The Disruptive Force of EVs

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"The failure of a successful businesses is rarely that they forget what made them successful. It is **what made them successful is no longer valued in the marketplace**."

Peter Drucker

Disruptive Technologies in our Lifetime

Future Disruptors…

Two Future Trends in Transportation: **Autonomous** and **Electric** Vehicles.

Autonomous Vehicles – Powered by AI

- Freedom of travel for kids and elderly.
- Cheaper mobility. No more insurance, registration, maintenance, fuel.
- Reduced car ownership.
- Smaller public parking structures.
- Houses without driveways or garages.
- Fewer truck drivers.
- Autonomous taxis already in service in several US cities.
  - Will spread slowly, mostly in cities.
  - Regulation will slow growth.
  - Northern US weather will slow adoption.

This is a topic for another class…

Trends Driving EV Adoption

Automakers know that EVs are simpler and cheaper to build. They must move to EVs to compete on a world stage.

+ lots of Software.

ICE = Internal Combustion Engine

BEV = Battery Electric Vehicle

Trends Driving EV Adoption

Lithium prices have fallen dramatically.
Battery cell and pack prices continue downward trend.

TRANSPORTATION

Electric vehicle battery prices are expected to fall almost 50% by 2026

October 7, 2024 Share

Lithium prices should see a controlled decline from historic highs over the rest of this decade

Source: Wood Mackenzie

Battery prices forecast to continue to fall

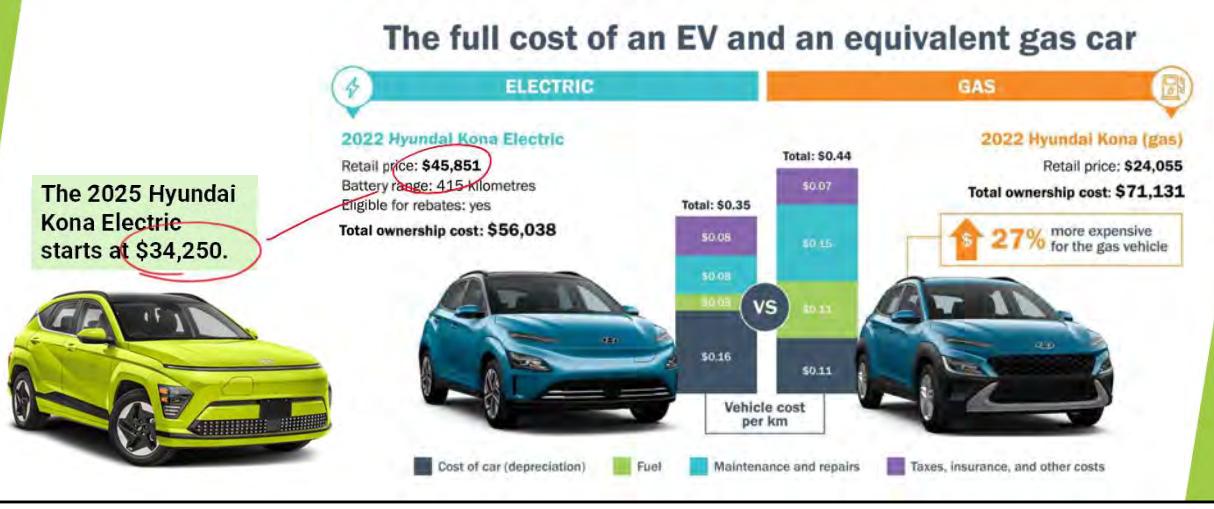
Global: average battery pack prices (US$/kWh)

Source: Company data, Wood Mackenzie, SNE Research, Goldman Sachs Research
2024- 2030 are forecasts

Goldman Sachs

Trends Driving EV Adoption

Many EVs are Cheaper to own than an equivalent gas car.
(But more expensive to buy, for now.)



And the gas Kona starts at over $26,000 in 2025.

