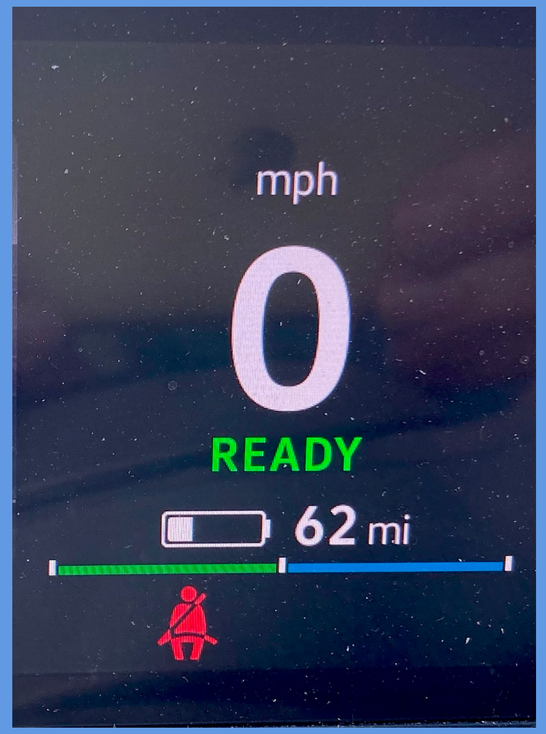
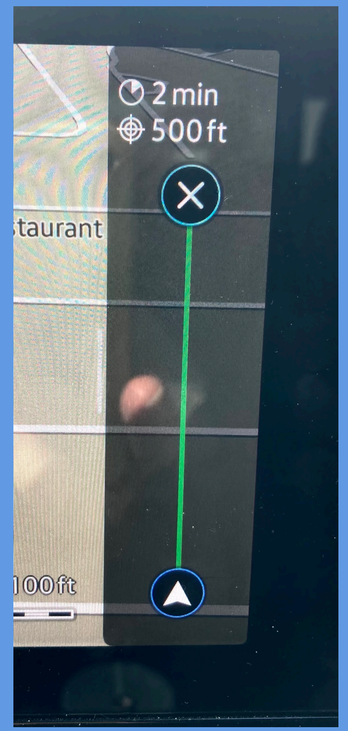
Session 2 : Range (and its anxiety)

Past Performance vs Future Results

And the “range” on the dash doesn’t help







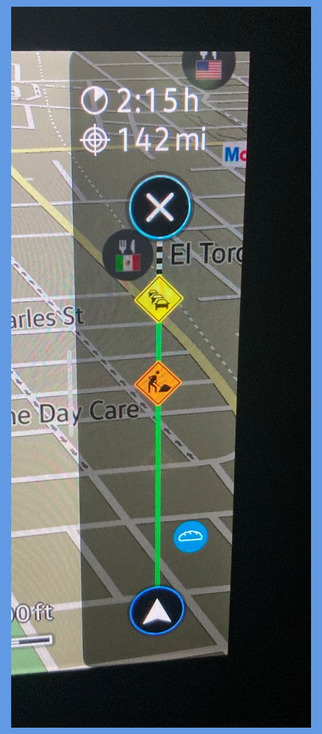
267 miles of range at start of trip. After driving 142 miles, the range is said to be 62 miles. If original was correct, the end of trip range should be 125 miles. “Range” was off by 65 miles. A 100% error.

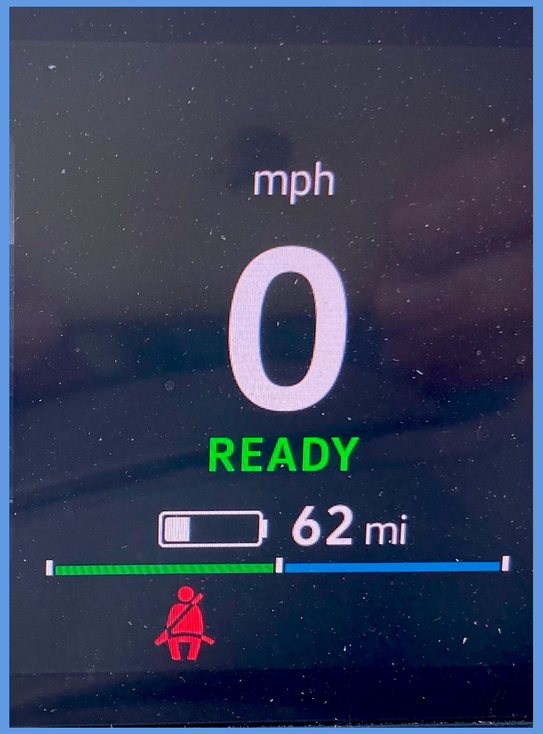
Looking Into Electric Cars

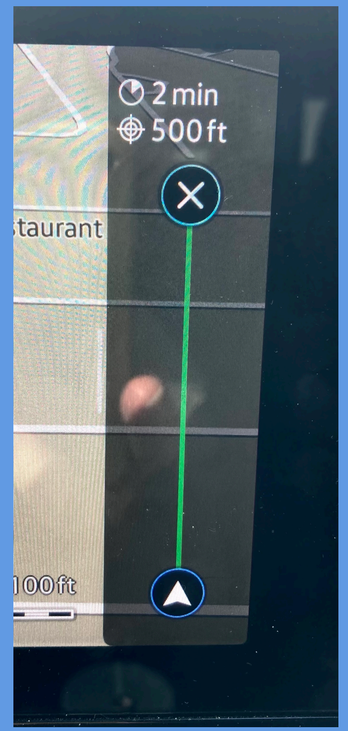
Session 2 : Range (and its anxiety)

Past Performance vs Future Results

And the “range” on the dash doesn’t help







A 100% error is bound to trigger range anxiety.

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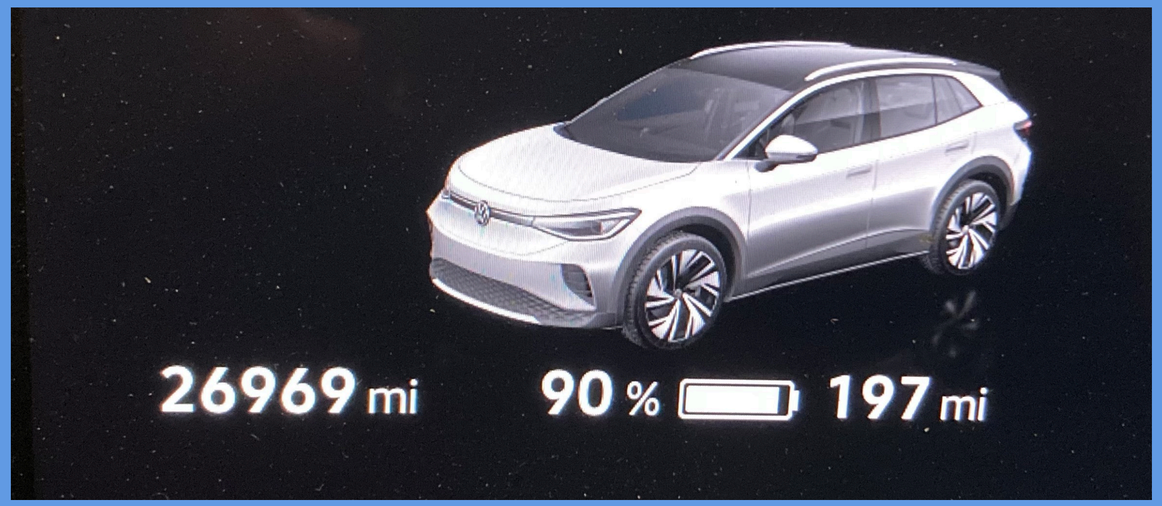
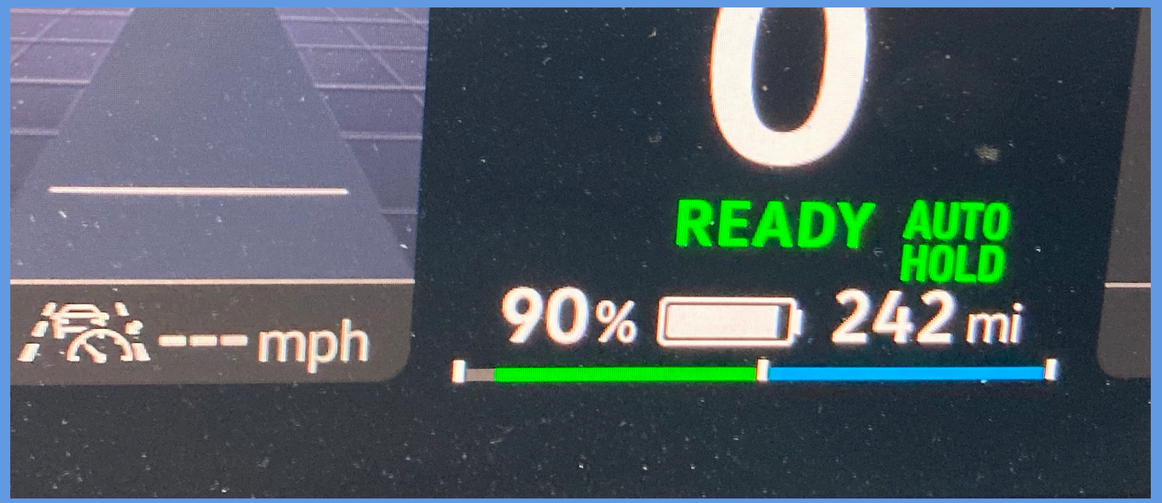
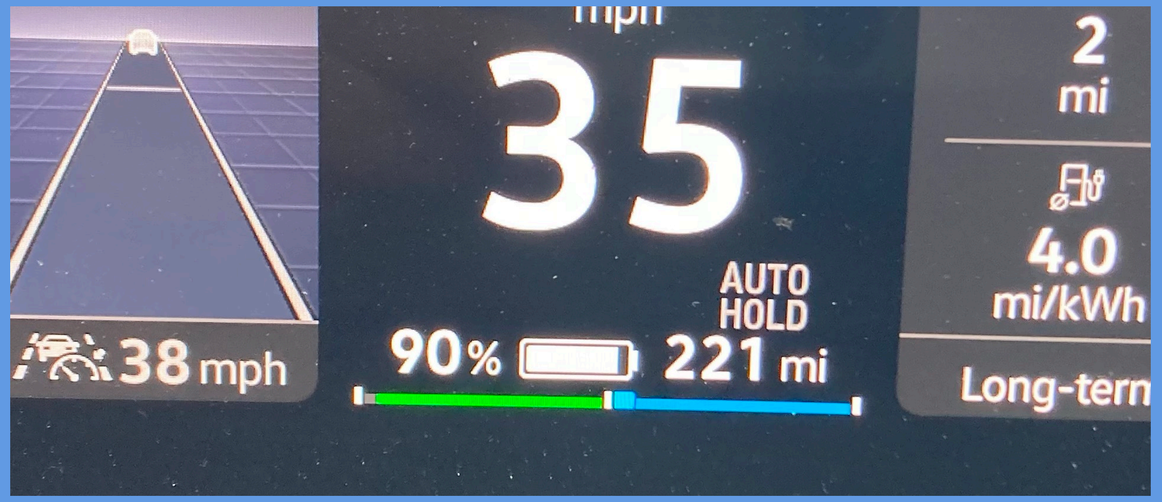
Session 2 : Range (and its anxiety)

Past Performance vs Future Results





And then This happened -
Above at end of charge, above right after car started and lower right
5 minutes later 2 miles away (2miles or 21 miles?)



Looking Into Electric Cars

Session 2 : Range (and its anxiety)

We'll work on that anxiety

But First

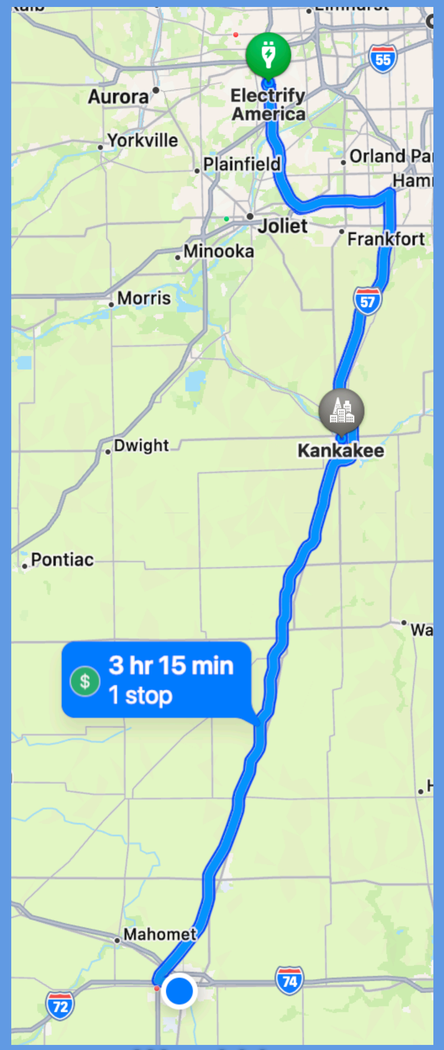
The good news. Even in the WORST weather that I have data. The next DCFC station is within range. The worst I have seen is 1.9 miles per kWh. This is weather that just maybe you should stay off the roads. But even with the 60% rule, My car can be driven 90 miles.

