editor's blog entry

There's been a ton of talk and debate about the Tesla Model S this week thanks to a lightning rod of an article by New York Times reporter John Broder in which he describes an unsuccessful attempt to drive the Model S from Washington, D.C. to Boston relying on Tesla's two East Coast Supercharger stations. Most of the debate has centered around the veracity of Broder's report and/or the relative "idiocy" of his approach to making the trip and (not) charging the car.

I'm not going to focus on that. Instead, I'm going to pick up a strand of discussion long-time EV advocate Chelsea Sexton put forward in a piece published on Wired.Com. In it, the always articulate Sexton argues that Tesla – and others – shouldn't be pushing a direct comparison between pure EVs and gasoline cars.

Take EVs for what they are, meaning highly efficient, fun-to-drive cars that surpass gasoline cars in many – but not all respects, writes Sexton. Don't force the point of comparison to be long-distance road trips, because that's not where pure EVs excel, at least not yet, she contends.

I disagree with Sexton -- and probably most EV advocates -- and align myself on this one with Elon Musk, whose strategy appears to be a full-frontal attack on gas cars.

Why do I think Musk is right?

Because for most people (early EV adopters and EV advocates are *not* most people, as much as I *wish* they were), convenience (more of it!), and versatility (more of it!) are the primary motivations for making a switch to a new technology. Unfortunately, convenience and versatility are precisely where pure EVs fall short (plug-in hybrid EVs do not fall short here, which is why they're doing better than pure EVs).

Poll: EV versatility

Will the pure EV ever be as versatile as the gasoline car?

- Yes
- No
- Maybe
- Not sure

Tesla/iPhone comparison

In her Wired.Com entry , Sexton draws a comparison between the Model S and the smart phone. She notes the smart phone has charging limitations, but that this hasn't stopped massive numbers of people from adopting it. But the Tesla Model S and iPhone differ in crucial ways: The iPhone surpasses the landline (this is Sexton's comparison) in virtually *every* way, except, perhaps, quality of connection.

As much as I love the Model S – and, yes, I've driven one – I don't think you can say the same thing about the Model S in relation to gasoline cars. At least not if you take a close, comparative look, using a series of criteria most people typically use in deciding whether a new technology

surpasses a more established one.

As much as I'd like to change the new technology adoption paradigm and get average people (meaning those with little to no expert knowledge about cars, EV or otherwise) to think of EVs *only* in terms of their own EV category, and *only* in terms of what EVs can, as opposed to can not, do, I don't see this happening anytime soon. Thus, I am in complete agreement with Musk, who appears to realize that because virtually everyone outside of a small group of EV aficionados is *always* going to directly compare EVs to gasoline cars, you might as well go with the flow and fight the battle head-to-head.

So, here goes, a list of criteria, ordered from least important to most important, by which we make judgments about whether a new technology, in this case pure EVs, surpasses an older technology, gasoline cars – along with my admittedly subjective but also hopefully logically argued take on which car technology is superior to the other in terms of a given criterion.

Environmental Impact –->Advantage EVs. Pure EVs can run solely on renewable energy, and, in fact, in many cases, they do – take the American Northwest, for instance, where most electricity is generated by hydroelectric power, or the thousands of folks who are now solar-charging an EV. You will *never* be able to run a gasoline car on renewable energy. EVs also produce zero point-of-source air pollution -- no choking on others' or your own auto fumes. The majority of studies also show EVs are more environmentally friendly than gasoline cars even when the source of

electricity is fossil fuels. Sadly, far too few people care about this criterion – however that's a discouraging issue that's outside the bounds of this entry.

Durability -->Tie. Yes, it's true we live in age of planned obsolescence and it's unlikely many people think about how long their iPhone is going to last. In fact, too many of us can't wait to throw out our iPhone4 to replace it with the iPhone5, etc. But cars are different. They cost a lot more, and more of us expect them to last, up to a decade or more (I'm still driving the same Acura Integra 21 years after buying it new). While it's fairly clear gasoline cars have far more parts and therefore are likely to have higher maintenance costs than a pure EV, the pure EV is going to need a battery pack replacement at some point. Overall, it's unclear if pure EVs will have a shorter shelf life than gasoline cars, although it seems likely if you keep up with maintenance and replace the battery, EVs will last decades, as gasoline cars can, and do.

