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GO ALL ELECTRIC.

EV Procurement: Market State & Supply Chains

Get AMPED Forum
November 17th - 12:00-1:00 pm

Agenda

- Introductions & Webinar Goals
- AMPED Campaign Overview
- Macro Trends in EV Economics
- Supply Chain Issues & EV Production
- Q&A
- Resources & Next Steps

Presenters

Eric Hittinger
Associate Professor of Public Policy
Rochester Institute of Technology

Brad McAreavy
President
Rochester Automobile Dealers Association

Webinar Goals

- Learn about fleet EV procurement challenges and their root causes
- Dig into long-term market trends and the political/economic context shaping EV supply chains
- Hear about the current state and forecast for EV availability

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Mitigating the impacts of climate change by reducing carbon pollution caused by fossil fuels through the promotion of beneficial electrification in the Genesee/Finger Lakes region.

This webinar series is made possible by these funders:

Climate Solutions Accelerator

of the Genesee-Finger Lakes Region

GRCC

Greater Rochester Clean Cities

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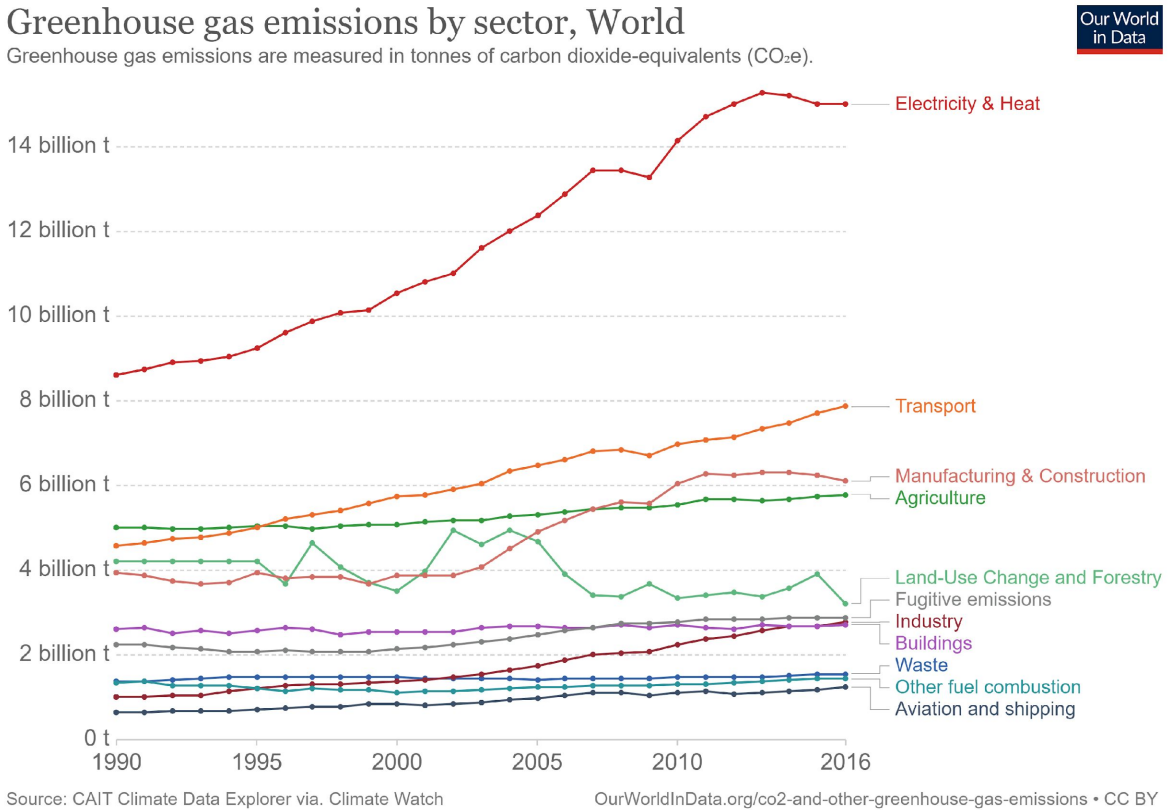
Macro Trends in EV Economics

Electric Vehicles: the big picture

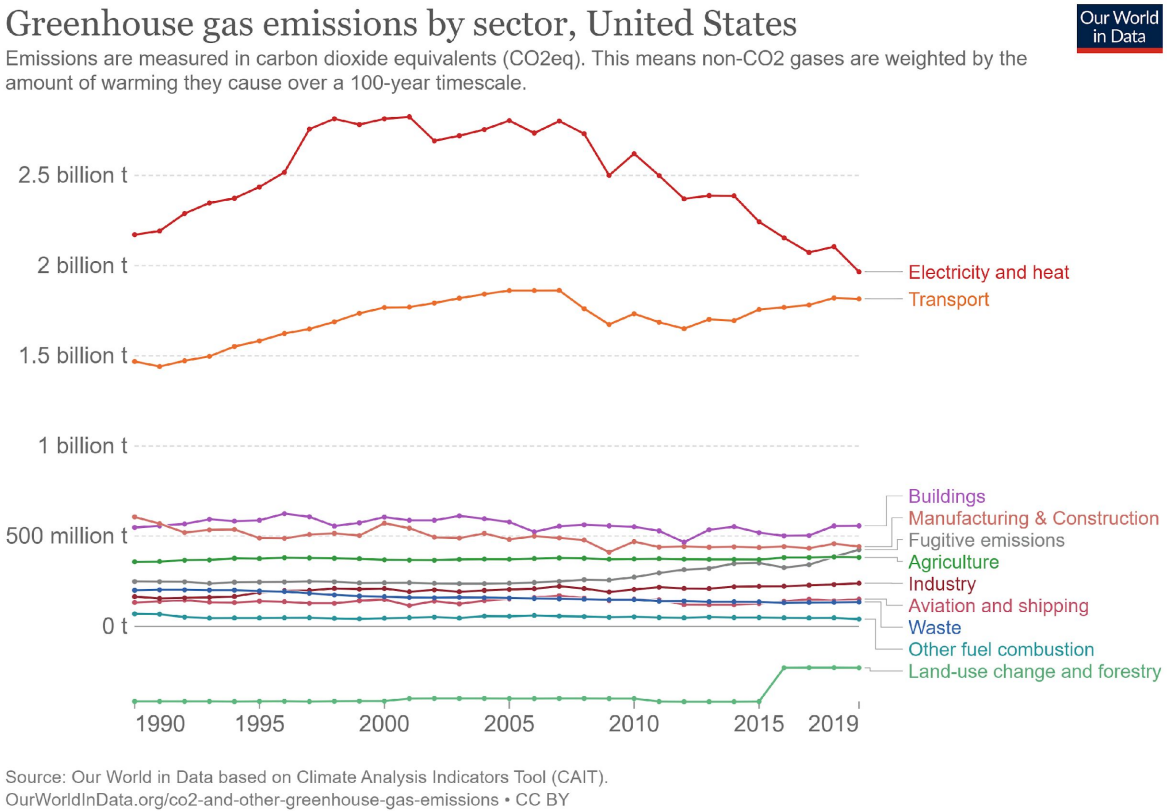
Eric Hittinger, Associate Professor of Public Policy @ RIT