Looking Into Electric Cars

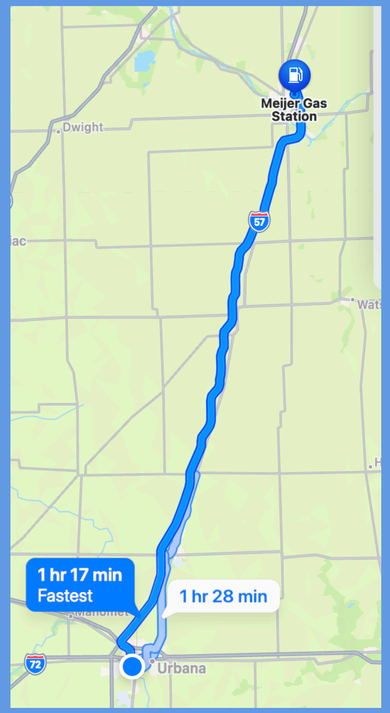
Session 2 : Range (and its anxiety)

Past Performance vs Future Results

Remember - (cold) (wind) (speed)



Woodridge



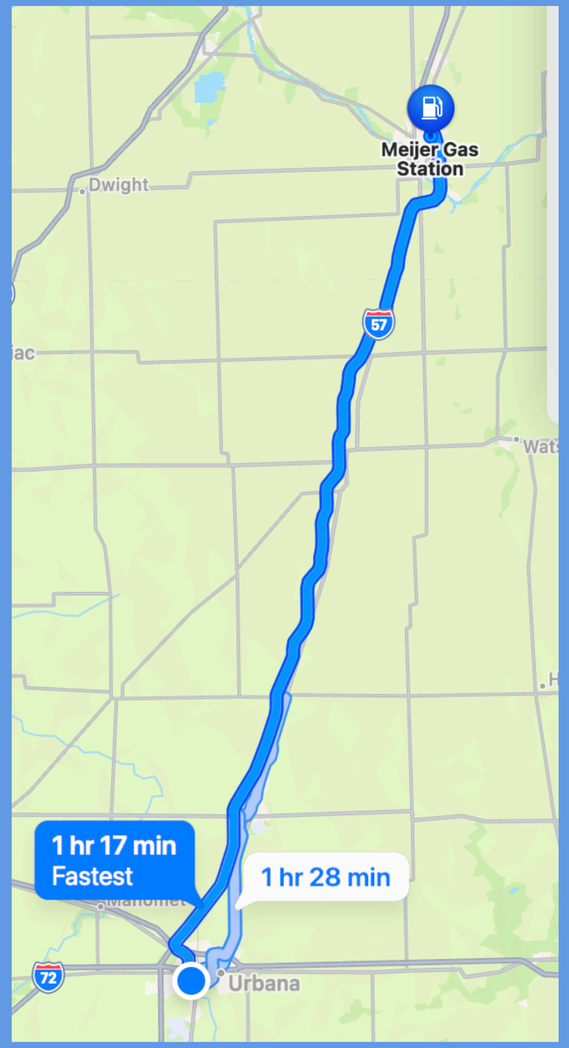
Bradley

I took delivery on my car on December 30 and my first range experiences were in January (cold). My first roadtrips were to the western suburbs of Chicago (distance) And sometimes it was windy (wind). The first preferred charger was Woodridge, 141 miles. On August 16th 2023 charger opened in Bradley, 86 miles. A very significant reduction in range anxiety.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results



Bradley

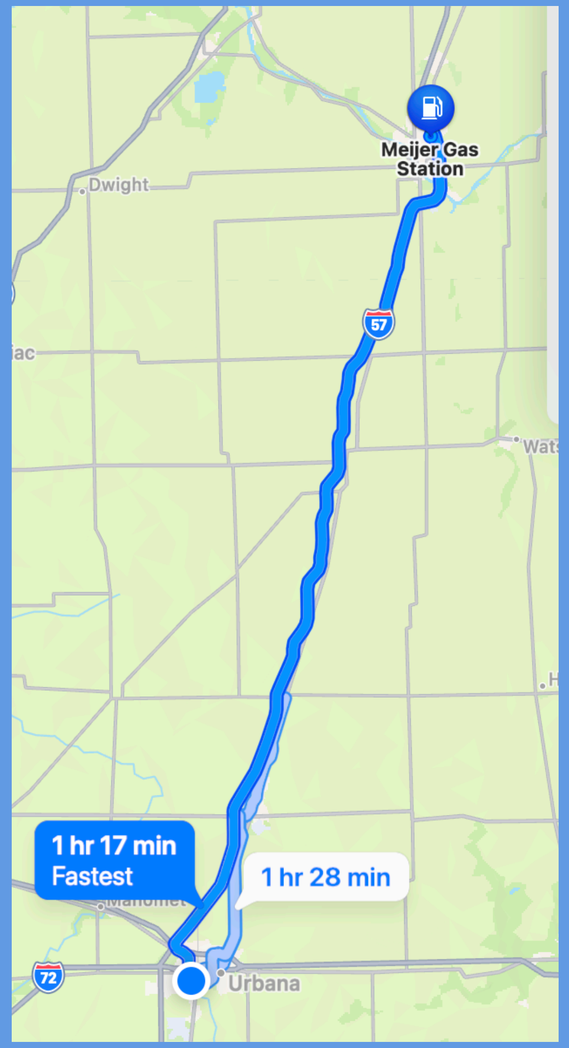
The good news. Even in the WORST weather that I have data. The Bradley location is within range. The worst I have seen is 1.9 miles per kWh. This is weather that just maybe you should stay off the roads. But even with the 60% rule, my car can always be driven 90 miles.

Remember - (cold) (wind) (speed)

They determine your distance.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)



Bradley

What is the 60% rule ?

Its a protocol to extend the life of the battery. If you keep your battery between 80% and 20% (A 60% difference), the expected life of modern EV batteries is expected to be 400,000 miles.

(With the newer battery technology, this is estimated but very reasonable.)

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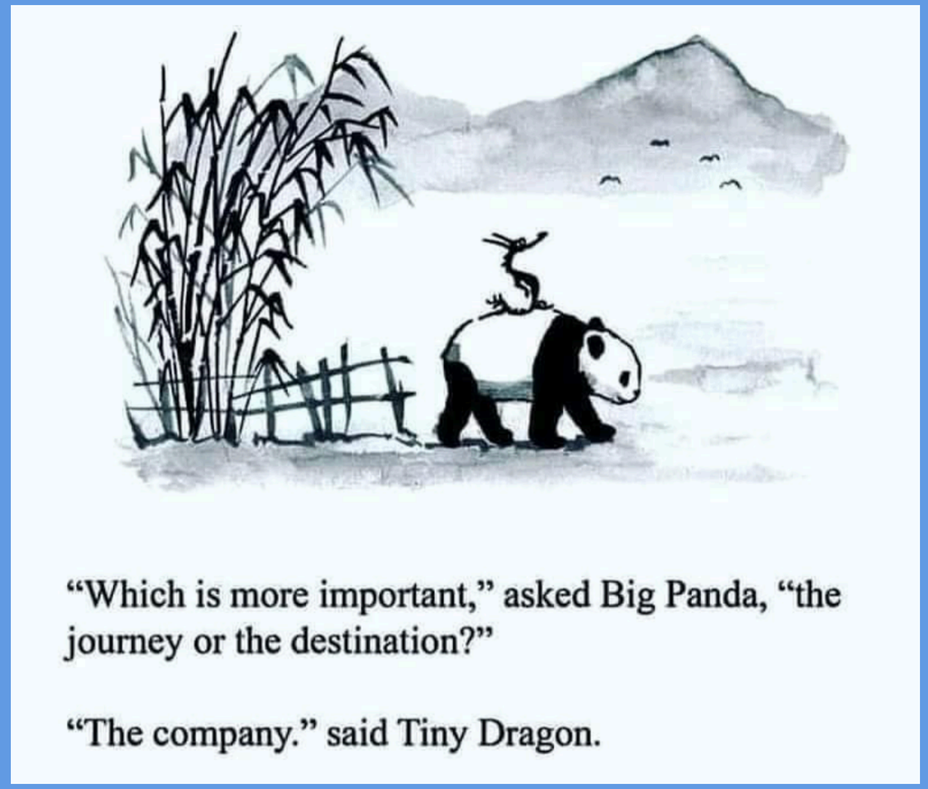
Session 2 : Range (and its anxiety)

Past Performance vs Future Results

Remember - (cold) (wind) (speed)



"Which is more important," asked Big Panda, "the journey or the destination?"

"The company." said Tiny Dragon.

What is the 60% rule.

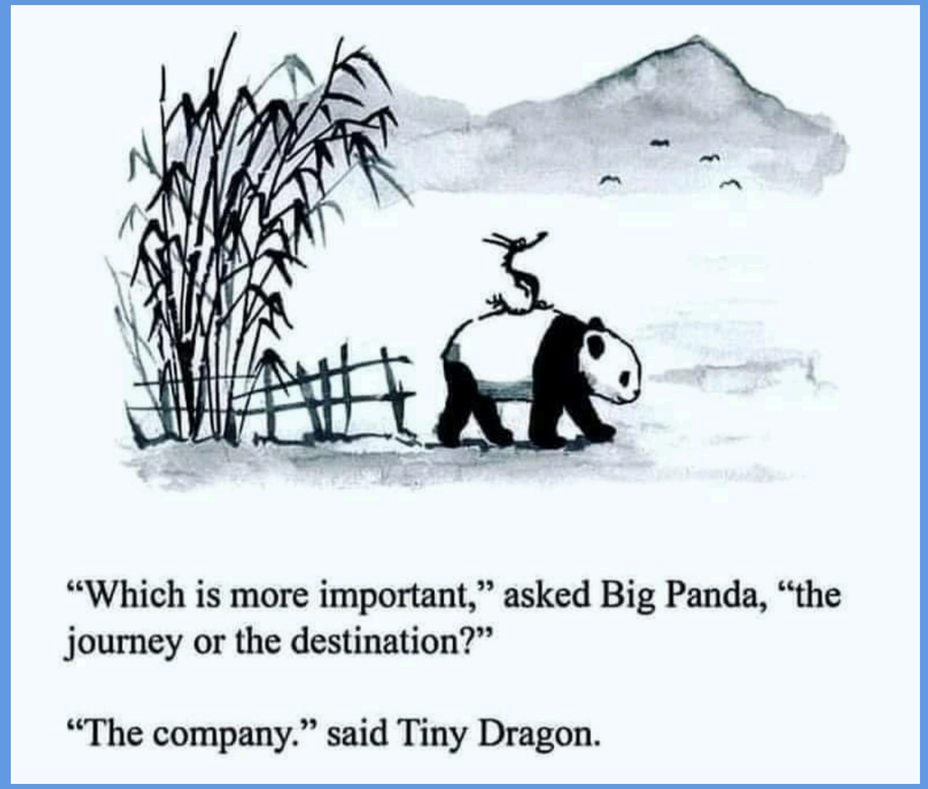
Yes - it does cut into the range. For my car 60% is 165 miles. More than twice the distance to Bradley. Which I now officially name the 90 mile or 90 minute travel leg.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results

Remember - (cold) (wind) (speed)



"Which is more important," asked Big Panda, "the journey or the destination?"

"The company." said Tiny Dragon.

the 90 mile/90 minute travel leg

This works for several reasons.

1) I want a restroom/beverage/ snack break every 90 minutes
2) Improves battery life
3) Shortens charge time

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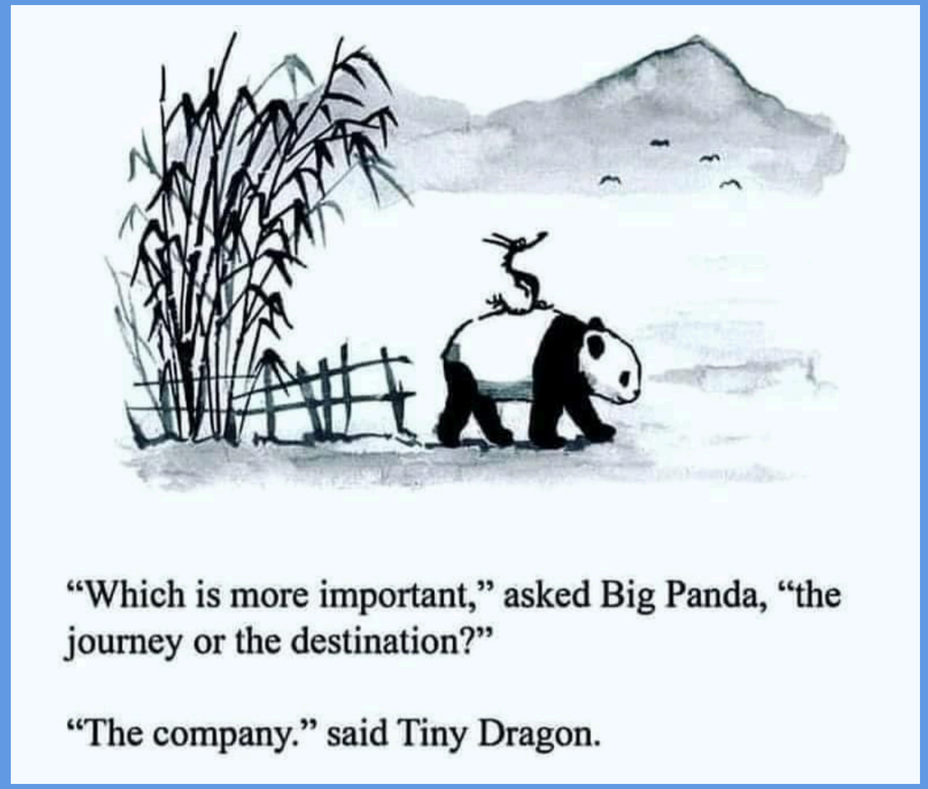
Session 2 : Range (and its anxiety)

Past Performance vs Future Results

Remember - (cold) (wind) (speed)



the 90 mile/90 minute travel leg

This works for several reasons.

1) I want a restroom/beverage/ snack break every 90 minutes
2) Improves battery life
3) Shortens charge time <==

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Session 2 : Range (and its anxiety)

Past Performance vs Future Results

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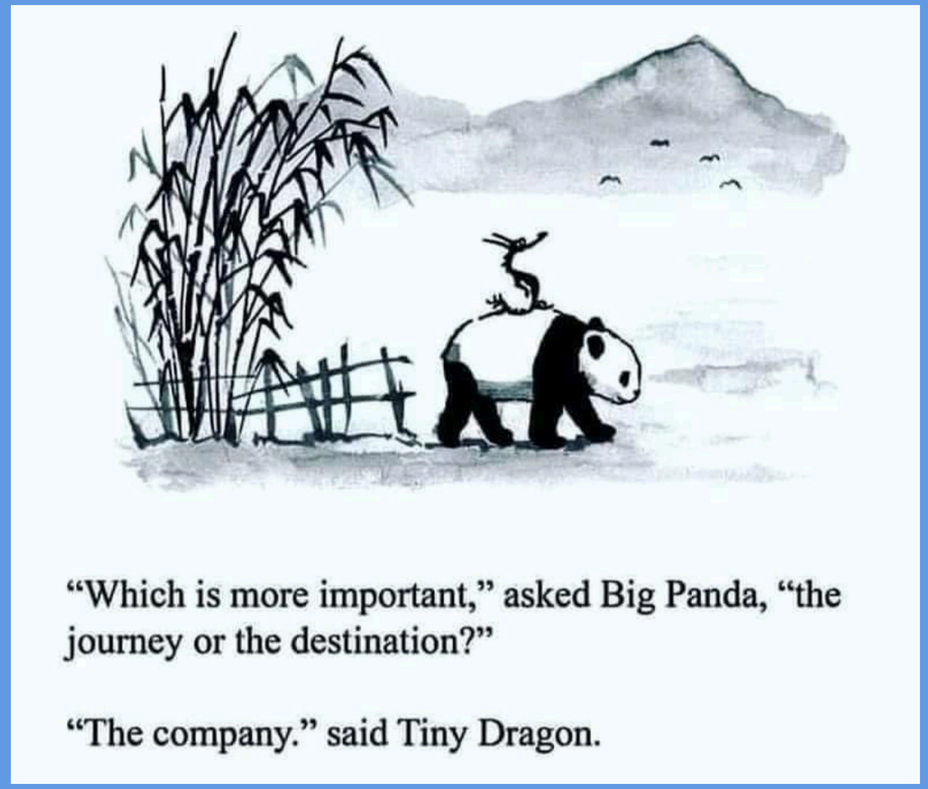

"Which is more important," asked Big Panda, "the journey or the destination?"

"The company." said Tiny Dragon.

the 90 mile/90 minute travel leg

There are a lot of health articles tell office workers to get up from their desk every hour.
That's 60 minutes. Driving is sitting in a chair and 90 mile/90 minutes works.