Utility/Ease of Use -->Tie. You want a new technology to be easier to use and for it to be more practical than its predecessor. For instance, the CD surpassed the LP record and tape cassette on utility and ease of use because it allowed much easier and efficient music navigation. The Tesla Model S is a wonderful car (again, I've driven one) and arguably the top of the heap in terms of production pure EVs. But I don't think you can make a persuasive case for it being easier to use and more practical than any new gasoline car from a basic get-in-and-drive perspective. In fact, gas car folks might say it's more complicated. But they'd simply be referring, unfairly, to the learning curve of driving an EV. There's a learning curve for all new technologies, including iPhones/smart phones, but this doesn't necessarily make them inferior -- unless the learning curve is too steep.

Economy -->Advantage Gasoline Cars. This criterion refers primarily to cost: How much does

the technology cost you up front, how much does it cost you to maintain, to use, etc. Now, before EV advocates get their undies tied in a bundle because I'm giving a slight edge to gasoline cars here, I acknowledge that, in the *long term*, if you take a comparable pure EV and a comparable gas car, say a Nissan LEAF and a Nissan Versa, in almost every case, you will save money, perhaps quite a lot of money with a pure EV. This is especially true if you've got home solar, as solar-charged driver Peder Norby, who's published multiple guest entries on SolarChargedDriving.Com, has repeatedly demonstrated. Trouble is, most people do NOT think about economy of cars in terms of the long term. They see up front, *short term* cost, meaning sticker price, and they see a "cheaper" gas car, when, for instance, they compare a Nissan Versa to a Nissan LEAF. You can talk all you want about how we need to change this thinking, ditch our self-destructive short-term cost paradigm, and I *way* agree with you. However, such a change is going to come slowly -- if it comes at all. Meanwhile, pure EVs need to cost no more than a *comparable* gas car, *up front*, or most average people are going to decide the old technology, gas cars, is still superior to the new technology, pure EVs, in terms of economy.

Enjoyment/Quality of Experience -->Advantage EVs. People have to like a new technology. And, to take the iPhone/smart phone example Sexton cites, people *love* these things. And what's not to love? You can communicate with anyone, anywhere in the world (who's on network) at any time. You can take pictures, produce video, upload these, watch TV, pay for items, use your phone as a navigation device, a surveillance device, as a music-playing

device, etc., etc., etc. While it's hard to argue pure EVs have inspired the same widespread fanatical joy smart phones have, it's also fair to say that in most cases (no, not all cases), after people have driven a pure EV, they gush more about the EV driving experience than the gasoline car driving experience. This is especially true if they've had the good fortune to experience the pure joy delivered by the Tesla Model S, which is so incredibly quick there's no way driving it cannot put a smile on your face. On the joy count, advantage pure EVs – again, for most,
not all
, people.

Convenience -->Advantage Gasoline Cars. We're now getting to the criteria most people rely most heavily on when deciding whether they'll leap to a new technology. We'll draw upon a dictionary definition of convenience here, or "the state of being able to proceed with something with little effort or difficulty" and we'll add "the quality of being able to maintain this state". In terms of the actual fueling process, it is definitely more convenient to fuel an EV –
if
you've got your own home and own garage. Plugging in at home sure beats having to drive to a gas station and pump gas in sometimes nasty weather conditions. BUT – and this is a HUGE but – if you do not have your own home/garage, it's not nearly as convenient to fuel an EV. Furthermore, the fueling infrastructure for EVs isn't anywhere near what it is for gasoline cars. Say hello to "range anxiety".

If you're going to use a pure EV for a long trip, you really have to plan, pay attention to how fast you're driving, pay attention to weather conditions, traffic conditions, whether you've got the heat or AC on, etc. Say what you will about how, over time, you can, and do, adjust to having to pay attention to all of these things. But there ain't no way this can be considered as convenient as simply being able to hop into your car and go wherever you want whenever you want, even, if say, you suddenly decide you want to drive from New York to Los Angeles.