Trends Driving EV Adoption

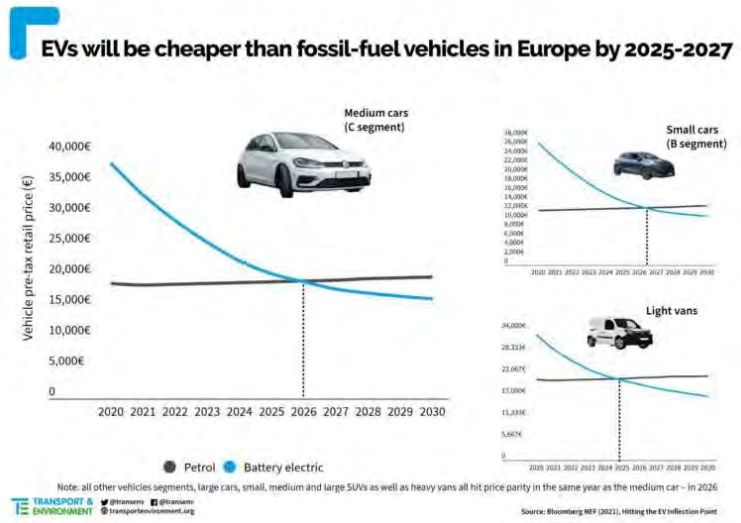
When will EVs be cheaper to buy than an equivalent gas car?

Projected between 2027 – 2030.

In **China** EVs are cheaper right now.

In **Europe** probably 2027.

In **US** probably 2030.



Trends Driving EV Adoption

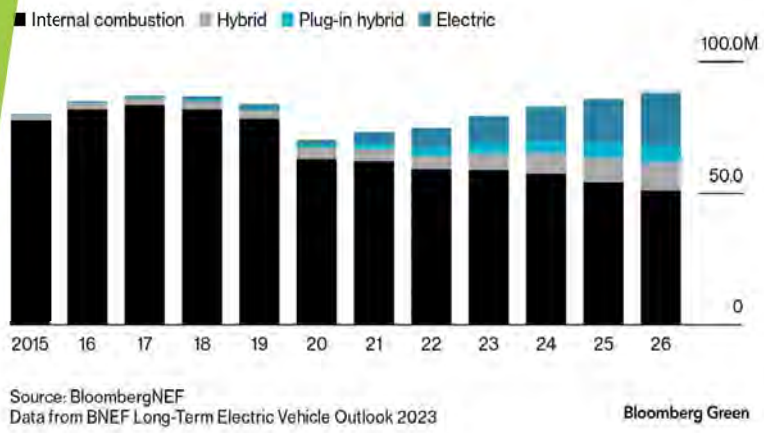
By 2032 Expect…

- EVs with solid-state batteries.
- Cheaper than equivalent gas cars.
- 500 miles of range.
- Charge from 10--80% in 10 minutes.
- Chinese companies will have at least 50% market share.
- Steer and brake by wire. (Accelerate by wire is already in all EVs.)

Mass EV Adoption is Underway

The world hit "Peak" ICE car sales in 2017.

EVs share of global vehicle sales continues to increase every year.



NY State 2024, EVs and PHEVs

- 98,000 new registrations.
- 276,000 total EVs on state roads.
- 50,000 EVs in the Hudson Valley region. This has been doubling every 2 years.

US 2024, EVs and PHEVs

- 1.7M sold in North America.
- Sales increased 21% over 2023
- Market share 11%

Source: EValuateNY

The US hit peak gasoline consumption in 2008, and consumption has held steady or declined since then. A lot of that is due to increased fuel efficiency of the US auto fleet. EVs have only affected the last 5 years, really only the last 3.

But EV Adoption Lags in the US. Why?

- Americans like **larger vehicles**, which are less efficient with an EV powertrain.
- Americans **drive longer distances** than Europeans and Asians.
- **Politics**.
  - Government policies under Republican administrations have for 40 years encouraged fossil fuels and discouraged Solar, Wind, and EVs.
  - Conservative media opinions against Climate Change, Clean energy, and EVs have greatly slowed adoption.
  - Tesla is the US sales leader by far, but opinions about Mr Musk are tanking sales. (Tesla sales down 13% in 1Q25, largest drop in Tesla history.)