eshgpt@rit.edu

Transportation is the #2 source of emissions globally

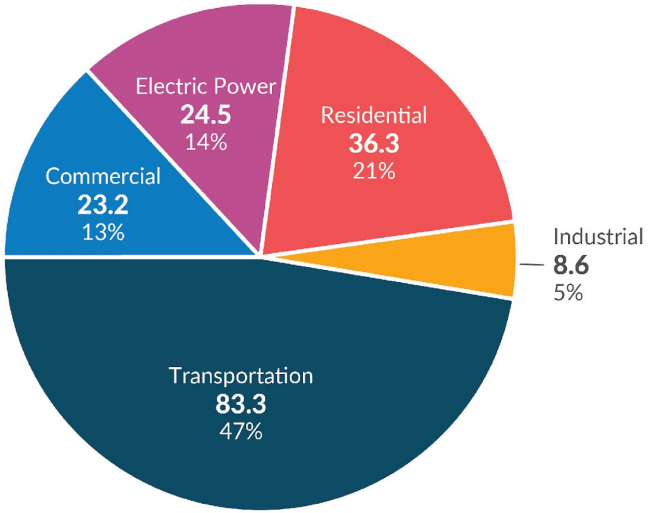


But it is the #1 source of emissions in developed countries



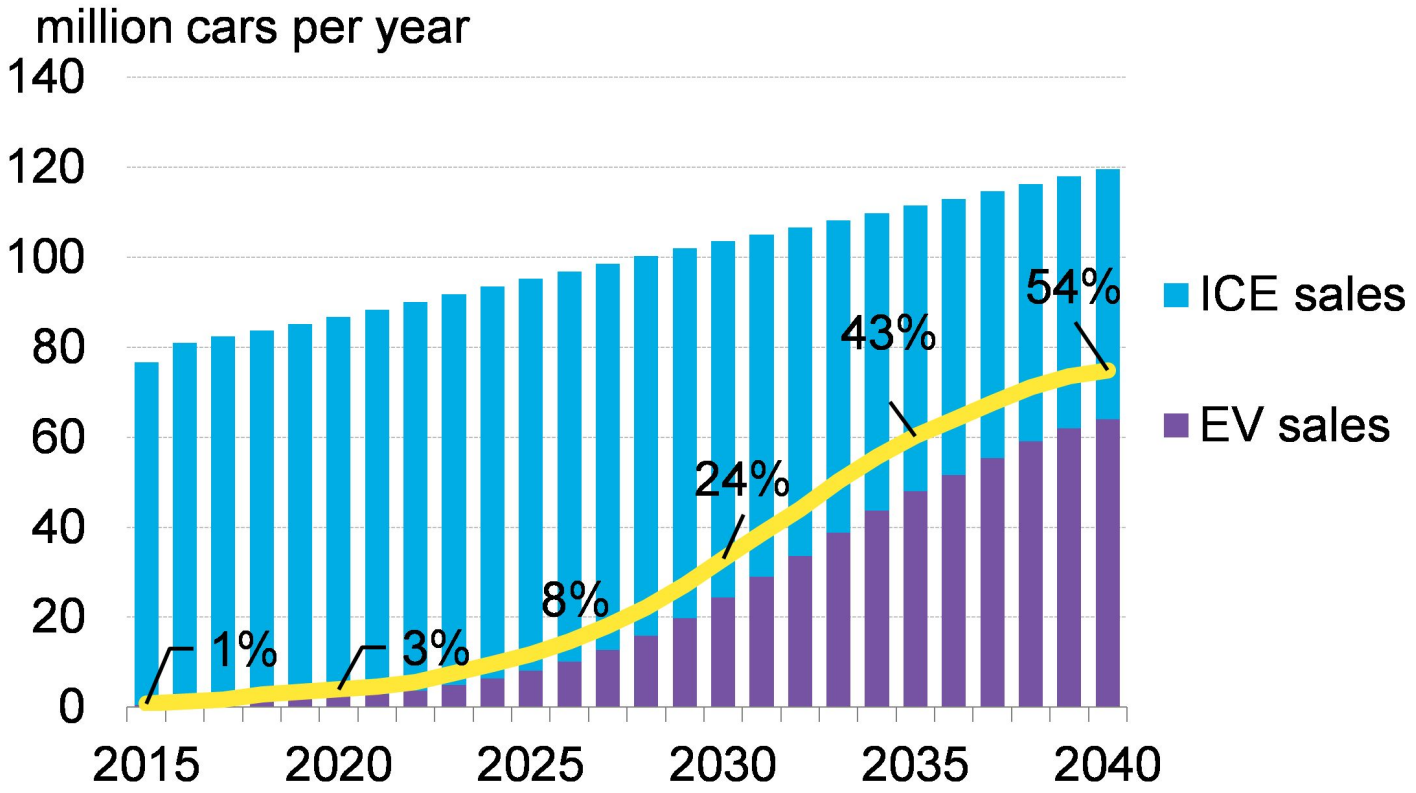
But it is the #1 source of emissions in developed countries

Figure 1: Total New York State Emissions by Sector, 2018
(million metric tons of CO2 and share of total emissions)

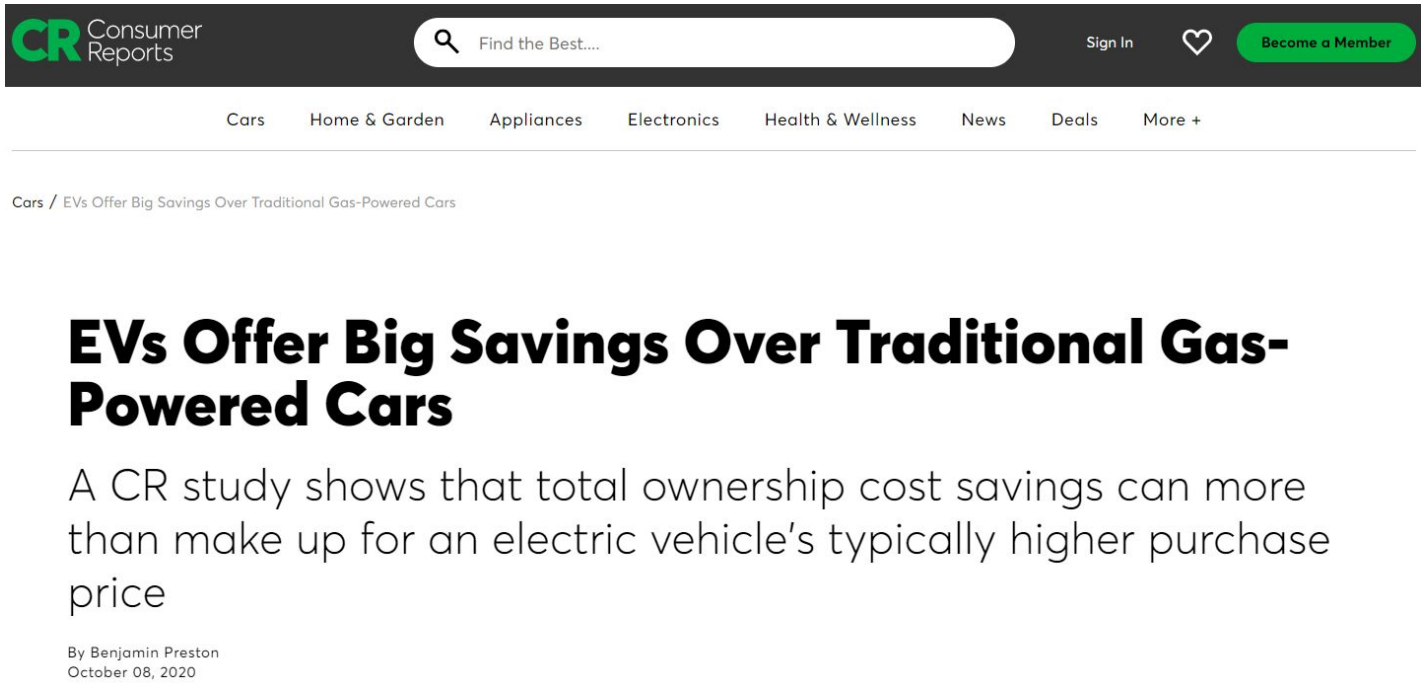


Source: U.S. Department of Energy, Energy Information Administration, "State energy-related carbon dioxide emissions by sector" (accessed October 27, 2021).