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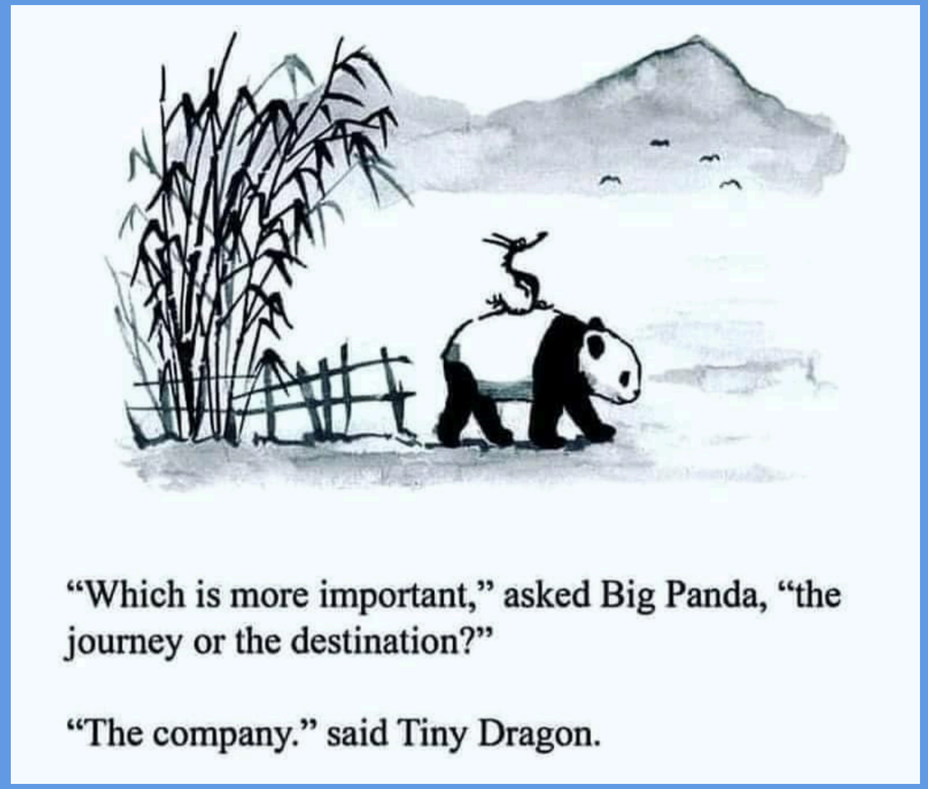
Session 2 : Range (and its anxiety)

Past Performance vs Future Results

Remember - (cold) (wind) (speed)



"Which is more important," asked Big Panda, "the journey or the destination?"

"The company." said Tiny Dragon.

the 90 mile/90 minute travel leg

So - it's healthier
Improves battery life.
Charging takes less time than you think.
It shortens your charging time.
(Yes it does - explanation later)

The view from CU

Things are pretty good with Champaign Urbana as a hub

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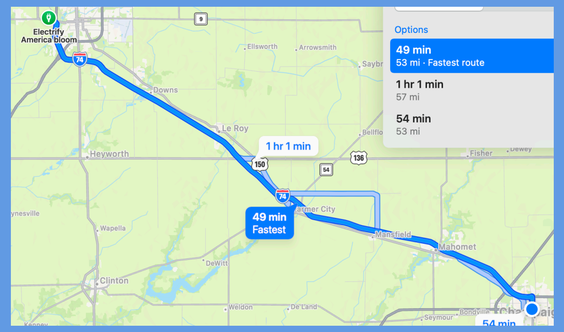
Session 2 : Range (and its anxiety)

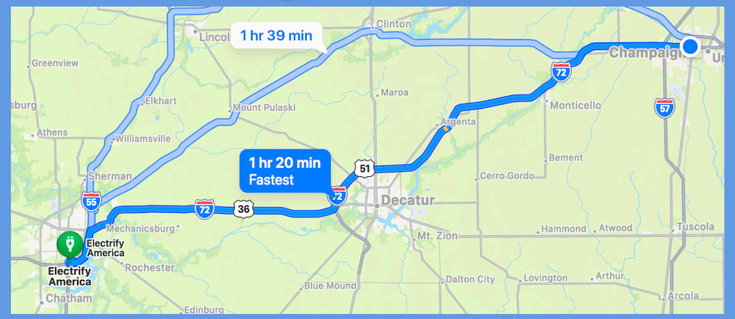
Past Performance vs Future Results

There are five ways to leave C-U by interstate.

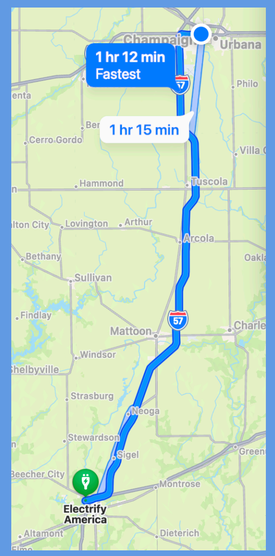
Bradley



Bloomington



Springfield



Effingham

Four of them are less than 90 miles.

I 57 to Effingham 79 miles

I 57 to Bradley 86 miles

I72 to Springfield 88 miles

I74 to Bloomington 50 miles

These four can be easily and comfortably reached in terrible conditions.

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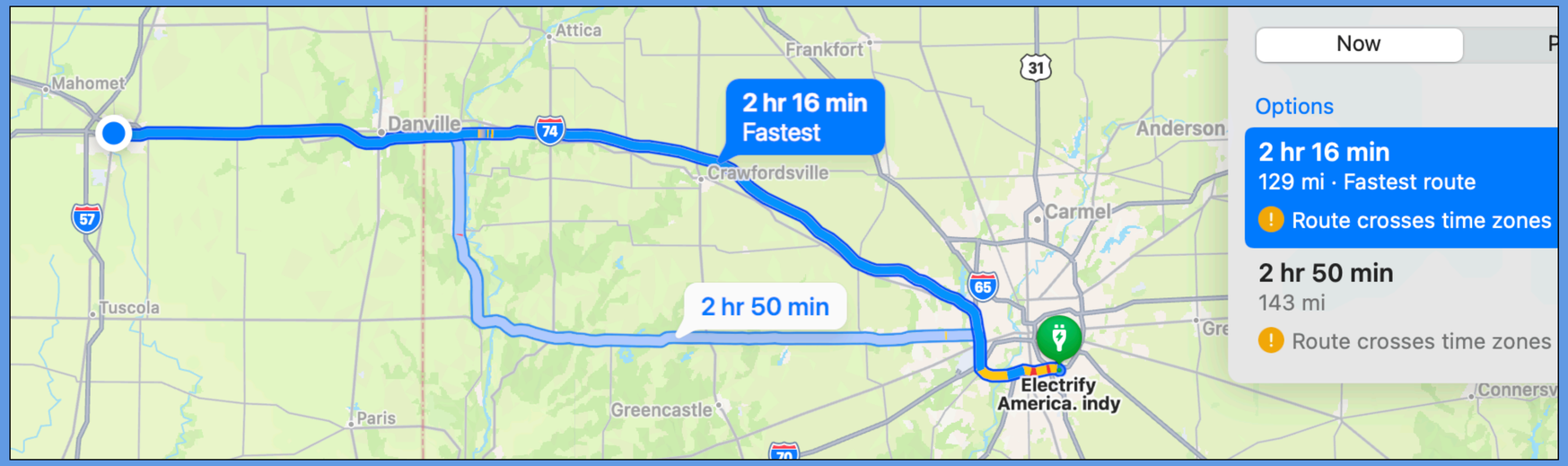
Session 2 : Range (and its anxiety)

Past Performance vs Future Results



The Indianapolis is still a little different.

I74 to Iindianapolis 129 miles

But can be reached - but speed reduction for some weather conditions is often recommended.

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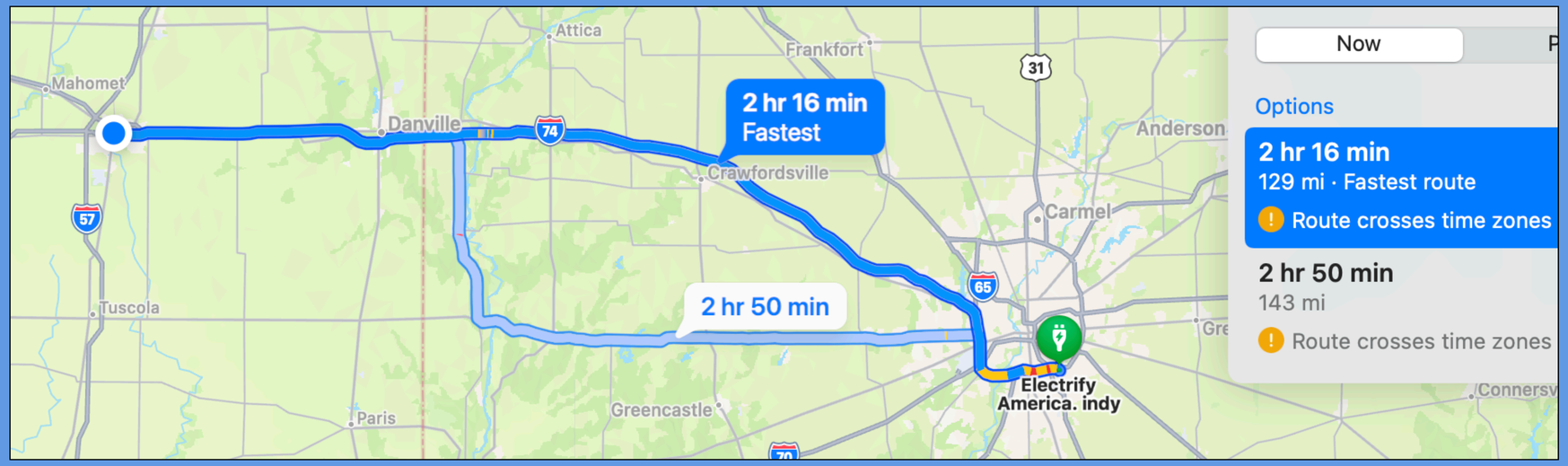
Session 2 : Range (and its anxiety)

Past Performance vs Future Results



Indiana as a whole is still a little different.

Indiana is slower than most states in the adoption of EVs and adding charging infrastructure. But is improving as all states improve. And all states have a NEVI program.

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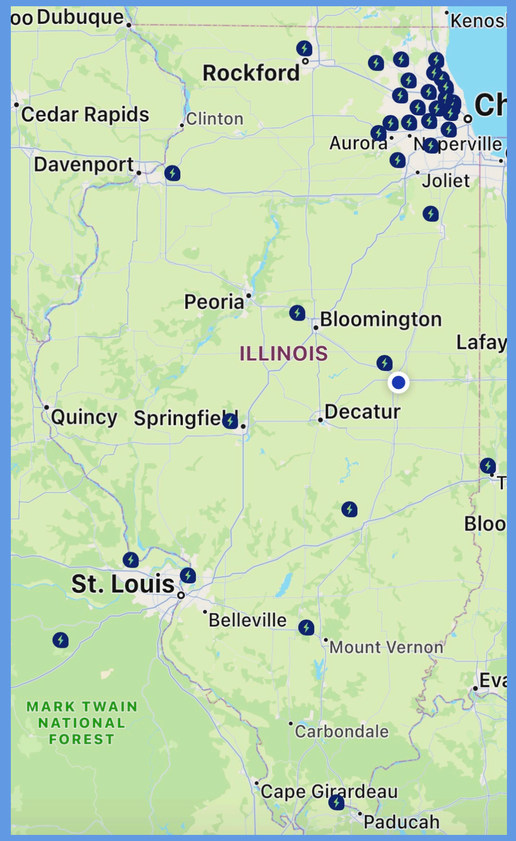
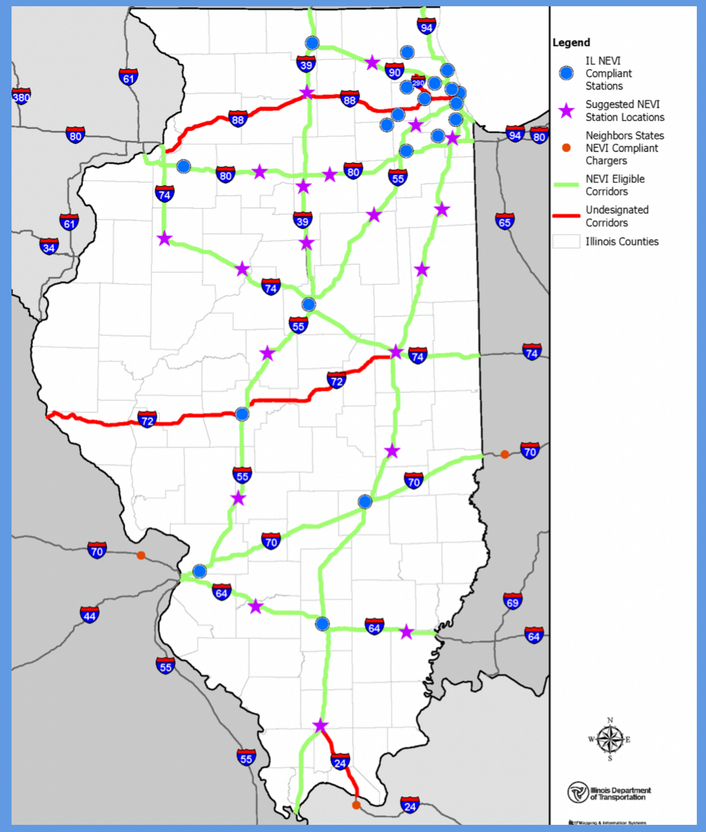
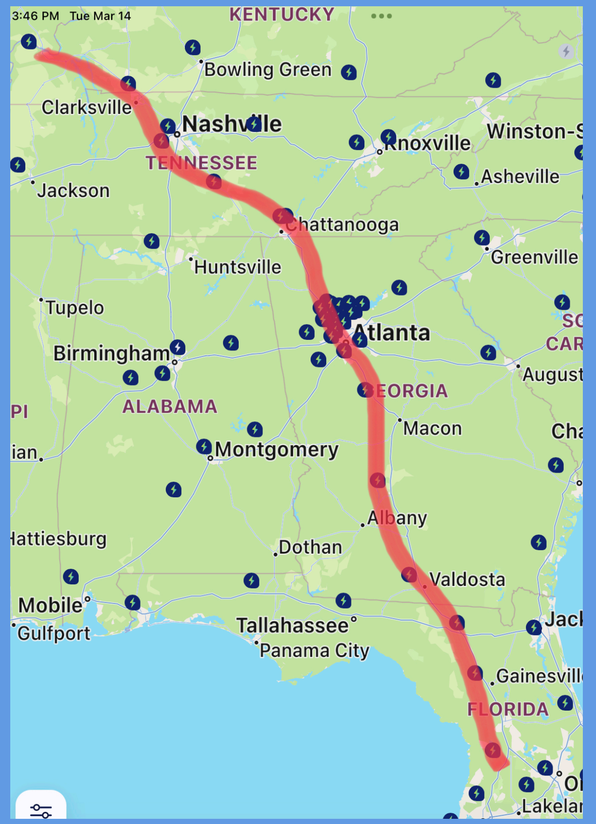
Session 2 : Range (and its anxiety)

Past Performance vs Future Results







These three maps represent the current status of charging for road trips. On the right is the Electrify America Network in Illinois - center - the current thinking from IDOT for the NEVI PROGRAM - and right my chosen route to Tampa last March.