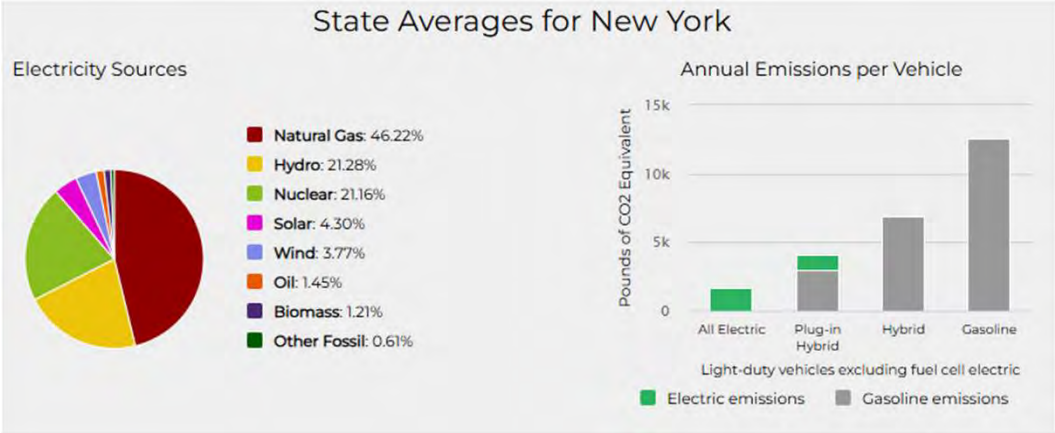
Sorry to bring politics into this discussion, but it plays a huge role in the adoption of EVs and clean energy technologies in the US. Conservative media and government stances against climate change, clean energy tech, and EVs have greatly slowed the adoption of these technologies. See Home - EV Politics, and Electric Vehicles for Hyde Park, NY

What disruptions will mass EV adoption bring?

“mass” = In US probably means 50% new car annual sales.

EVs Reduce Greenhouse Gases

But so far in the US the effect of EV's lowering greenhouse gases has been offset by Americans buying larger vehicles, and by increased demand for electricity due to data centers, AI, and bitcoin mining.



Source: Alternative Fuels Data Center. https://afdc.energy.gov/vehicles/electric_emissions.html

EVs Reduce Air Pollution for Everyone

"Key Findings: By 2050, as the United States moves to 100 percent zero emission vehicles and non-combustion electricity generation, the cumulative national public health benefits due to cleaner air could reach:"

- **$978 billion in public health benefits**
- 89,300 fewer premature deaths
- 2.2 million fewer asthma attacks
- 10.7 million fewer lost workdays

Source: https://www.lung.org/clean-air/electric-vehicle-report/driving-to-clean-air

EVs Reduce Air Pollution for Everyone in Your Town

At the zip code level, for every additional 20 EVs per 1,000 people, there was a 3.2% drop in the rate of asthma-related emergency visits.