Bloomberg New Energy Finance forecasts that most of the world's new vehicles will be EVs by 2040 (similar to International Energy Agency forecasts)



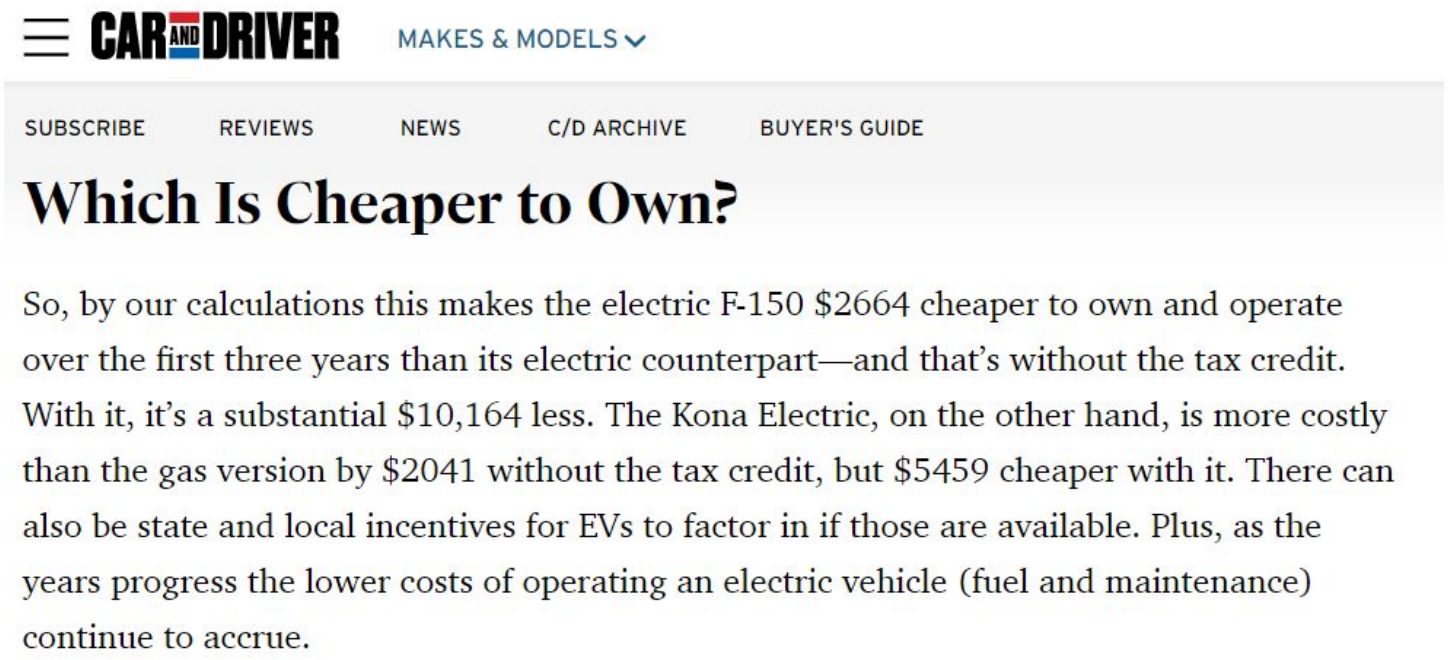
EVs have similar ownership costs as gasoline vehicles today (and even non-treehuggers agree)



EVs have similar ownership costs as gasoline vehicles today (and even non-treehuggers agree)

Overall, AAA estimates you'll spend $9,119 annually owning an electric vehicle that you drive for 15,000 miles in a given year. That figure includes costs related to power (electricity) and maintenance, as well as financing, registration, fees, insurance and depreciation, and it's based on fairly inexpensive EVs — specifically, BMW i3, Chevrolet Bolt, Hyundai Kona Electric, Nissan Leaf, and Tesla Model 3. For the sake of comparison, the total cost per year for a minivan that gets the same use is $10,101, while a small SUV would cost you $8,362 and a half-ton pickup would run over $11,000.

EVs have similar ownership costs as gasoline vehicles today (and even non-treehuggers agree)



CAR AND DRIVER MAKES & MODELS

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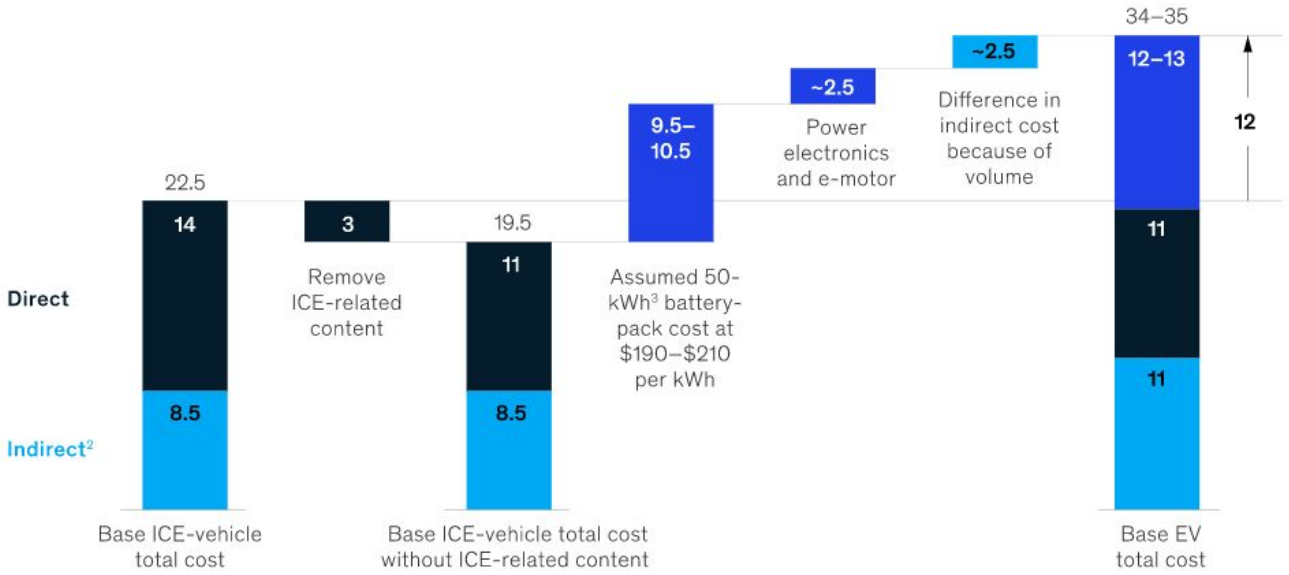
Which Is Cheaper to Own?

So, by our calculations this makes the electric F-150 $2664 cheaper to own and operate over the first three years than its electric counterpart—and that's without the tax credit. With it, it's a substantial $10,164 less. The Kona Electric, on the other hand, is more costly than the gas version by $2041 without the tax credit, but $5459 cheaper with it. There can also be state and local incentives for EVs to factor in if those are available. Plus, as the years progress the lower costs of operating an electric vehicle (fuel and maintenance) continue to accrue.

And the economics of EVs will improve from there: McKinsey recently put out a nice report on EV costs and potential savings

Cost walk of ICE[1] to electric-vehicle (EV) C-Car in 2019,
estimated average per vehicle, $ thousand



[1]Internal combustion engine.
[2]Includes average incentive cost of $2,000.
[3]Kilowatt-hour; includes battery-management system.
Source: Industry experts; UBS; McKinsey analysis

Figure:
https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/making-electric-vehicles-profitable