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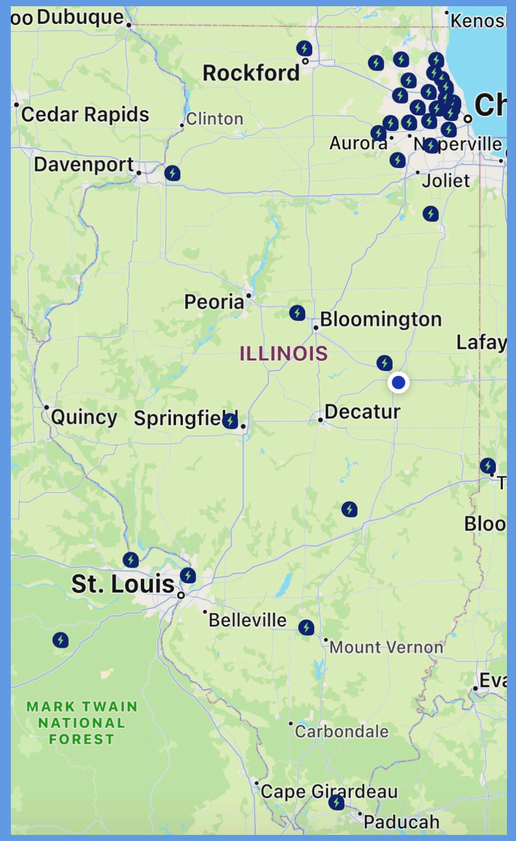
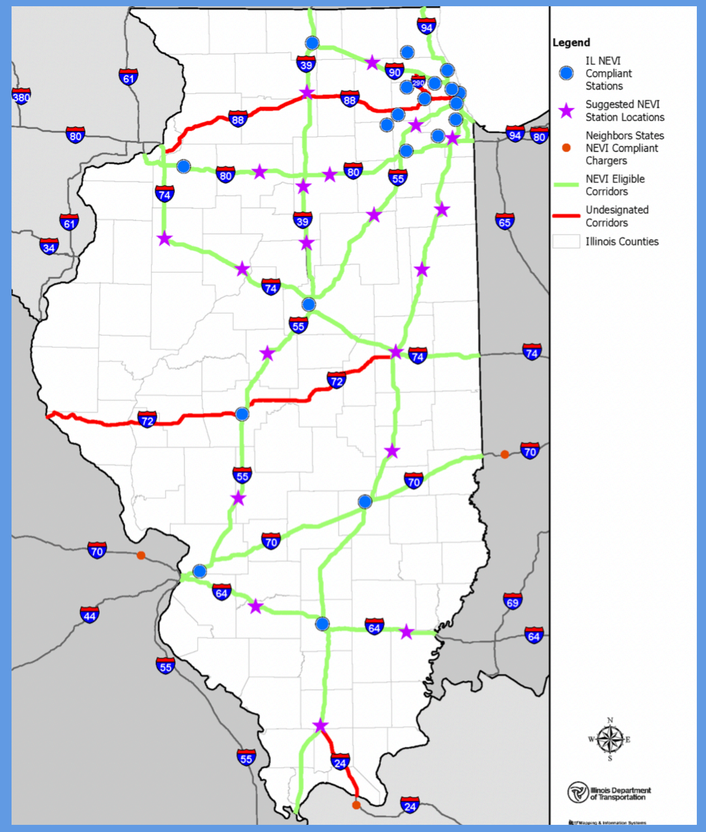
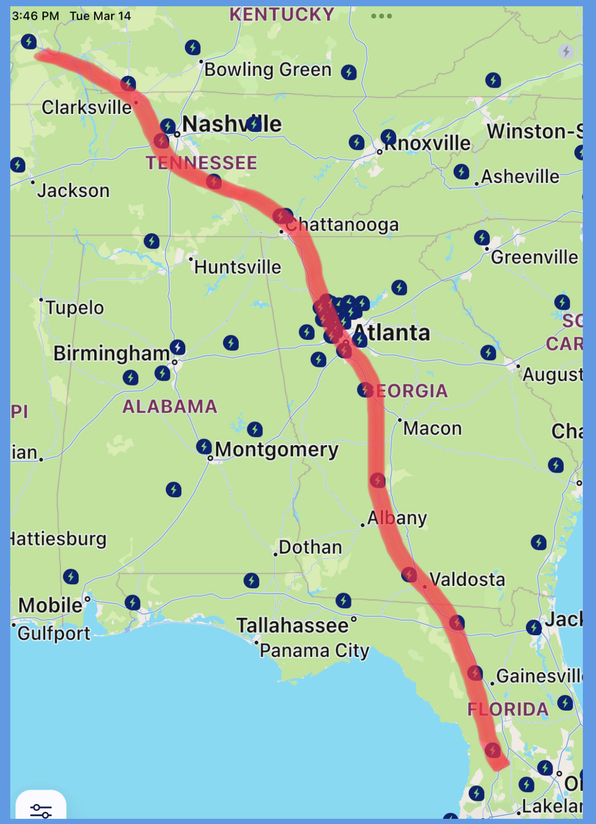
Past Performance vs Future Results







There is a density difference in the left map. Under the surface there are kinda two networks. One of chargers spaced along interstates - the other is targeted to the zip codes where EV registrations are the highest. Both types of placements are needed, but the zip code chargers are more profitable. ??

Center map thinks Joliet is NEVI compliant ??

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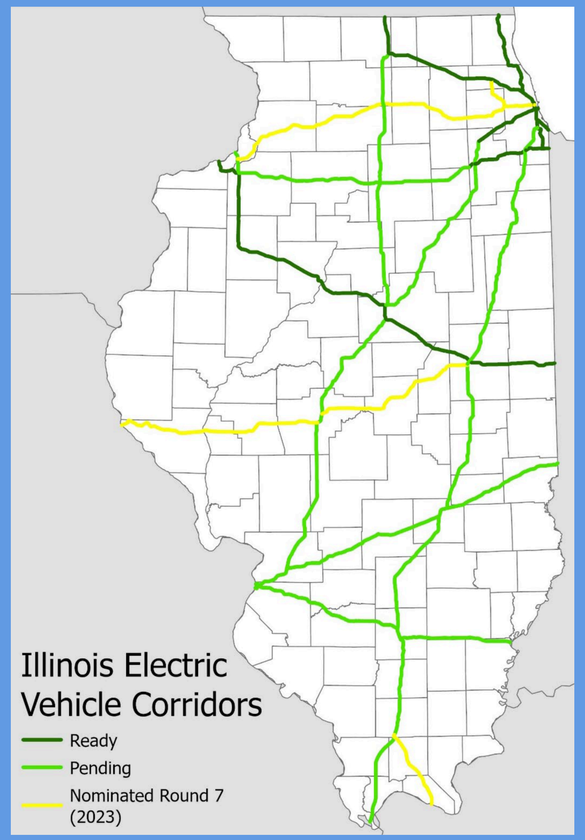
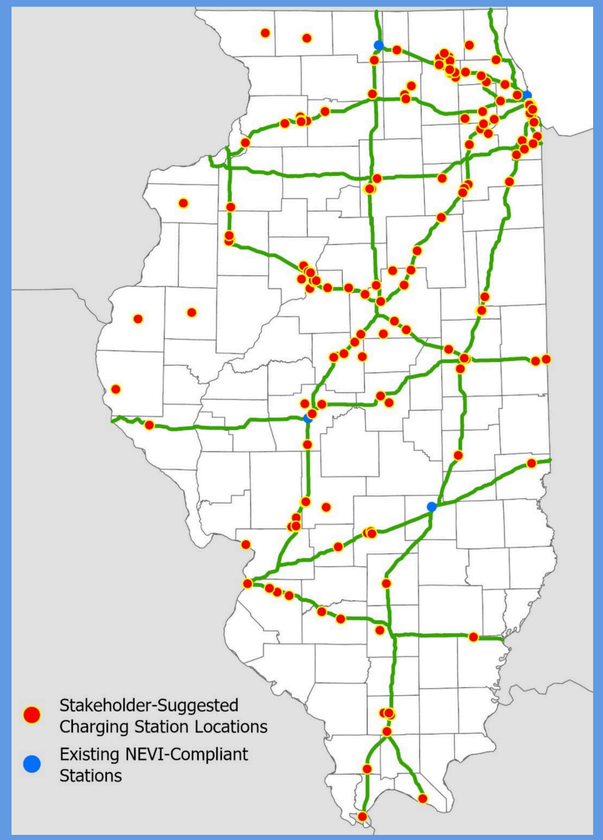
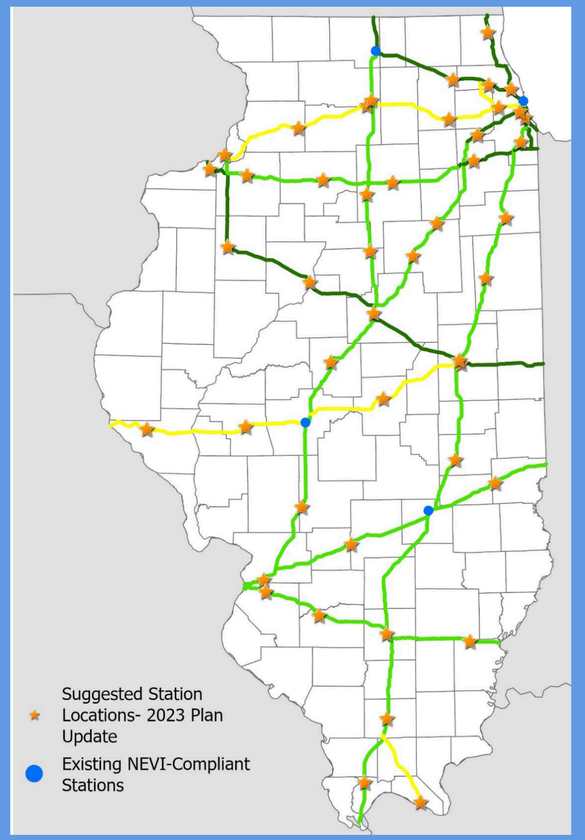
Session 2 : Range (and its anxiety)

Past Performance vs Future Results







left map - NEVI will make all routes an EV Corridor. Center - IDOT asked for suggestions for NEVI locations. Right - probable NEVI locations.

Those maps will improve.

And some improvements are already there.
Some are already planned.
First up the NEVI program, A federal program with $$ already distributed to the states.

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Session 2 : Range (and its anxiety)

NEVI

The NEVI program is the National Electric Vehicle Infrastructure Program. Created in 2021 to provide high speed chargers every 50 miles on every interstate in all 50 states.

The first NEVI station opened west of Columbus Ohio in early December 2023.

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Session 2 : Range (and its anxiety)

NEVI

U.S. Department of Transportation

The NEVI Formula Program will provide nearly $5 billion over five years to help states create a network of EV charging stations along designated Alternative Fuel Corridors, particularly along the Interstate Highway System.

The total amount being made available to states in fiscal year 2022 is $615 million. States will have to submit an EV Infrastructure Deployment Plan before they can access the funds.

A second, competitive grant program designed to further increase EV charging access in locations throughout the country, including in rural and underserved communities, will be announced later this year.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

NEVI

Federal DCFC Charger requirements

- No more than 1 mile from Interstate exits or highway intersections along the corridor.[d]
- Stations should include four Combined Charging System (CCS) connectors - Type 1 ports (simultaneously charging four electric vehicles).
- Site power capability should be no less than 600 kW (supporting at least 150 kW per port simultaneously across 4 ports).
- Maximum charge power per DC port should not be below 150 kW.

There are four requirements each charging site must meet.

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==>

#1 Locations have to be within one mile of the highway.

One of the EA stations I use is about 5 miles from I-55. At city speeds, driving to and from the charger adds 20 minutes driving to a twenty minute charge. Doubling the time.

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==>

#2 Four stations is a good number. CCS is the standard for non-Teslas (With more EVs adopting the Tesla NACS connector - changing this to CCS & NACS is expected. Teslas do have an affordable adaptor, so its not really an issue.)

Looking Into Electric Cars

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NEVI

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==>

#2 Four stations is a good number. CCS is the standard for non-Teslas (Also the Tesla supercharger network already does this for Teslas. So it is not needed for Teslas but all additional chargers help as numbers of EVs increase.) Also some existing locations push the 1 mile fairly hard - & that effects practical charging times.

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==>

#3 To me this looks like extra language to avoid loopholes.

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Session 2 : Range (and its anxiety)

NEVI

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- Maximum charge power per DC port should not be below 150 kW.

==>

#4 This eliminates power sharing. Sometimes a charger with two connectors will share the power output. Which would be 150 kw for one car and split to 75 kw each car if a second car plugs in.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

NEVI

But first - the practical illustration of charging in the real world. Imagine 3 chargers at each end of a 150 mile route.

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NEVI






Each charger has one EV charging to 100% and will be capable of reaching the opposite charger. Each EV will take one hour to charge since charging to 100% is so slow.

(Using 80% of the charge leaving a margin for error - nobody wants to need a tow.)

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NEVI






Six chargers can handle only six EVs each hour.

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Session 2 : Range (and its anxiety)




Reducing the number of chargers to four and placing them 50 miles apart.

Now using the 60% rule and only charging from 30 - 70% (twice) each EV will be able to charge along the way and complete the 150 mile trip. And with the four properly spaced chargers; the number of EVs completing their trip is still six.

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Session 2 : Range (and its anxiety)




Reducing the number of chargers to four and placing them 50 miles apart.

The six EVS still get what they need, the Charging network saves 33% on equipment and still sells the same amount of electricity.

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Session 2 : Range (and its anxiety)






Or keep the same number of chargers and placing them 50 miles apart.

The six EVS becomes nine EVS and everyone is happier. If all EV drivers adopt the 60% rule, it effectively increases the number of chargers by 50%.

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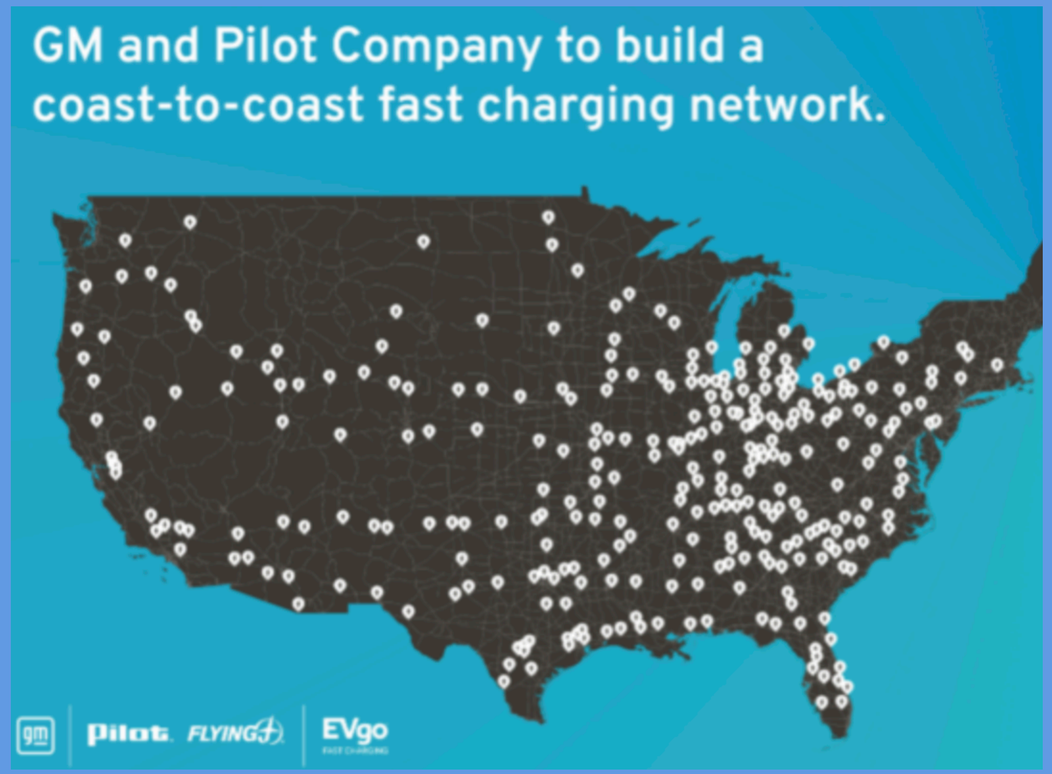
Session 2 : Range (and its anxiety)

So how many new chargers are being added ?