PRESS RELEASE

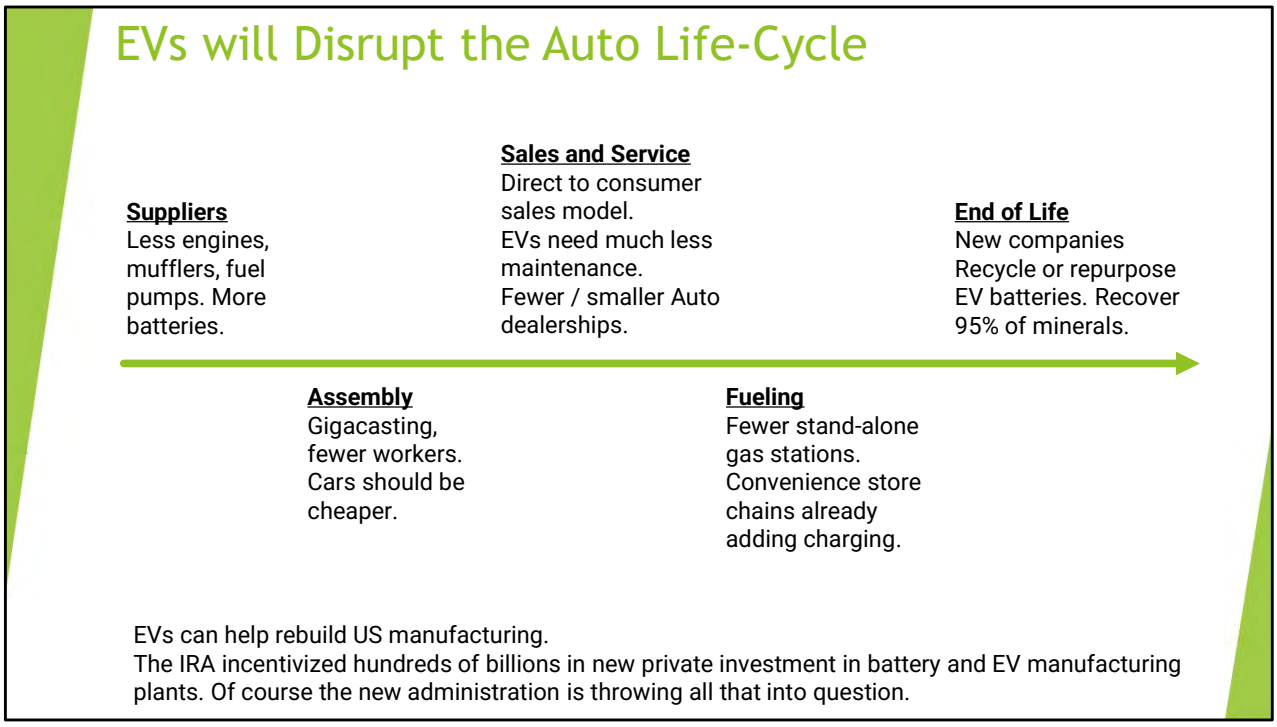
Study links adoption of electric vehicles with less air pollution and improved health

Researchers from the Keck School of Medicine of USC conducted one of the first-ever studies showing that electric cars are associated with real-world reductions in both air pollution and respiratory problems.

Zara Abrams February 02, 2023

Source: https://keck.usc.edu/news/study-links-adoption-of-electric-vehicles-with-less-air-pollution-and-improved-health/

Studies of cities with low emission zones also show lowered air pollutants and decreased deaths from air pollution. https://electrek.co/2025/03/15/surprise-taxing-polluting-vehicles-in-london-made-everyone-much-healthier/



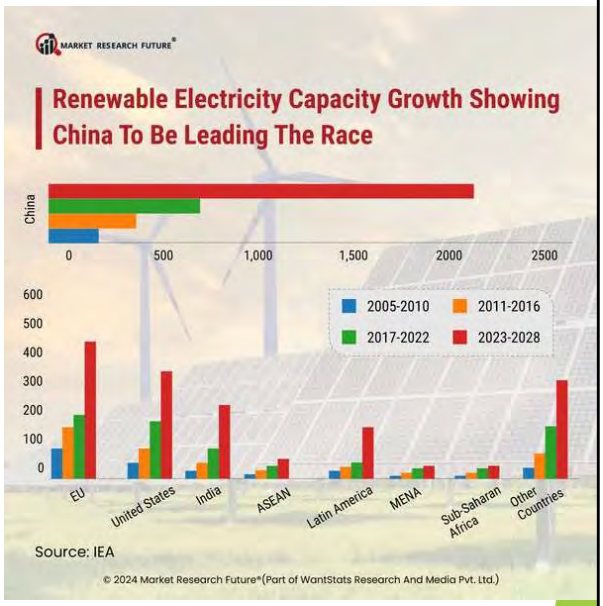
Clean energy investments by state

https://www.energy.gov/invest shows all the private investment that is taking place as a result of the Inflation Reduction Act.