Yes, more charging stations, or in Tesla's case, more Supercharger stations , will definitely help EVs. But until these dot the U.S. in the same density as gas stations and until you can go at least 300 miles on the highway without having to worry about your speed, weather conditions, whether you have the heat on or not
and
can charge your car back up to 300 miles worth of range again in, say, 15 minutes, the gasoline car is going to win the battle of convenience. And, believe me, in the United States of America, it's hard to think of anything more important to more people more of the time than convenience. Convenience is what you might call an "Ueber-criterion." In other words, it's far more significant than any other consideration in terms of average people being convinced a new (car) technology surpasses a previous one – with the possible exception of another related "Uber-criterion", versatility.

Versatility -->Advantage Gasoline Cars. If a new technology doesn't always have to be more versatile in order to inspire people to adopt it, it certainly doesn't hurt if it is. In fact, more versatility can help a lot.

Take Chelsea Sexton's comparison between the landline phone and the iPhone/smart phone. The smart phone is so much more versatile than the landline phone, it's laughable. It essentially qualifies as a totally different technology, albeit it one that brings so many different technologies together in highly mobile form – telephony, photography, video, audio, etc. – it's almost misleading to refer to it as a single technology. And, of course, the iPhone, though it does need to be charged, as Sexton points out ;-), is way more mobile than the landline phone. It *extends* the range of the older technology – by leaps and bounds. You can use your smart phone to text the person in the same room -- or someone 20,000 miles away on the other side of the world.

Gasoline cars can't go everywhere – they can't fly, they can't float, and, of course, they can't go where there are no gas stations (though you can bring your own gas with you). However, currently gas cars are *way* more versatile than pure electrics, even cream of the crop pure electric vehicles such as the Tesla Model S.

The same car you use (really, you shouldn't use it this way), to drive your kids 25 yards to the school bus stop near your house (I kid you not, people do this in our neighborhood!), is the same car you use to drive 20 miles to work, is the same car you use for that 1,500-mile round-trip road trip to Grand Teton National Park. Sure, you'll only do the latter trip once a year. But you'll do it (sorry for the caps – can't help myself here, even though I am way an "ueber" pro-EV guy) IN THE VERY SAME CAR. And you won't have to think a bit about where you're going to tank up, plan your trip according to weather, traffic conditions, etc. You'll just go – and get there without ever having to worry about anything – except, perhaps, how you're going to keep the kids entertained for 12 hours in the car.

Final Call -->Advantage Gasoline Cars. As huge an EV, and, really, solar + EV fan, as I am, the truth is that measured in terms of the two criteria that matter most to most people, *convenience and versatility*, gas cars come out on top, even when we're talking about the Tesla Model S. (Admit it pure EV advocates in two-car households: You hop into your *gas* car, or your plug-in hybrid, for the longest trips you do. Need I say more?)

Many EV advocates, including Chelsea Sexton, think Elon's picking the wrong battle in trying to go nose-to-nose with gas cars on convenience, and, especially, on versatility. They say -->Change the way people think about cars. Though, really, what they're also saying is -->Change the new technology adoption paradigm. I say: Good luck!

The criteria you personally highlight in determining whether a new technology surpasses an old one might be different than mine, or you might list the ones I have here – environmental impact, durability, utility/ease of use, economy, quality of experience, convenience and versatility -- in a different order of importance. In fact, in terms of adopting a new auto technology, I would definitely put environmental issues in front of "economy". Of course, I'm hardly average. And neither are the majority of early pure EV adopters.

Elon Musk clearly recognizes the sheer importance of convenience and versatility (he's also high on quality of experience, but EVs already win there) for moving people from an older to a

newer automotive technology.

Many EV advocates, including Chelsea Sexton, think Elon's picking the wrong battle in trying to go nose-to-nose with gas cars on convenience, and, especially, on versatility. They say -->Change the way people think about cars. Though, really, what they're also saying is -->Change the new technology adoption paradigm. I say: Good luck!

It may well be that in fighting a full-frontal battle with gas cars on the highway of automotive convenience and versatility, Musk, is picking a battle he'll never win. However, as long as Musk and Tesla fail to win the battle of convenience and versatility -- quite clearly *the* most important battles in the push to inspire people to adopt new technologies -- pure EVs will not be viewed as a superior technology to gasoline cars by most people in the U.S. and they will not be widely adopted, and used, by most Americans. It's as simple as that.

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