CleanTechnica

First up NEVI $5 billion
Pilot truck stops 500 locations -
Shell $5 billion - BP $5 billion
Travel America 1000 ports.
Walmart 14000 ports
7Eleven 10k locations
Waffle House 2k locations
And more.

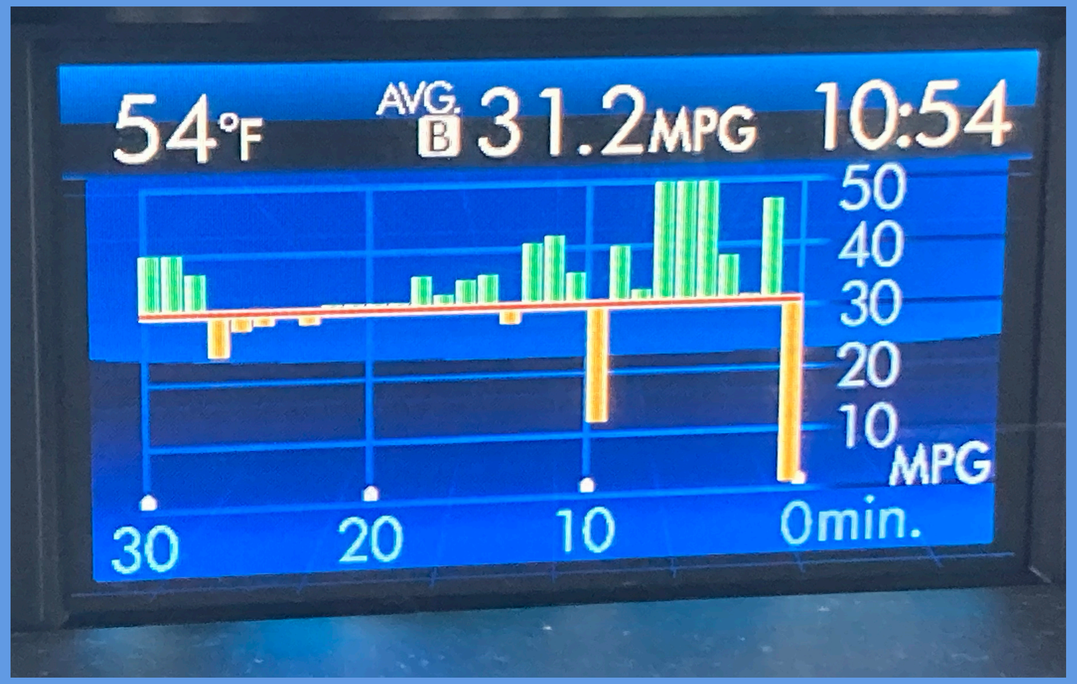
Variability is why the dash is wrong.

All vehicles, gas and electric,
have a variable range.
Because they use different
amounts of energy in
changing weather conditions.
(cold) (wind) (speed)

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results



31.9	30.6	31.6
25.9	28.2	31.2
32.9	27.7	32.9
33.6	18.1	30.1
34.3	25.8	30.4
30.0	23.6	32.1
31.7	30.6	30.8

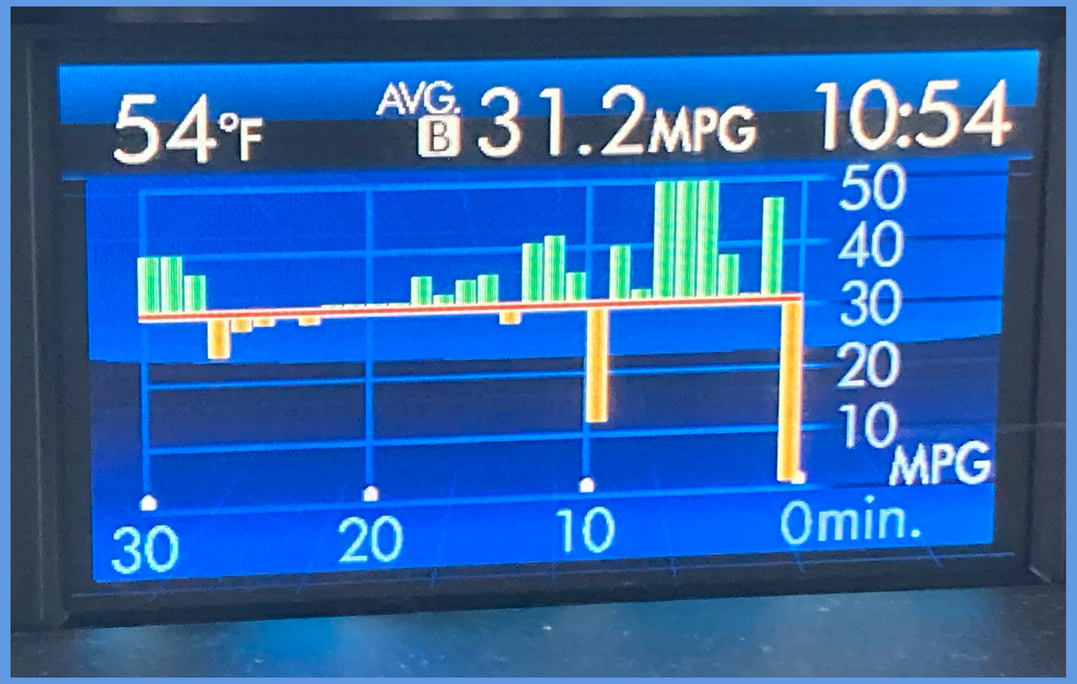
Efficiency can change at any time and throughout the year.

This a 30 minute graph of a Subaru hybrid as the MPG varies. On the right, a list of average MPG with each tank of gas in the last year that I owned the car.

Yes the 18.1 mpg was for late January.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)



Tesla has a similar screen in the Model 3, but my VW doesn't.

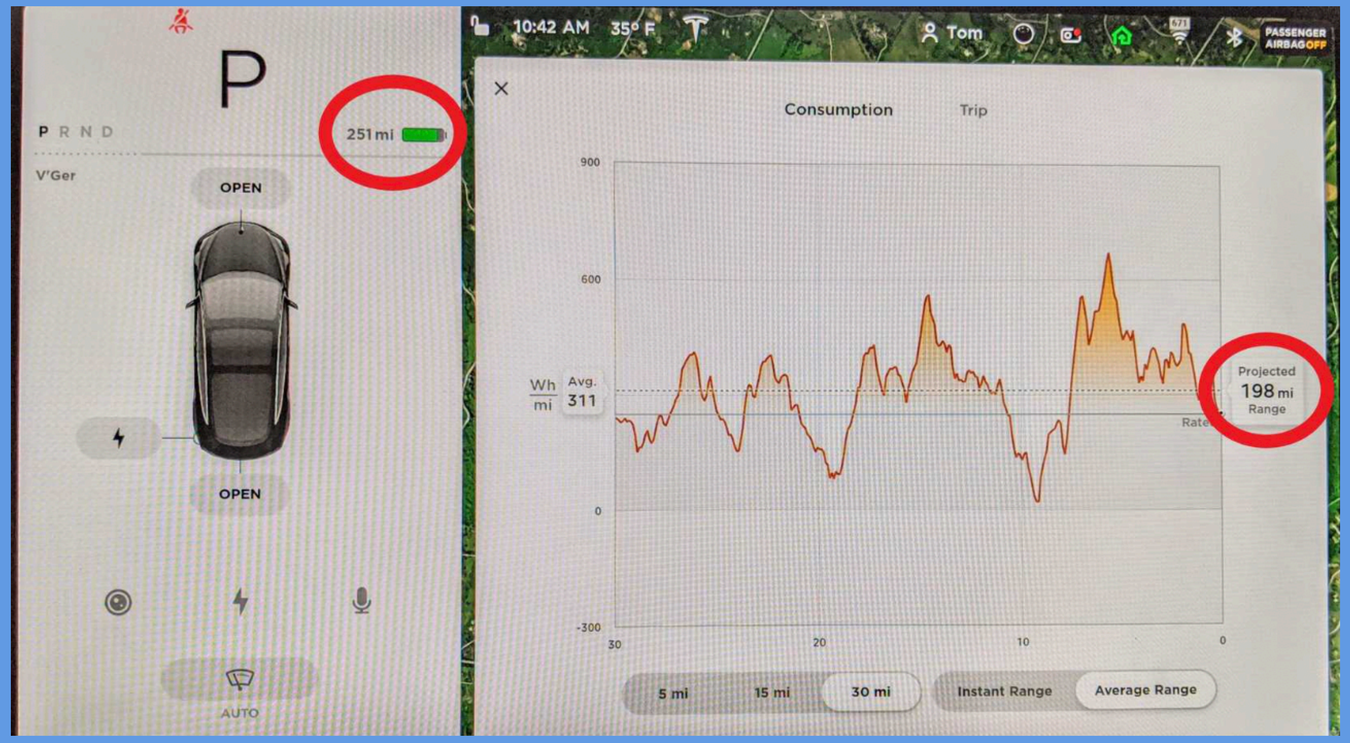
Since efficiency can change at any time, it might be more surprising if the range estimate was accurate.

This usage is from a gas Subaru hybrid. Efficiency of both gas and electric varies with wind, speed, temperature and load. Its just more obvious with electric.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results



Tesla screen in the Model 3, The graph is useful but still has a discrepancy between the two range predictions.

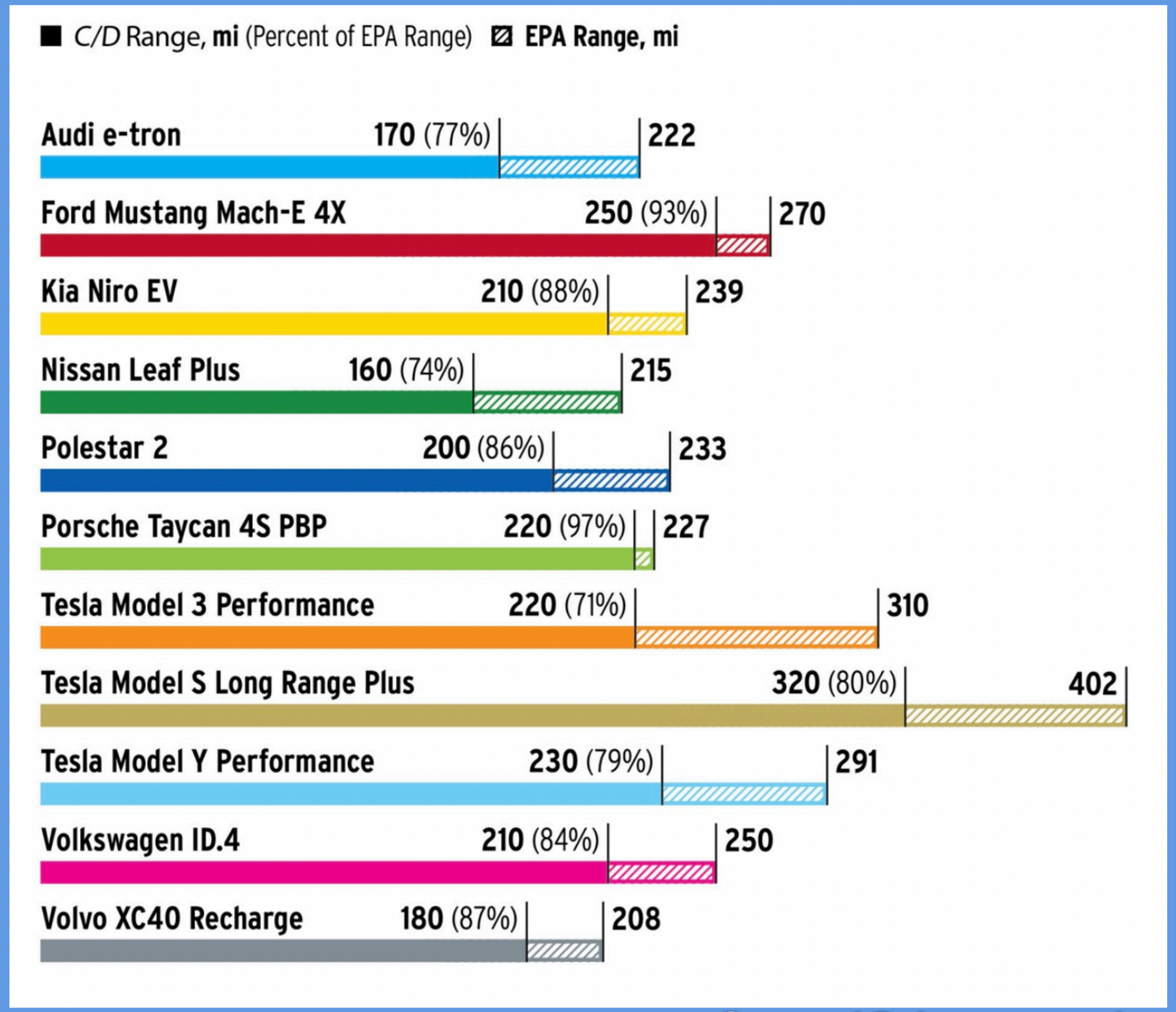
Efficiency can change at any time and throughout the year.