These are cost improvements you can make without any technology improvement

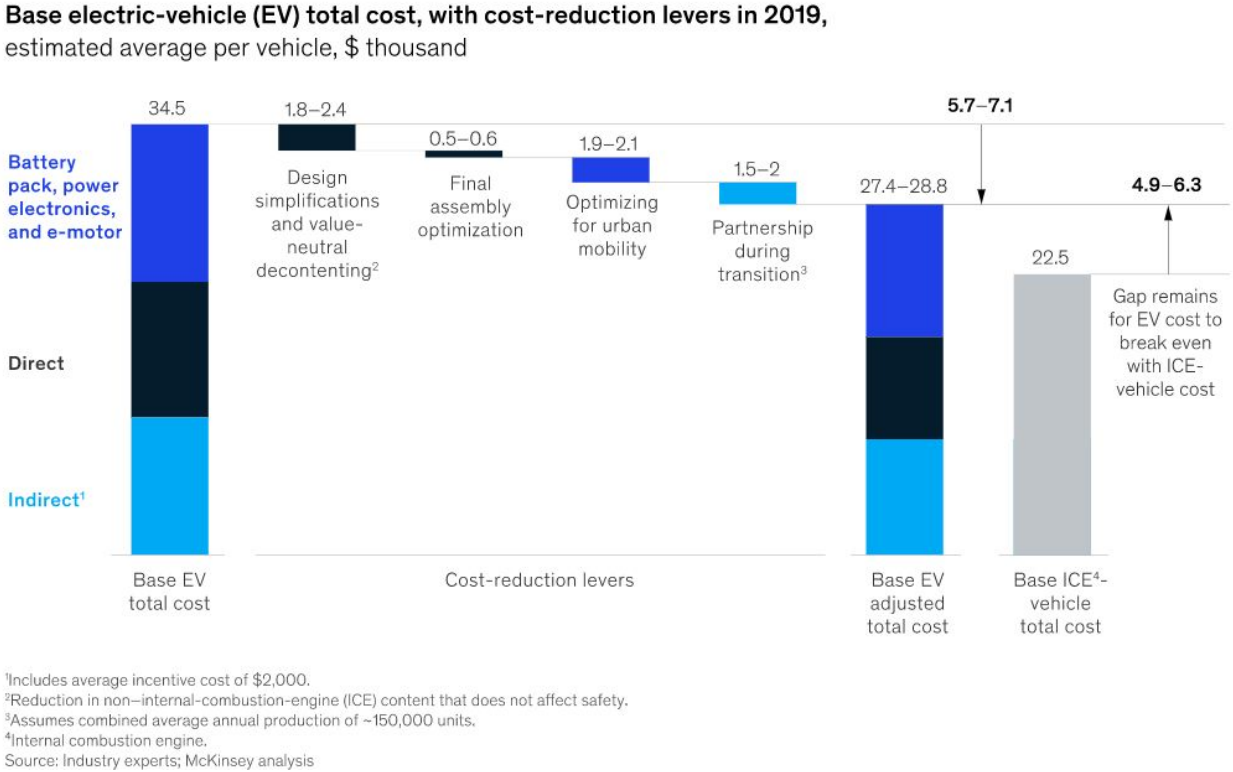
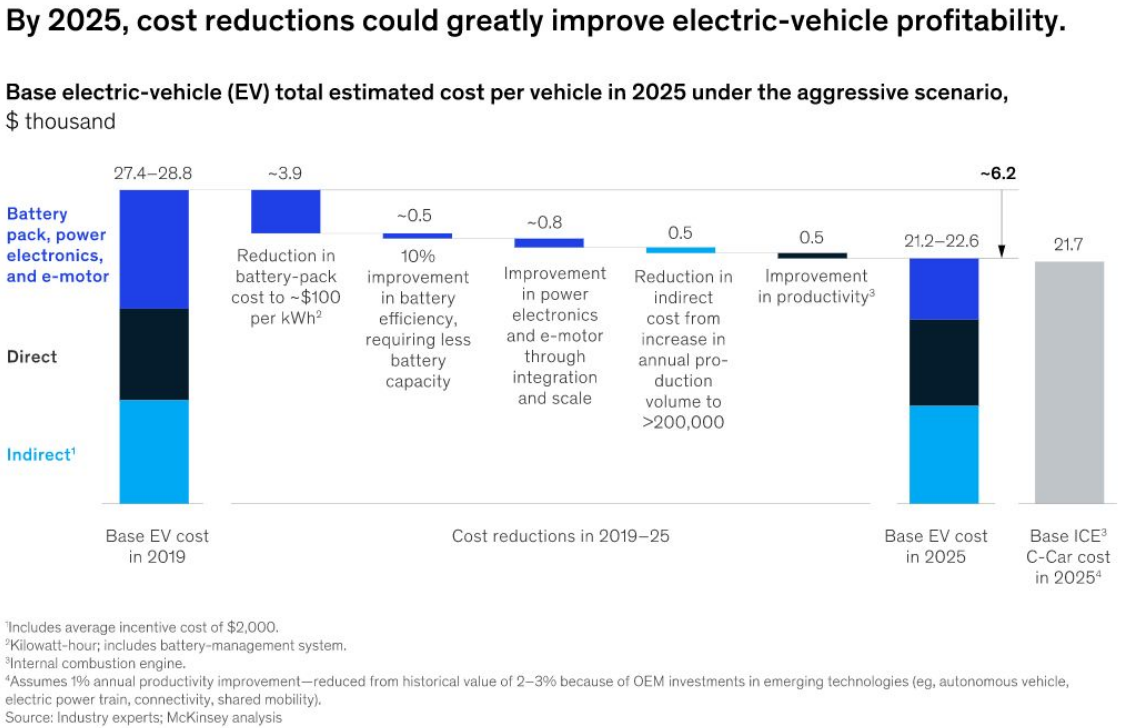


Figure:
https://www.mckinsey.com/industries/automotive-and-assembly/our-insights/making-electric-vehicles-profitable

If you then add technology improvements, EV **upfront capital cost** can be at ICE levels in a few years



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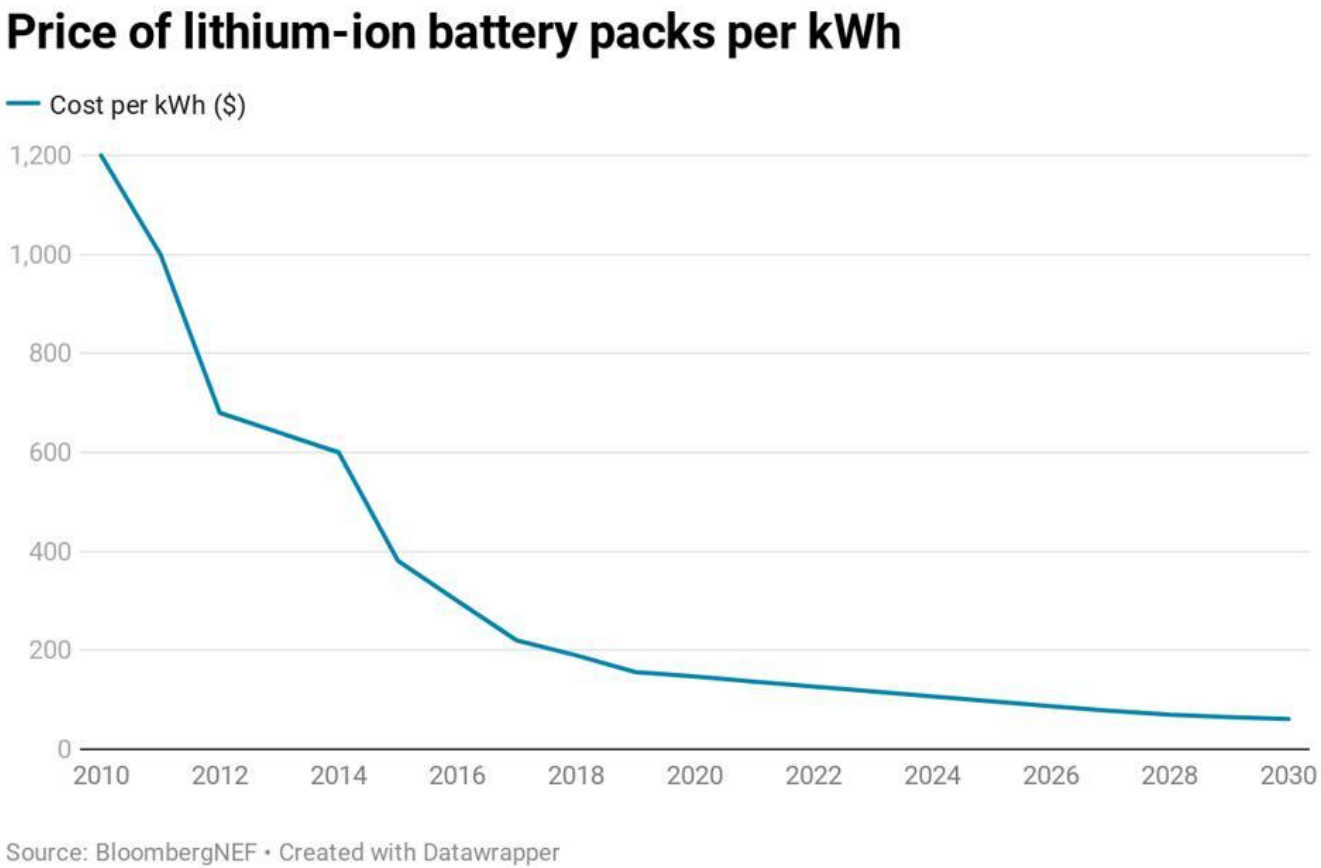
The biggest driver is falling battery prices