So does this website: https://e2.org/announcements/

Gasoline prices will decrease, then rise.

- EVs will lower demand for oil. Prices will fall until prices near oil production costs — in the US about $55/barrel. High-cost producers will go out of business. Then prices will rise. OPEC will lower production to keep prices high.
- When will we hit **global peak oil?** 2030?
- Already did in China, in 2024.
  - China, once the **worlds largest importer of oil**, is importing less each year.
  - Chinese EV sales are **60% of all car sales** now.
  - China adding solar and wind power equivalent to **1 nuclear power plant every day**. 360 GWh in 2024. (1 Nuclear plant = 1 GWh output)
  - China projects by 2035:
    - **Gas and diesel use will drop 50%.**
    - Overall oil use will drop 75%.



EVs will help local Electric Utilities

- Your EV can Power your home during an outage. A typical EV could power your home for 5 days.
- Utilities will use EVs to lower costs, and pay EV owners.
  - Existing programs: VPPs, ChargeSmart, Peak Perks, etc.

Chinese Autos are ~~Coming~~ Already Here.

- **You will be driving a Chinese car.**
  You may be driving one now.
  - Lower cost to manufacture, huge scale, good quality.
  - There are already cars for sale in US that are made in China – Several Lincoln models, Buick, Volvo, Polestar 2 EV, BMW iX3.
- **Chinese EVs are excellent and affordable.** How long will the US be able to protect their domestic auto makers from them? Be prepared for Chinese EVs to be on sale in America in the 2030s.
- Gov policies need to encourage EVs to keep US automakers competitive. Will Ford, GM, and Stellantis survive? Will they sell any cars outside US?
- German manufacturers like Volkswagen group are losing market share, and factories are operating at about 55% capacity. This leads to increased costs per car. So Gas car prices will go up.

2008 - China wanted the industrial base that automaking brings, but could not compete on ICE tech, so they leapfrogged to EVs.

BYD Seal EV. Sells in China for $31,000 equivalent. LFP battery. About 320 miles EPA.

BYD and Tesla are the world leaders in EV sales.

Buick Envista. Made in China.

The US will continue to protect the domestic auto industry. But if automakers don't adapt to what the rest of the world wants, if they are producing cars only for US consumption, they will shrink and die. Stellantis and Ford seem the most vulnerable right now.

Remember the 1970 oil shocks, and the introduction of Japanese cars into the US market. Look at how dominant Toyota, Honda, Subaru, Nissan are now in the US. And the Korean automakers Kia and Hyundai are now also major players in the US market. Full-Year Auto Sales Report For 2024

New Business Opportunities

- What's the future of stand-alone gas stations? Certainly reduced demand. Are opening new gas stations a good business decision?
- Convenience stores will add EV charging and remove some gas pumps. Make money off store, food, bathrooms.
- Installing and servicing charging stations. I have worked with several specialized companies who just install EV chargers.
- Hotels, Restaurants, Shopping plazas, adding EV charging.
- Own an automated taxi fleet. Or make some money with your idle car.

High-speed EV Chargers at Coppolla's Restaurant in Hyde Park.

Conclusion
The world of 2035…

- **Many more EVs**.
  - Most made in China (worldwide).
  - In China about 90% of cars on the road will be electric.
  - Europe about 50%.
  - US about 25%.
- **Auto Companies:** Consolidated, smaller supply chains, fewer people working in the auto industry.
- **A smart electric grid** uses your EV to satisfy spikes in demand, power your home during outages.
- **Autonomous vehicles** used for taxies, trucking, farming.

Have Fun with the Disruption!

Let's go Inspect an EV

Tesla Model Y
Best selling car in the world 2023.
2nd Best in 2024.
AWD starts at $49,000.
$41,000 after rebates.