Since I don't own a Tesla model 3 to play with, I have basic idea of what this represents but I am not sure. In my VW I get miles/kWh and this is WH per mile. One is the inversion of the other. You adapt to the one you get.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results



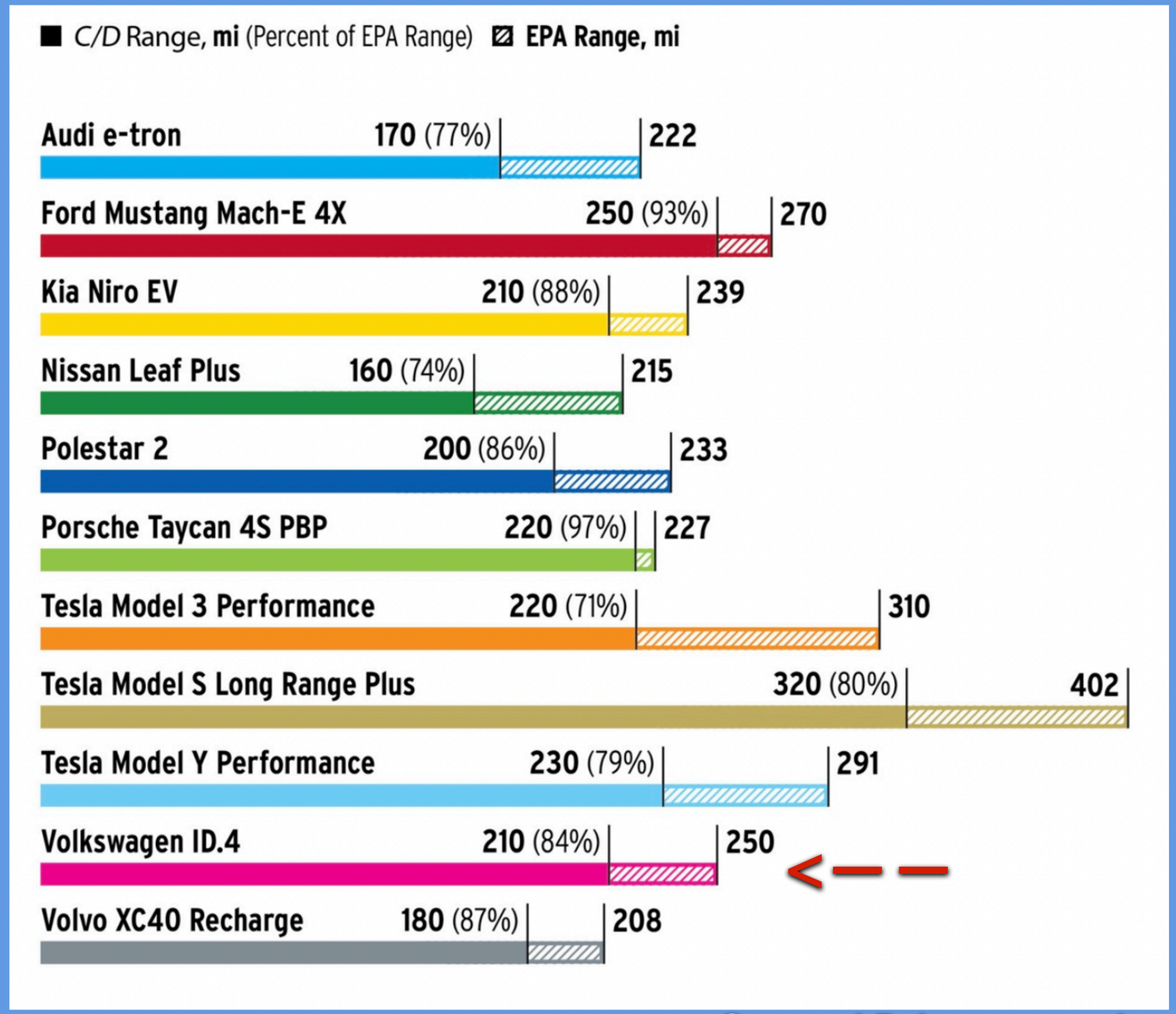
Car and Driver magazine

The variations with wind, speed, and temperature results in disagreements . Different organizations arrive at different mile numbers for that range. And this disagreement is for range tests done at similar conditions.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results



Car and Driver magazine

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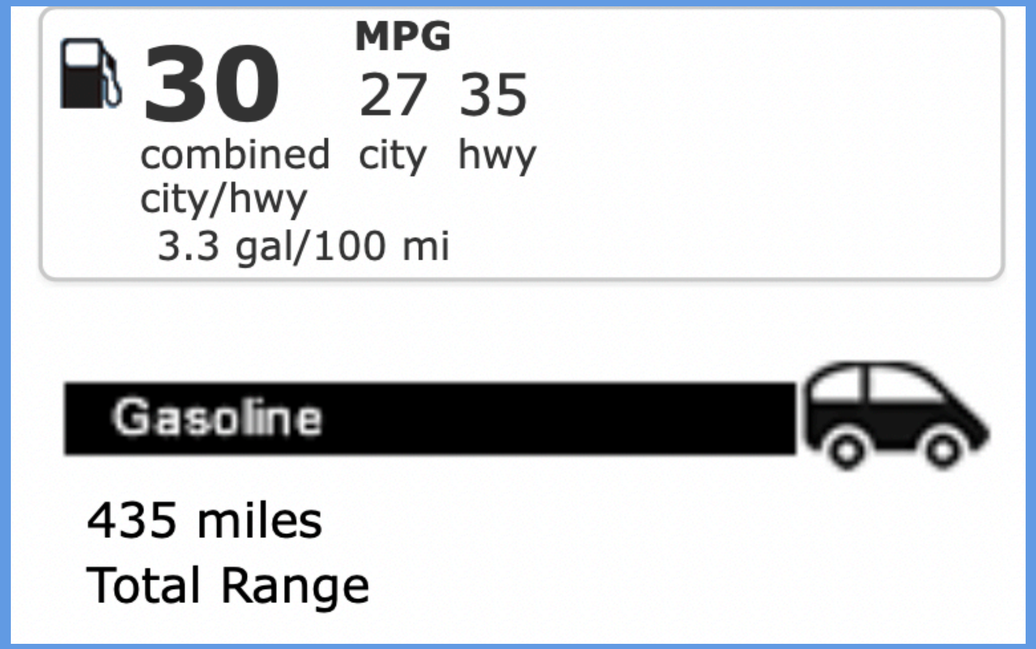
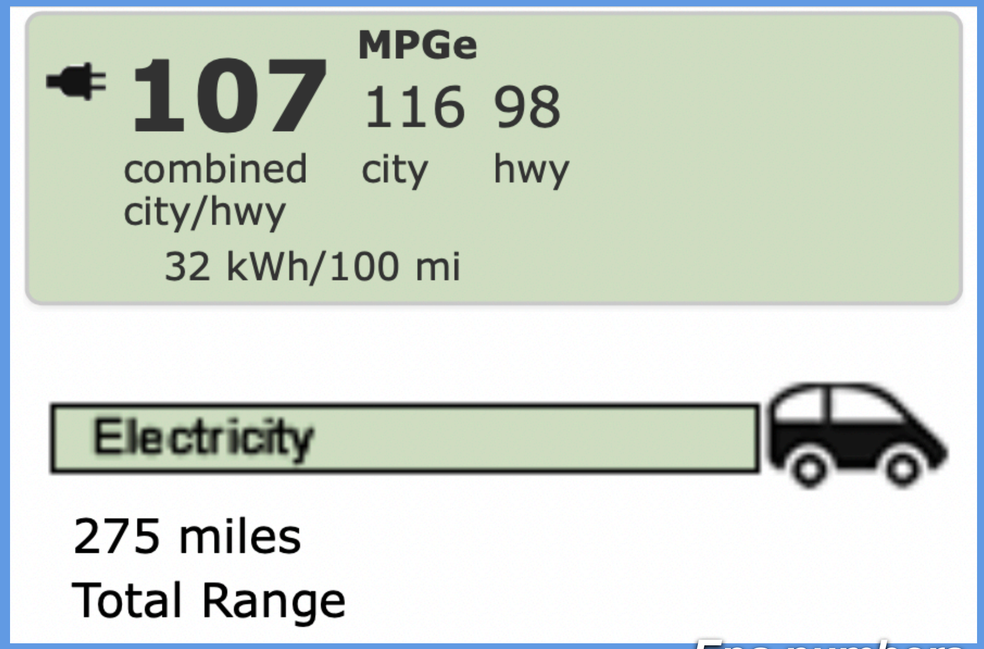
Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results





Epa numbers

At 27 - 30 - 35 a gas Vehicle is more efficient on the highway

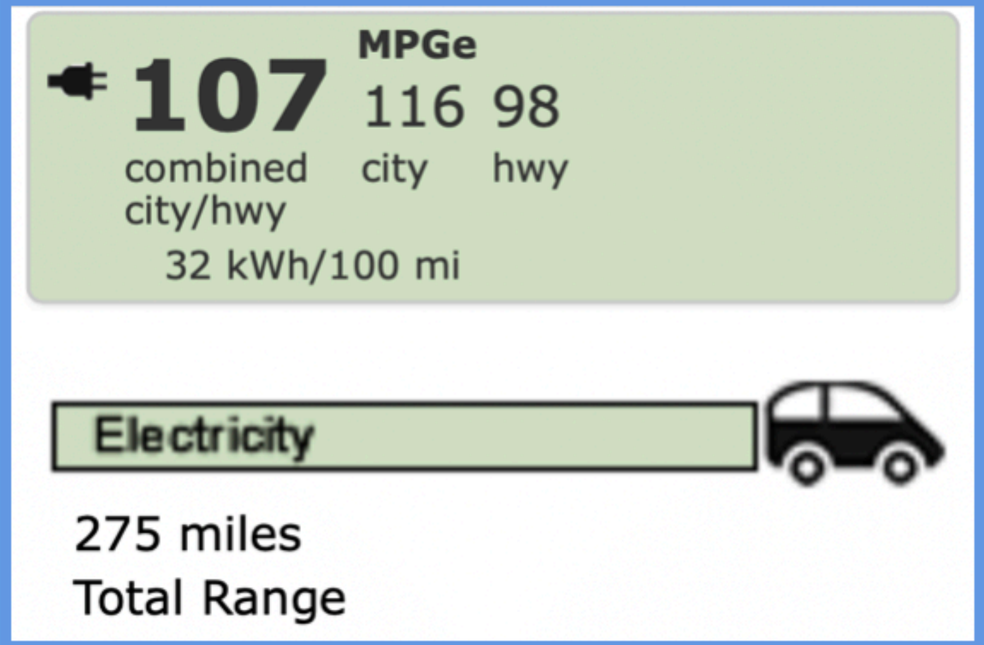
At 116 - 107 - 98 an EV Vehicle is more efficient in the city

I often refer to this as gas vs Electric are upside down to each other.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results



Epa numbers

But what is noteworthy as a driver is that the EV efficiency VARIES. And the difference between hwy city combined is the speed. Speed is the main variation in range and has a lot to do with why the dash is wrong.

Variability is why the dash is wrong.

For all trips there is a distance, the weather and how fast you drive. The distance is fixed. The only parts of the weather that effect variability is the temperature and the wind. You control how fast you drive. So the factors are:
(cold) (wind) (speed) - since distance is known.

Wind

First there is wind.

Most of the time its not a real problem. It becomes worth noting when it gets above 10 miles per hour. But can be downright cruel when it hits 25 miles per hour.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Wind

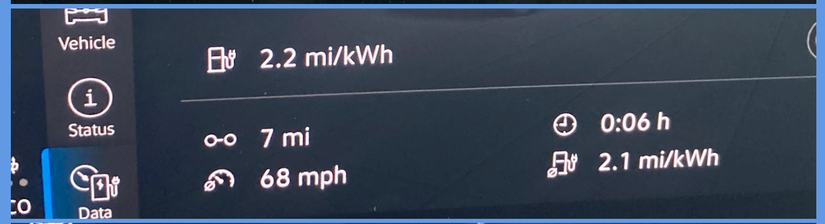
This 72mph was with the tailwind. It would have been a completely different trip returning on the same day.

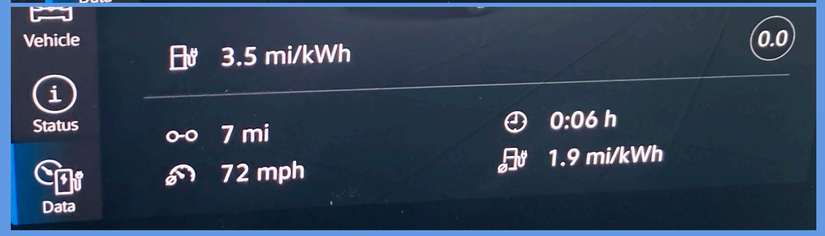
I apologize for losing my data set that would reveal the windspeed. I think it was 25 out of the north on I57. Temp near 32 with rain. On my final runtime rain turned to snow and shut down the cruise control and greatly reduced visibility

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Wind





Going the other way

Against the wind – same direction but different speeds.

62 mph	2.3 m/kWh	177 miles
65 mph	2.2 m/kWh	170 miles
68 mph	2.1 m/kWh	162 miles
72 mph	1.9 m/kWh	146 miles

Then a tailwind

72 mph	4.0 m/kWh	308 miles

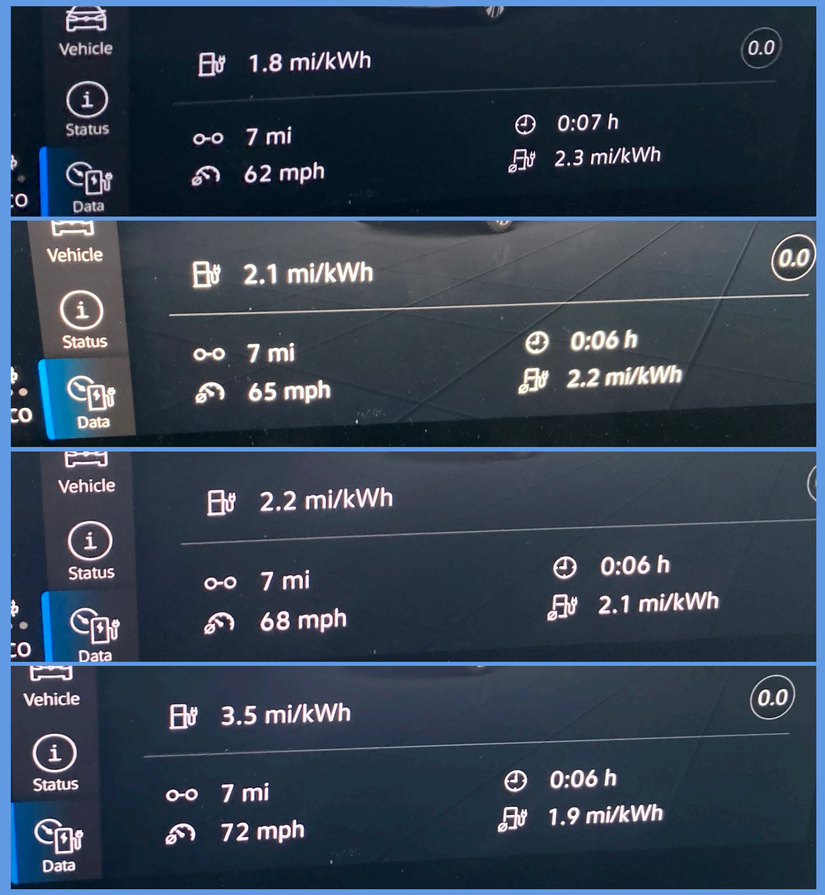
Compared to a standard range of 230 miles .

Worth noting gas cars also have this extreme variation in efficiency.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Wind



Against the wind – same direction but different speeds.

72 mph 1.9 m/kWh 146 miles

Even the 60% rule gets you there.

Going the other way

Temperature

Temperature has two factors

The battery is less effective and more of the battery is used to make the passengers comfortable.