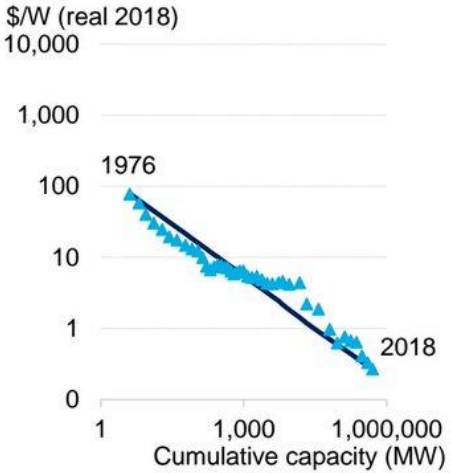


The biggest driver is falling battery prices

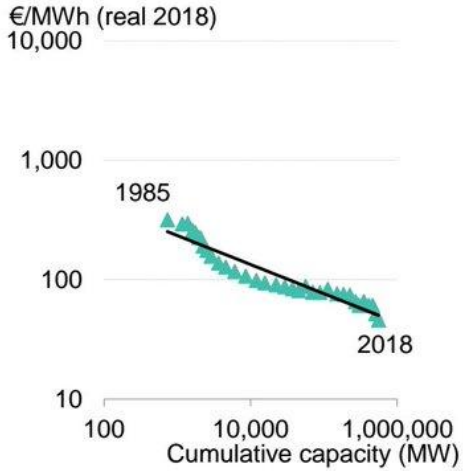
Experience curves

LIEBREICH Associates

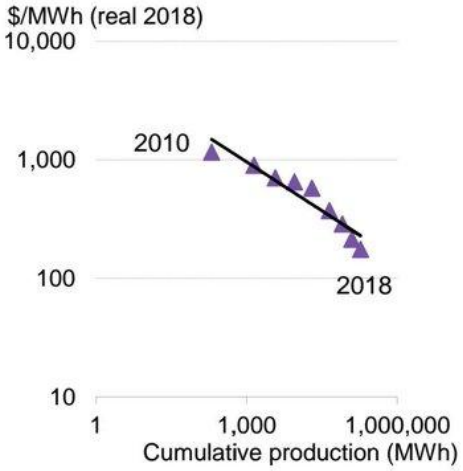
Solar – learning rate 28.5%



Wind – learning rate 15%



Batteries – learning rate 18%



Source: BNEF

But what about charging and energy sources?

There are already a lot of chargers, but geographic access & fast-charging are still important

The Alternative Fuels Data Centre lists almost 50 000 EV charging stations currently in operation in the United States. Of these, 93% are publicly accessible, and 17% are on non-urban roads (including highways and other arterials). A disproportionate share of direct current (DC) fast chargers are public (99%) and located on highways (25%), reflecting the faster charging needs at these locations.

About 6% of charging stations are located along the interstate highway system, the backbone of the national road network. Stations along the interstate highways account for 16% of the total number of DC fast charging points. About 8% of the US population lives more than 10 km from a public charging station. Bringing this share down to less than 5% would necessitate building an additional 1 185 stations; bringing it down to zero would require building more than 5 000 additional stations.

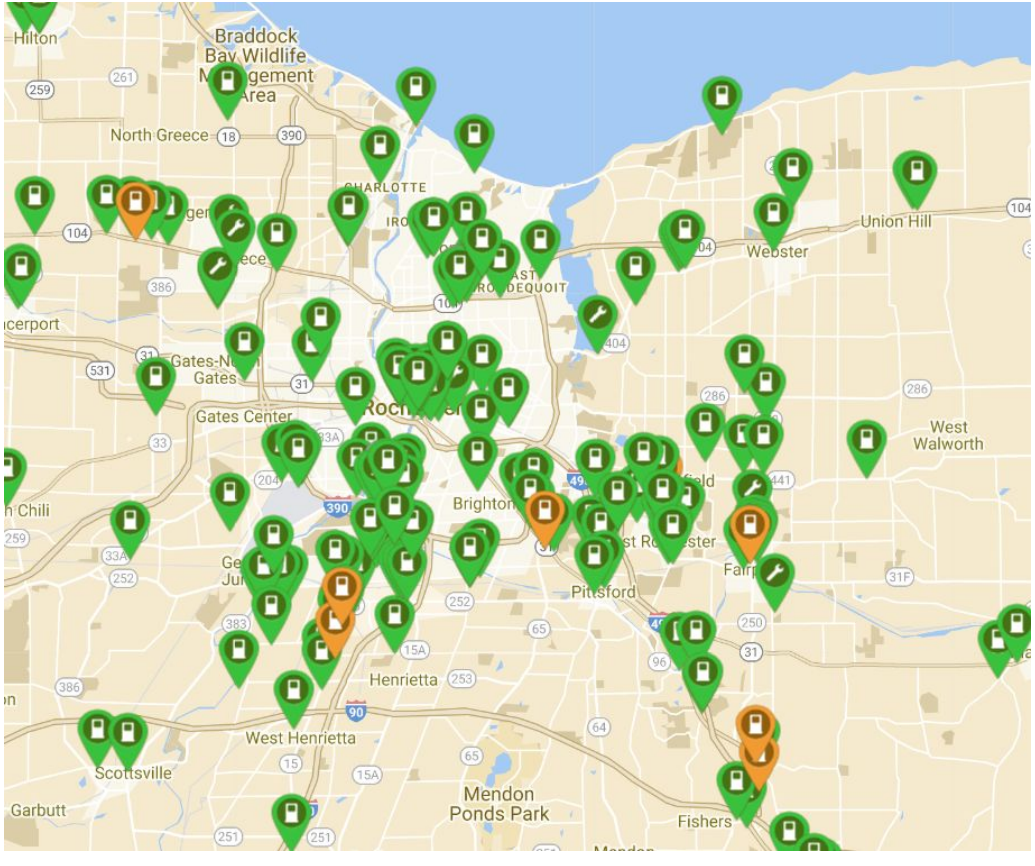
Source:
https://www.iea.org/reports/global-ev-outlook-2022/trends-in-charging-infrastructure

There are already a lot of chargers, but geographic access & fast-charging are still important

The infrastructure bill that passed in November 2021 earmarked $7.5 billion for President Biden's goal of having 500,000 chargers (individual plugs, not stations) around the nation. In the best case, Michalek envisions a public-private collaboration to build a robust national charging network. The Biden administration has pledged to install plugs throughout rural areas, while companies constructing charging stations across America will have a strong incentive to fill in the country's biggest cities and most popular thoroughfares. After all, companies like Electrify America, EVgo, and ChargePoint charge customers per kilowatt-hour of energy they use, much like utilities.