Temperature

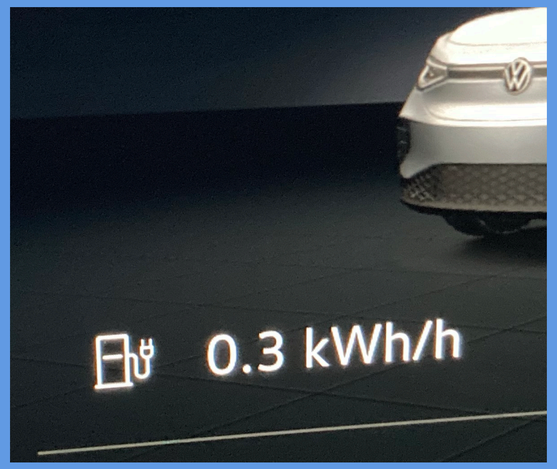
Temperature has two factors

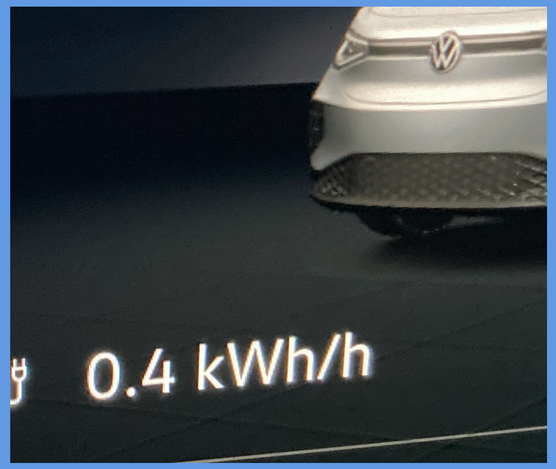
The battery is less effective and more of the battery is used to make the passengers comfortable. There isn't much you can do about the car but you can do something about and for yourself.

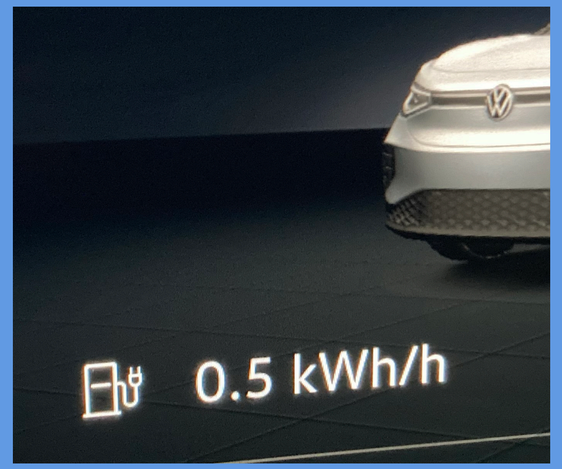
Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Temperaature





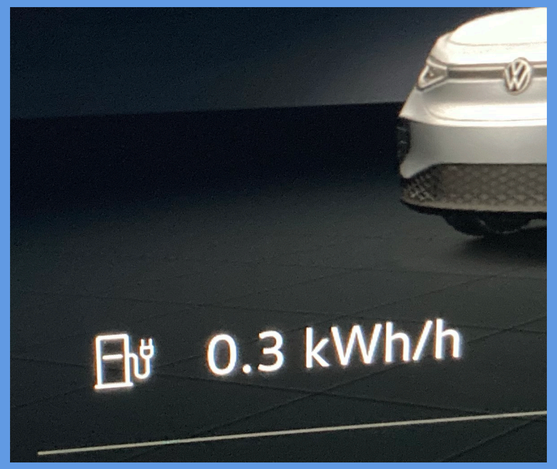


These numbers are energy draw while parked
Upper left is just the stuff thats always on
(computer radio etc)

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Temperaature

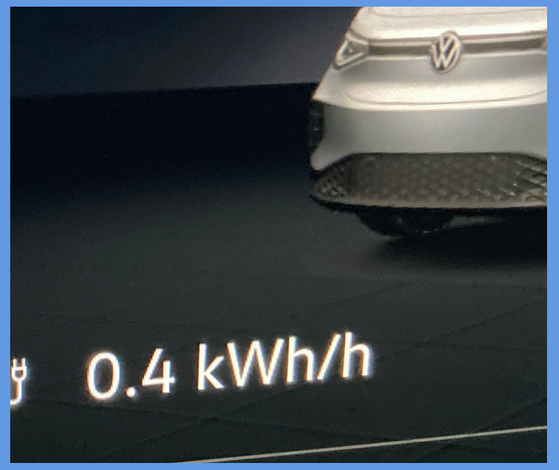


Upper left is just the stuff thats always on (computer radio etc) Then adding heated steering wheel energy use is .3

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Temperaature

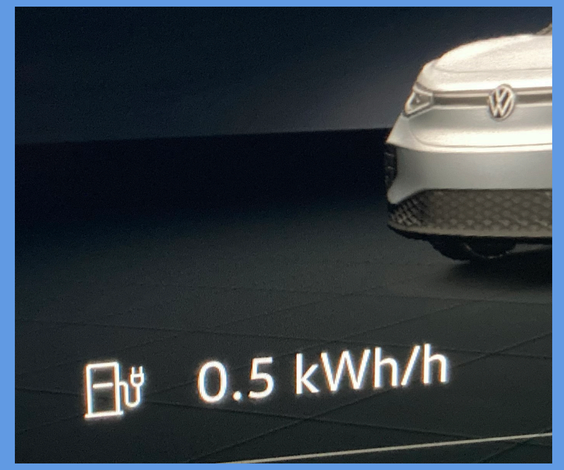


Upper left is just the stuff thats always on (computer radio etc) Then adding heated steering wheel & heated seats = energy use rises to .4

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Temperaature



Upper left is just the stuff thats always on (computer radio etc) Then adding heated steering wheel, heated seats & low fan with some cabin heat = energy use rises to .5

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

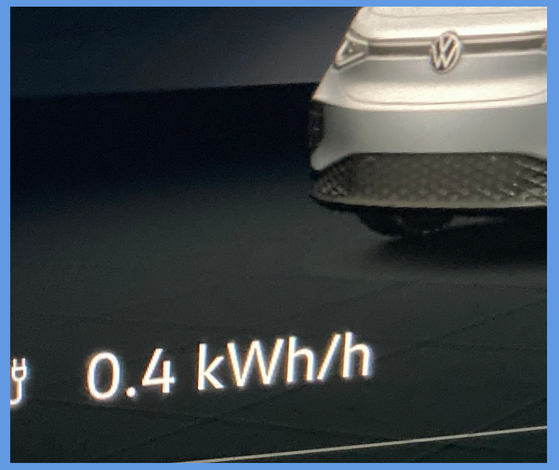
Variables : Temperaature

The number on the lower right is heated steering wheel, heated seats & cabin heat turned up to a higher fan and a temp of 75 degrees = energy use rises to 3.6 = which is 7 times the energy which will make you comfortable.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Temperaature

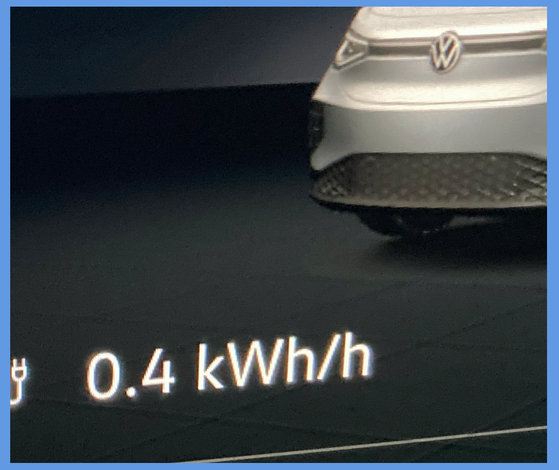


Here in Champaign most of my trips are too short to heat the cabin with gas or electric. Using heated seats and a heated steering is much more effective and efficient.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Temperaature



On short trips most of the added heat dissipates while you are out of the car. And you have to start over. Using heated seats and a heated steering is much more effective and efficient.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

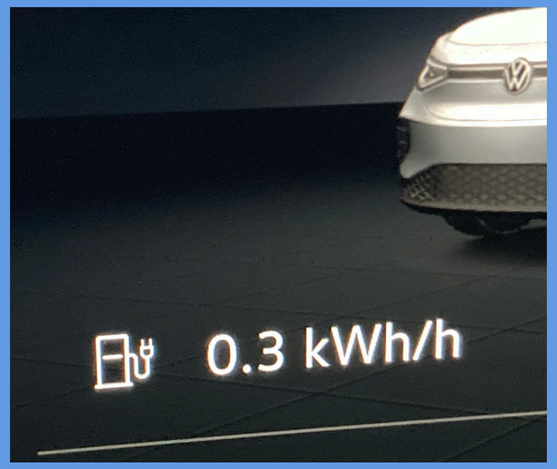
Variables : Temperaature

I call this level Sauna. Most (all) people will have a coat, just keep it on. After years with the Gazette, I have both lighter weight coat for in the car and a heavy coat when I need it for longer times out of the car.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Temperaature

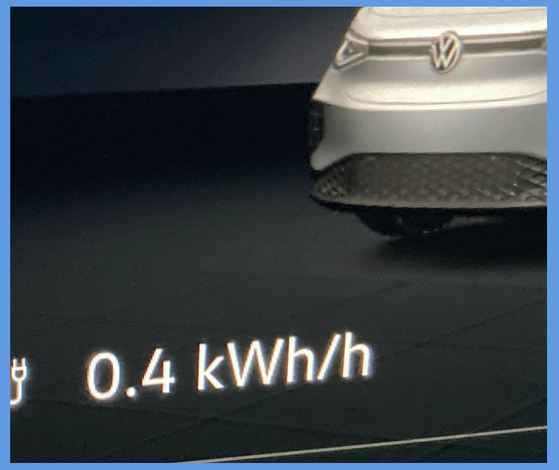


I use the heated steering wheel the most.
Fastest and most effective to get warm.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Temperaature

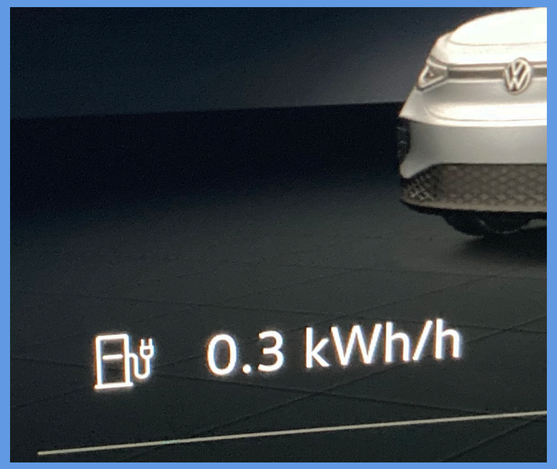


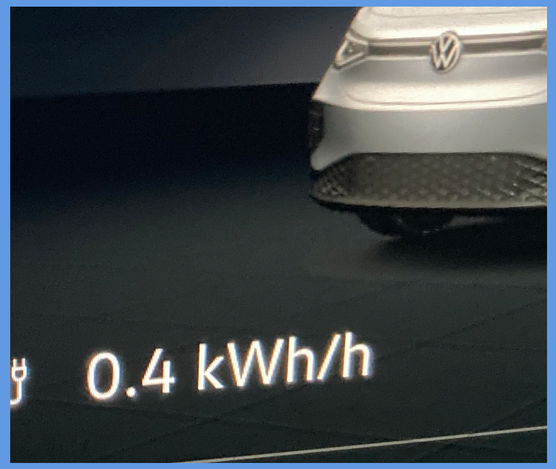
Butt (pun intended) the seat warmers are remarkably fast. I have stopped using mine on high.

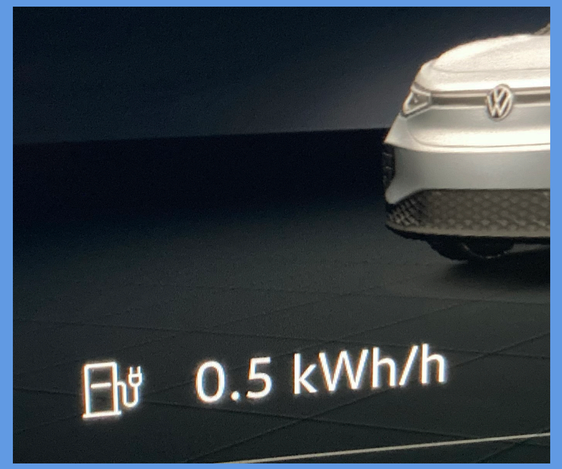
Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Temperaature







It is a decision made by those in the car. To say it again at 80% charge going 90 minutes between stops it is still possible.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Temperaature

Leather driving gloves were originally designed more than a century ago to protect drivers from cold metal steering wheels or their splintery wooden counterparts. Nowadays, they're more of an aesthetic accessory, but who cares? This cognac-colored pair from Riparo is a nice, affordable choice.

From Christmas shopping site

Trivia

Since few modern cars have metal and/or wood steering wheels, forego the gloves. I find the warmth from the wheel soothing and effective.

Speed

And here comes speed.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Speed

This is a chart of projected range on the same day with the same wind speed an temperature.

wind	dir	temp	dist		speed	eff	Range	change in R	k/wh per 100mi
8	nw	45	7		70	2.9	223.3	standard	34.48
8	nw	45	7		75	2.6	200.2	89.66%	38.46
8	nw	45	7		65	3.1	238.7	119.23%	32.26
8	nw	45	5		55	3.9	300.3	125.81%	25.64

By varying your driving speed you can change the range you get. Drive faster it goes down - drive slower it goes up.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Speed

This is a chart of projected range on the same day with the same wind speed an temperature.

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8	nw	45	7		65	3.1	238.7	119.23%	32.26
8	nw	45	5		55	3.9	300.3	125.81%	25.64

Electric has an advantage over gas. With a gas vehicle the range can drop as you slow down. With electric the range (for the remainder of the trip can increase as much as 24% by just slowing down. But please, if you slow down to 55 mph please do so off of the interstate system.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Variables : Speed

And again with the mantra -
just charge to 80% and
you'll get there.

But for some - this can be
used to your advantage.

Can you trust the car range meter ?

Can you trust the car range meter ?

“Trust, but Verify”

“Trust, but Verify” The phrase became internationally known in English after Suzanne Massie, a scholar of Russian history, taught it to Ronald Reagan, then president of the United States, the latter of whom used it on several occasions in the context of nuclear disarmament discussions with the Soviet Union.