Source:
https://www.technologyreview.com/2022/06/28/1053908/electric-vehicle-charging-stations/

Rochester already has a lot of chargers, though not in every neighborhood and most are slow chargers



Upstate NY is the best place in the US to charge an EV: electricity is cheap and clean

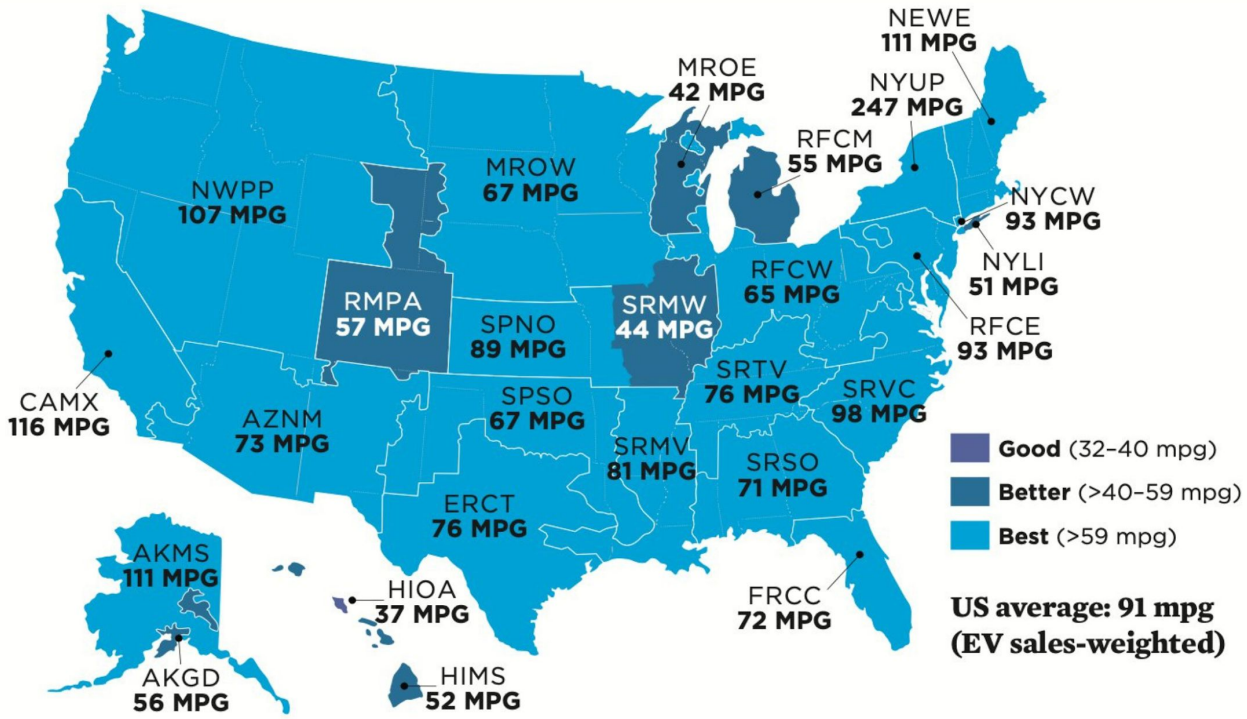


Figure: Union of Concerned Scientists

Can the grid handle it?

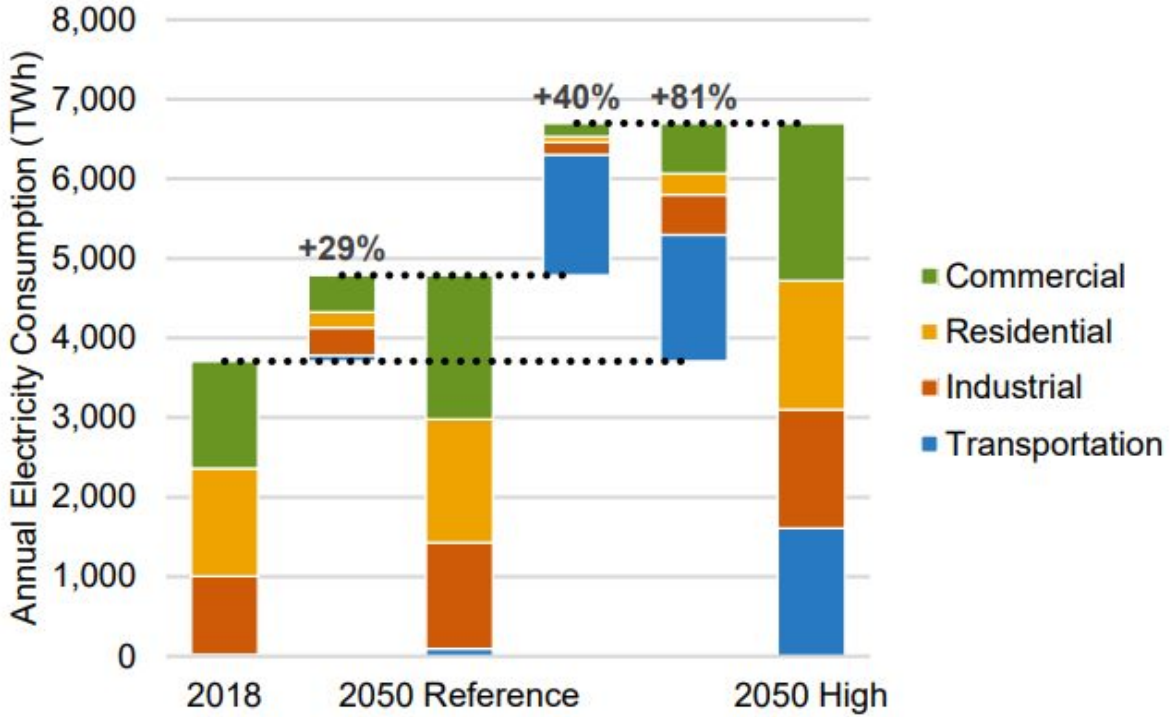


Figure: https://www.nrel.gov/docs/fy21osti/79094.pdf

Can the grid handle it?

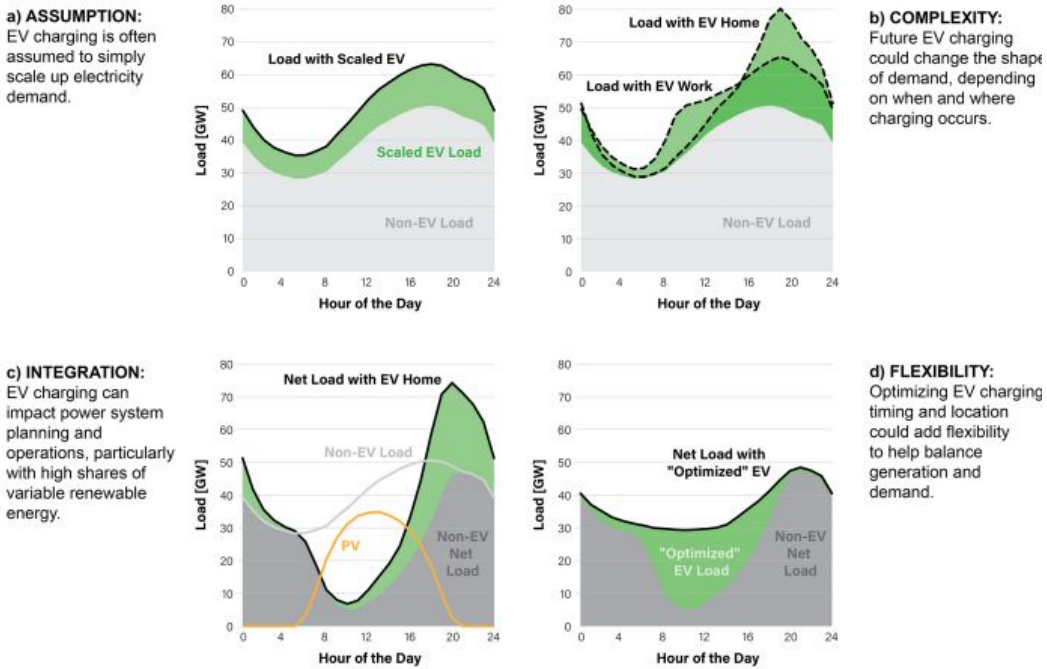


Figure 2. Possible impacts of EV charging on total electricity demand: (a) assuming that EV charging leads to a simple scaling up of current load (current assumption in many models); (b) considering mobility-based modeling of alternative EV charging profiles, leading to two possible total loads that are significantly different; (c) highlighting interaction between EV profiles and variable renewable production; and (d) illustrating the effect of coordinated and optimal EV charging. Load (non-EV) and PV data is from [69] for a summer day in CAISO for a system with 30% annual PV penetration. The different EV charging patterns illustrated in the figure result from different charging strategies, but the green areas (total EV use and charging energy) are the same across all panes.