Can you trust the car range meter ?
“Trust, but Verify”

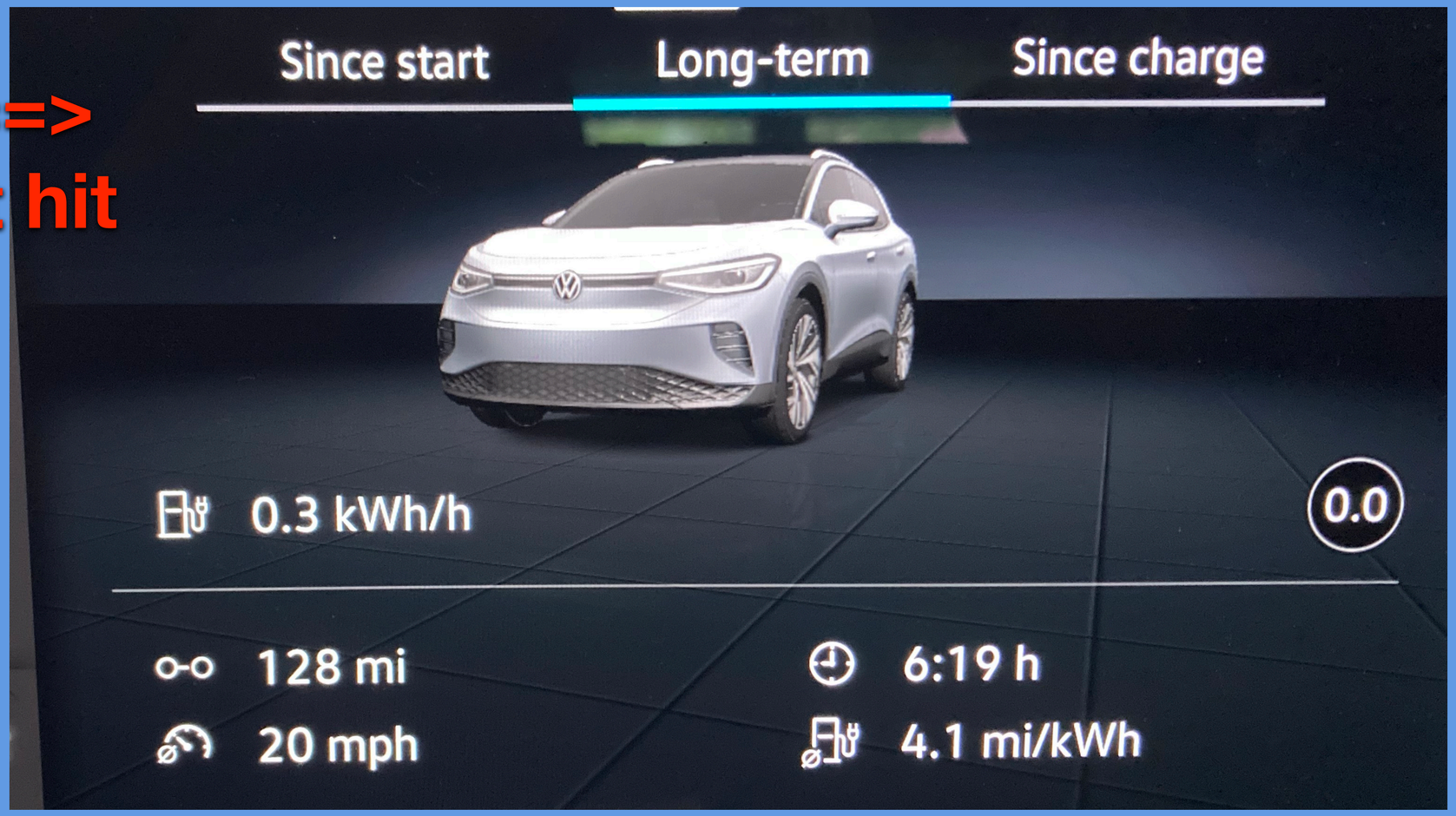
There is a way to check what you are getting while you drive and the weather rarely changes quickly.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results

====>
First hit



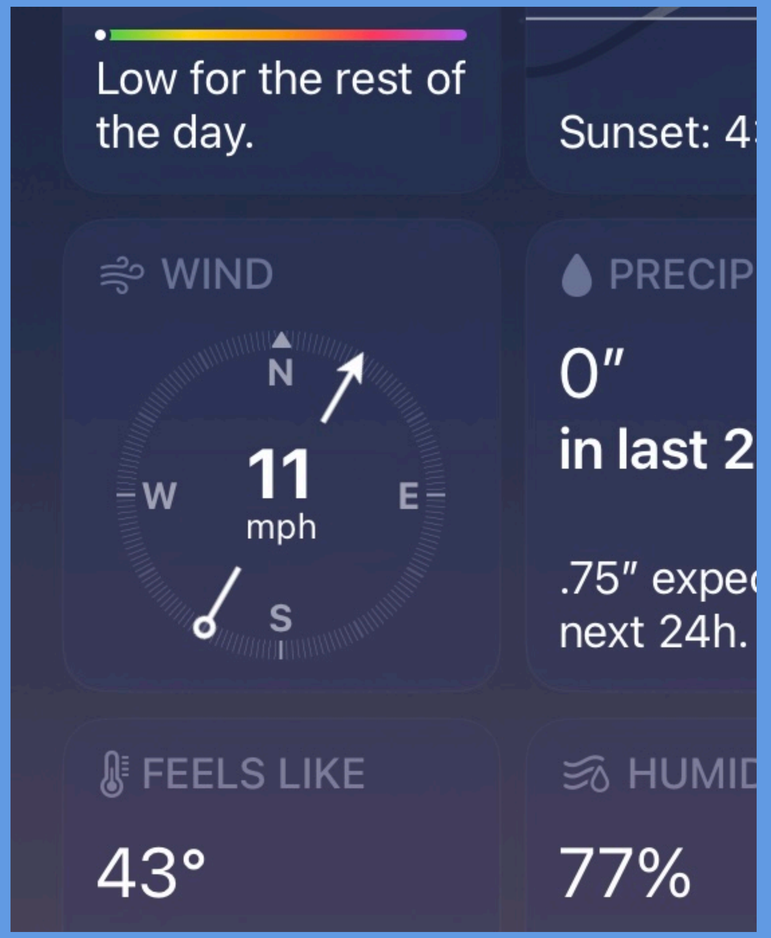
<====
Then hit reset

When you do this - this data set resets and it shows what the car is doing now. I believe all cars have this in one form or another.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results



This is from a trip in November a constant 70 mph temp 43 wind south at 11

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Car is getting 2.8 mi/kwh.

On this day my 60% rule range was 130 miles. I can count on that for this leg of the trip

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results

40 Mi Buffer

M/K	90%	80	70	60	50
3.2	182	158	133	108	83
3.0	168	145	122	99	75
2.9	161	138	116	94	71
2.8	154	132	111	89	68
2.6	140	120	100	80	60
2.4	126	108	90	71	52
2.2	112	95	78	61	45
2.0	98	83	67	52	37

Car is getting 2.8 mi/kwh.

On this day my 60% rule range was 130 miles. I can count on that for this leg of the trip

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results

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2.6	140	120	100	80	60
2.4	126	108	90	71	52
2.2	112	95	78	61	45
2.0	98	83	67	52	37

Car is getting 2.8 mi/kwh.

On this day my 60% rule range was 130 miles. I can count on that for this leg of the trip. Which is farther than my 90ish mile goal. I could have spent less time charging and stopped at 60%. Or I can drive faster. But the real point is I have verified what the car will do.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Car is getting 2.8 mi/kwh.

The point is this is current performance - not past performance. Not Future results but it certainly should hold for a couple hours.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Unless speed is increased this is the lowest efficiency the car will get. Electric cars get more efficient as they slow down. Unless you drive into the parking lot at 70 mph after running all the traffic lights, your final (average) efficiency will be higher.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Electric cars get more efficient as they slow down. With the total trip having slow parts your average speed will be (surprise ! A lot lower) And your final (average) efficiency will be higher. I can't tell you how much - with experience I knew I could drive 75. (I still averaged 2.8)

But wait - there’s more

But wait - there’s more

Modern navigation has an underused gift.

But wait - there’s more

Modern navigation has an underused gift.

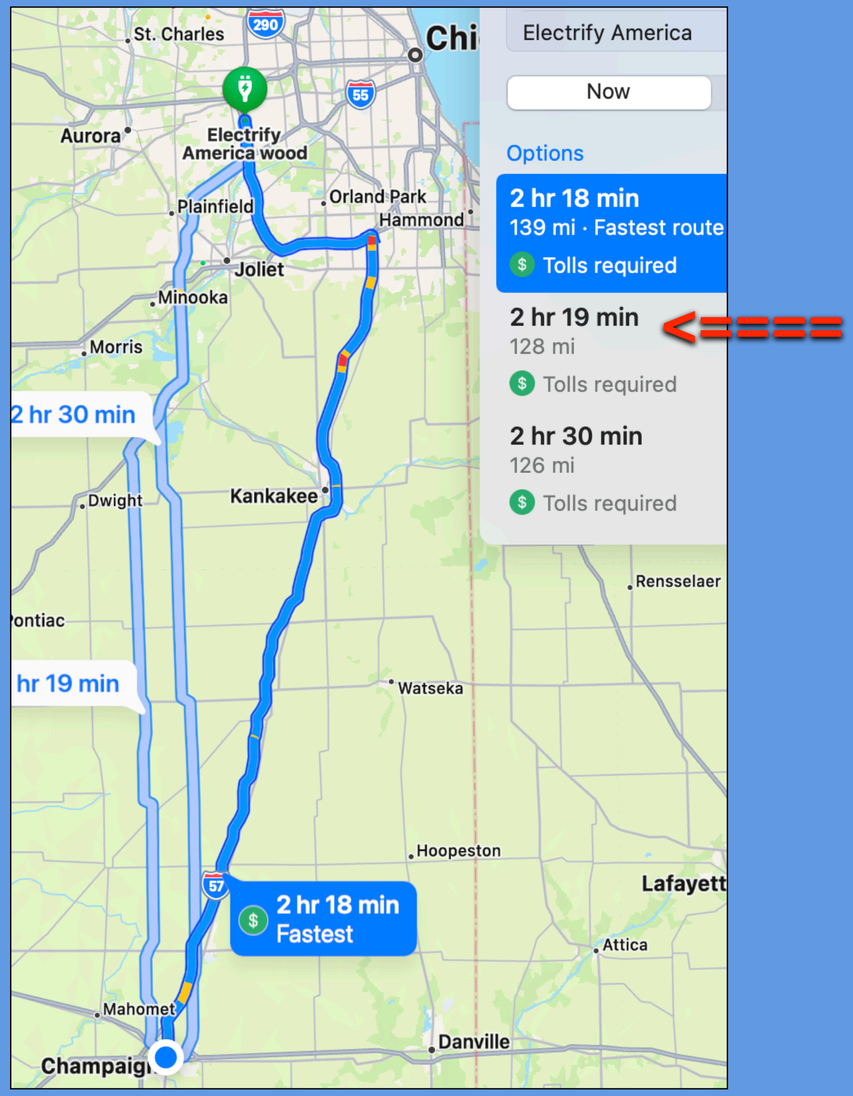
Interstate highways are nice but they don’t always go where we want them .

But wait - there’s more

When I put in a route request for a trip
This popped up.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)



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That 20% increase in range can be taken advantage of. Note the travel time using I55 and US47. Only 1 minute longer on US47. Planning to use that route could cut charging time 10 minutes. A bigger gain on some days since the prevailing winds here are typically from the south. With cold temps and winter winds – keeping this route in mind could really pay off in Dec through early Feb.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results

‘A Bunch Of Dead Robots’: EV Charging Stations Suffer ‘Disaster’ As Sub-Zero Temps Freeze Chicago

[Screenshot/X/DanielTurnerPTF]

The Dialy Caller

The perfect reputation of Tesla superchargers took a beating.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results

‘A Bunch Of Dead Robots’: EV Charging Stations Suffer ‘Disaster’ As Sub-Zero Temps Freeze Chicago

[Screenshot/X/DanielTurnerPTF]

The perfect reputation of Tesla superchargers took a beating.

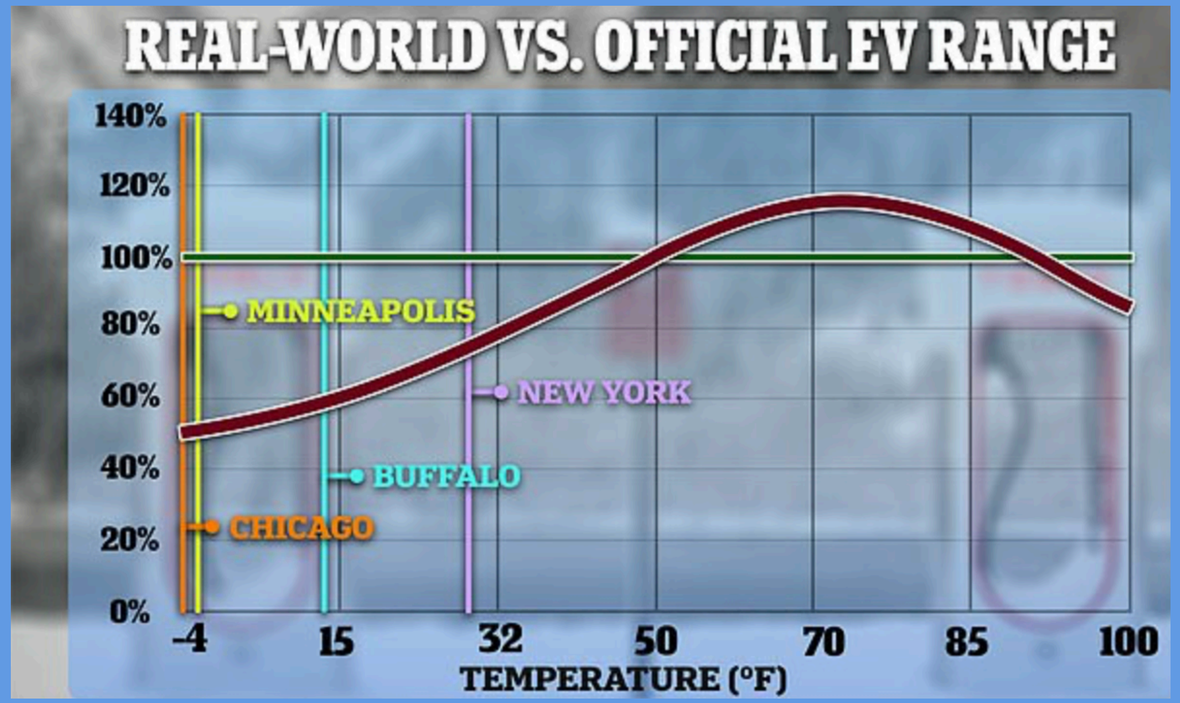
But don’t forget O’Hare shut down. Roads were closed.

Some gas stations probably closed and some gas cars froze.

Looking Into Electric Cars

Session 2 : Range (and its anxiety)

Past Performance vs Future Results



Daily Mail UK

On the upside - looking for information about the weekend I found this awesome graph.

What could the cold EVs in Chicago have done different ?

Fill up with gas - charge before the storm.

What could the cold EVs in Chicago have done different ?

Fill up with gas - charge before the storm.
Be aware that things shut down - regardless of fuel type and stay home.

What could the cold EVs in Chicago have done different ?

Fill up with gas - charge before the storm.
Be aware that things shut down - regardless of fuel type and stay home.
And turn things off - the guy who got off a plane at O'Hare and his Tesla was dead probably left Sentry mode on and ran for days.

What could the cold EVs in Chicago have done different ?

Fill up with gas - charge before the storm.
Be aware that things shut down - regardless of fuel type and stay home.
And turn things off - the guy who got off a plane at O'Hare and his Tesla was dead probably left Sentry mode on and ran for days.
What else - do you have an idea.

The End

The End

Stopping point.

Epa numbers