Figure: https://www.nrel.gov/docs/fy21osti/73762.pdf

Questions? Complaints?

Please add them to the Q&A and we will get to them towards the end.
Or if you are shy, you can email me: eshgpt@rit.edu

Supply chain issues & EV production

ELECTRIC VEHICLE (EV) CHALLENGE

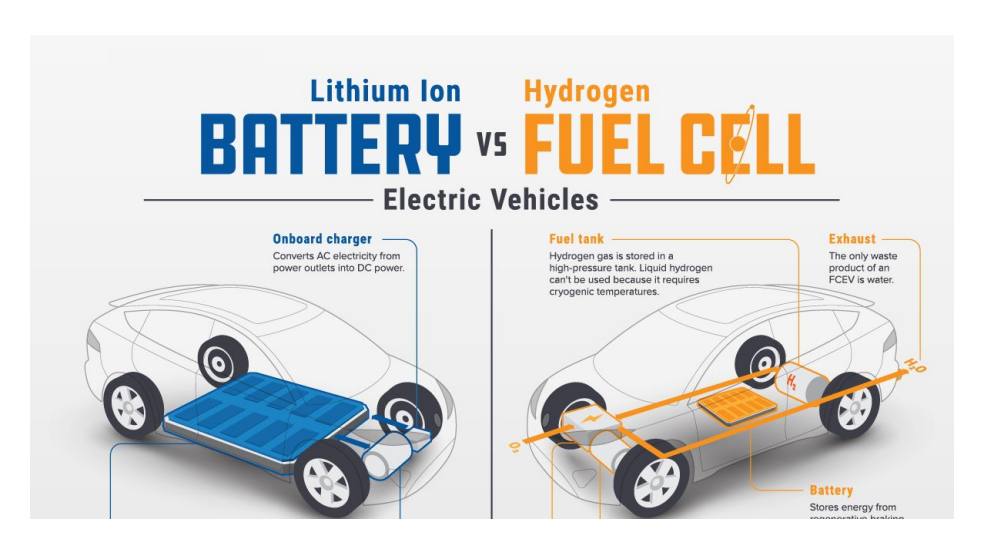
Brad McAreavy

President

Rochester Auto Dealers Association

INTRODUCTION

- **Most dramatic transition period since the invention of the automobile**
- **EV's are the primary focus**
- **Other viable technologies are being explored:**
  - **Hydrogen fuel cells**
  - **Synthetic fuels**



FEDERAL GOVERNMENT ROLE

- **Current federal administration is heavily committed to climate change initiatives**
- **Funding for publicly accessible charging networks**
- **Funding for manufacturing facilities in the US**
- **Current economic conditions are impacting the microchip industry**

NEW YORK STATE GOVERNMENT ROLE

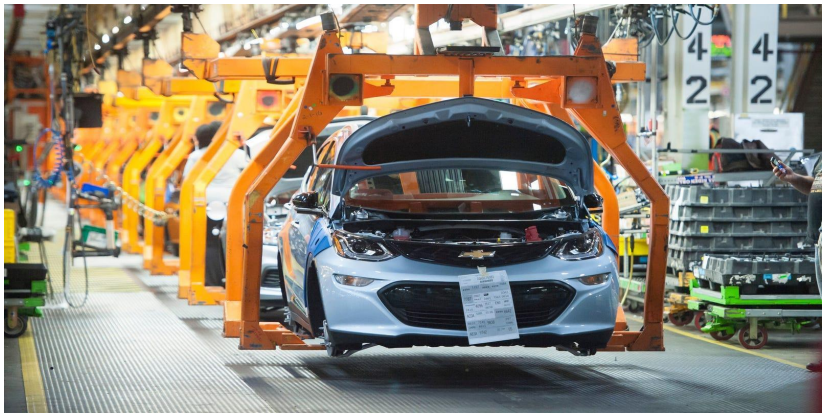
- **New York State is fully committed to climate change programs**
- **NYSERDA Drive Clean Rebate Program**
- **NY State Make-Ready EV Charging Station Program**
- **NY following Cal-ZEV guidelines**

BOTH LEVELS OF GOVERNMENT HAVE COMMITTED BILLIONS

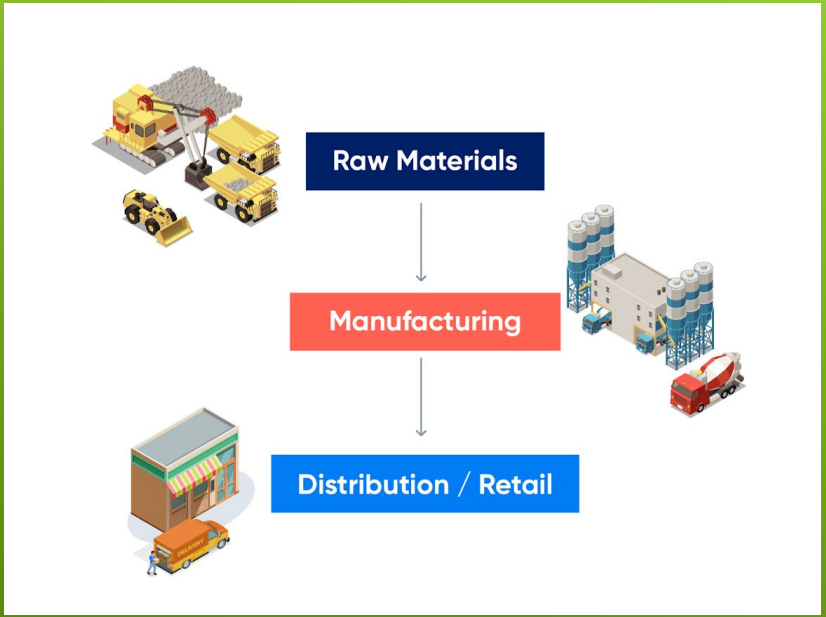
- **Regardless of House and Senate control, programs are expected to remain intact.**
- **Agreement that US needs to establish domestic supply chain**

MANUFACTURERS' ROLE

- **Billions of dollars committed to battery manufacturing in the US**
- **Billions on new or renovated manufacturing facilities**
- **Taking advantage of federal and state incentive money**
- **Eligibility for vehicle federal tax credit is contingent upon location of materials and manufacturing**



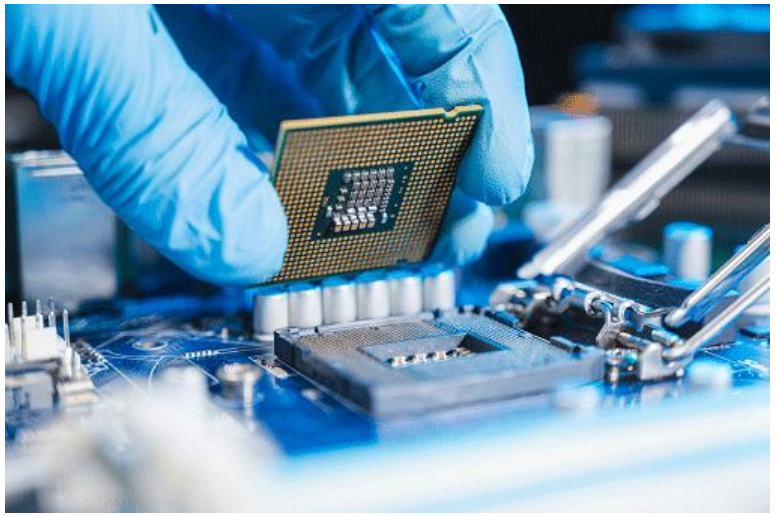
MANUFACTURERS' ROLE



- **Manufacturers want to own their supply chain**
- **Ford Motor Company has separated EV and ICE business processes**
- **Every manufacturer is expected to get in the EV game**

MANUFACTURERS' ROLE

- **Microchip shortage continuing to take a toll**
- **Short term capacity of the microchip industry is expected to rise**
- **Long term, the microchip industry is planning for a decline due to current and future economic conditions**



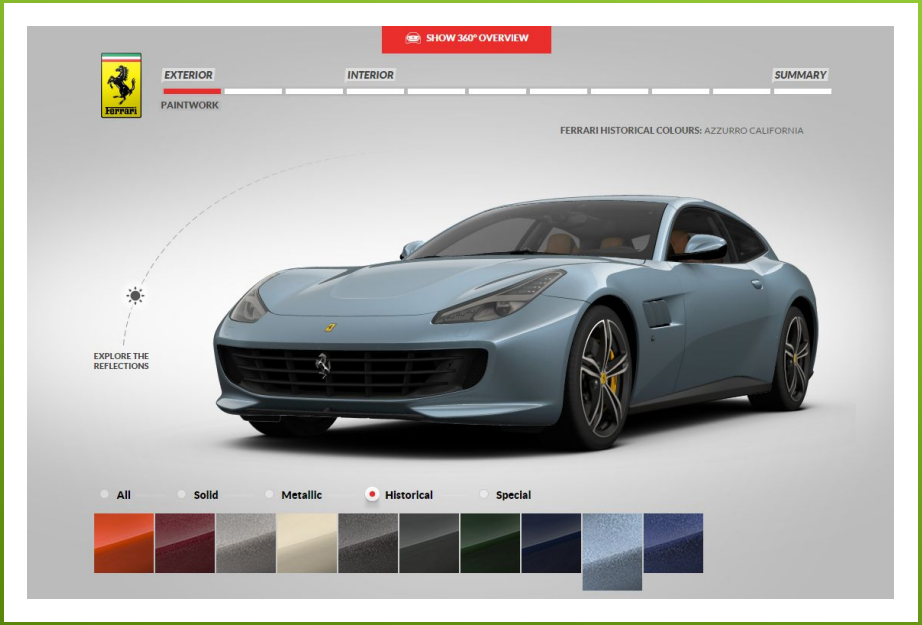
DEALERSHIPS' ROLE

- **Substantially low inventories for past 2 years**
- **Consumer purchasing behavior has changed**
- **Non-negotiable pricing is generally the result**
- **Some manufacturers prefer this sales method**
- **Order method vs inventory method**

DEALERSHIPS' ROLE

- **Manufacturers are strongly encouraging dealers to invest in the EV future**
- **Significant dealer investment required**

IMPACT TO THE CONSUMER



- **Limited inventory for the foreseeable future**
- **Consumers should consider ordering vehicles**
- **Average wait time is six to eight weeks**
- **Ordering allows for a customizable experience**
- **Ask the dealer about federal and state incentive eligibility**

IMPACT TO THE CONSUMER

- **Need to install an EV charging unit at home?**
- **The RADA can help!**

What about electric trucks?

A Note from BYD:
Commercial Electric Truck Manufacturer

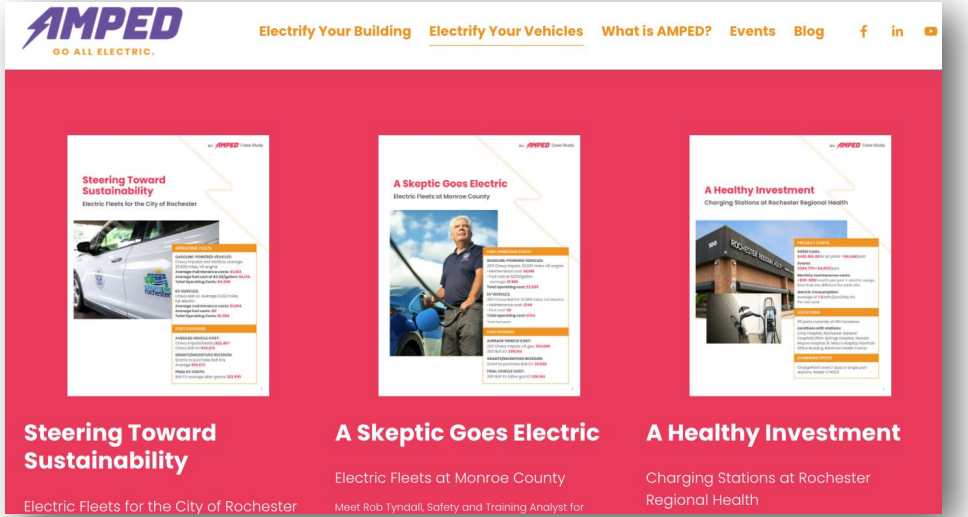
"I will say lead times from BYD are no different than the lead time for a diesel truck, **about 12 months**. Truck fleets are familiar with these long lead times for diesel trucks as this has been the case for over a year now and it's looking like it will continue for a few more years. What's important to remember about procuring an EV truck is you have to have your infrastructure in place before you receive the truck. Some infrastructure projects can take well over a year to complete depending on the work that needs to be done to the site."

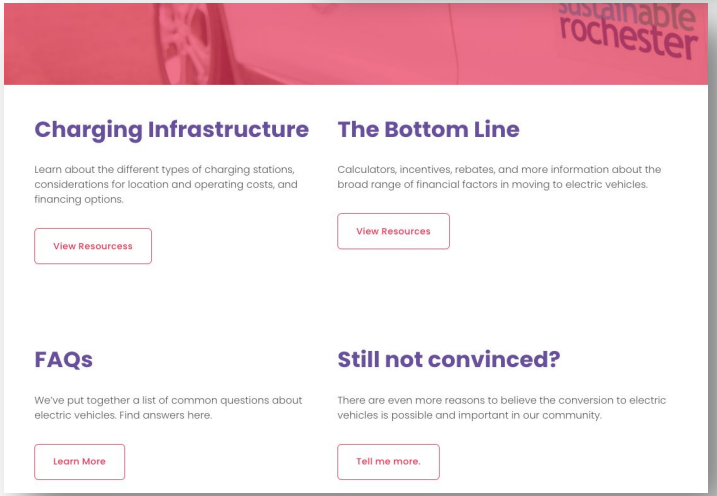
AMPED Resources

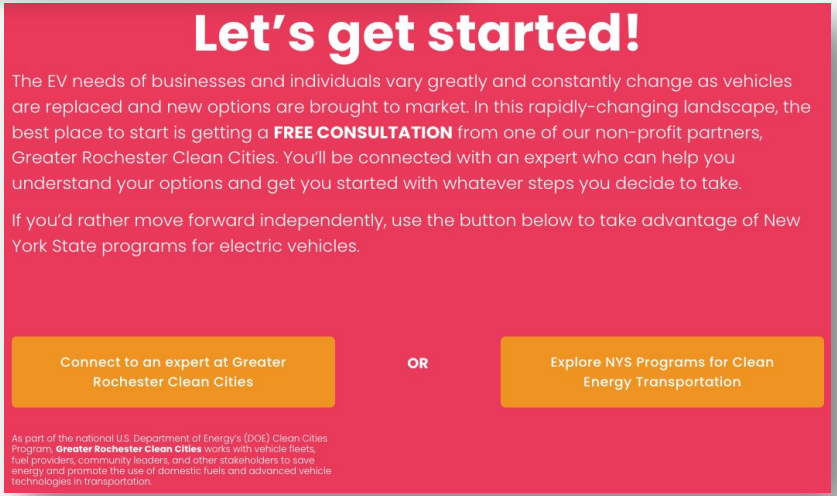
Next Steps

- Call a local dealer and ask about EV models you can look at or test drive today
- Get your EV orders for 2023 and beyond in the pipeline now!
- Check out the Rochester International Auto Show, March 2nd - 5th, 2023 at the Rochester Riverside Convention Center to see a wide selection of EVs
- Subscribe to AMPED updates for the latest in EV news & events
- Contact DLKeefe@rochester.rr.com at Greater Rochester Clean Cities to have a conversation about electrifying your fleet

AMPED Website information and resources







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Next Get AMPED Forum: Grid Reliability

January 19th, 2022