

Texas Electric Transportation Resources Alliance

*Leading Texas Toward an
Electric Transportation
Future*

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The materials, positions and questions are the work of TxETRA staff and collaborators. They do not represent the formal positions of member companies. They are based on conversations in our working group.



TXETRA

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What is TxETRA?

Texas Electric Transportation Resources Alliance

We are a non-profit group for utilities, manufacturers, charging companies and environmentalists.

We are developing policy needed to electrify the Texas transportation system.



Why are Electric Vehicles Transforming the Transportation Market so Rapidly?



Reduces air pollution levels and climate change emissions



Lower and more stable fuel and maintenance costs



EVs provide grid stability



Promising new industries for emerging countries



Can be powered with renewables & storage



The Big Questions About Electric Vehicles

Where will we charge electric vehicles?

What's a fair fee for EV owners to pay for road and bridge taxes?

How do we deal with geographic and economic equity concerns?

What consumer protections should be put in place?

How do we assure the batteries are reused or recycled?

A Massive Shift in Toward Investments in EVs is Occurring

\$435B

Total Global Investment

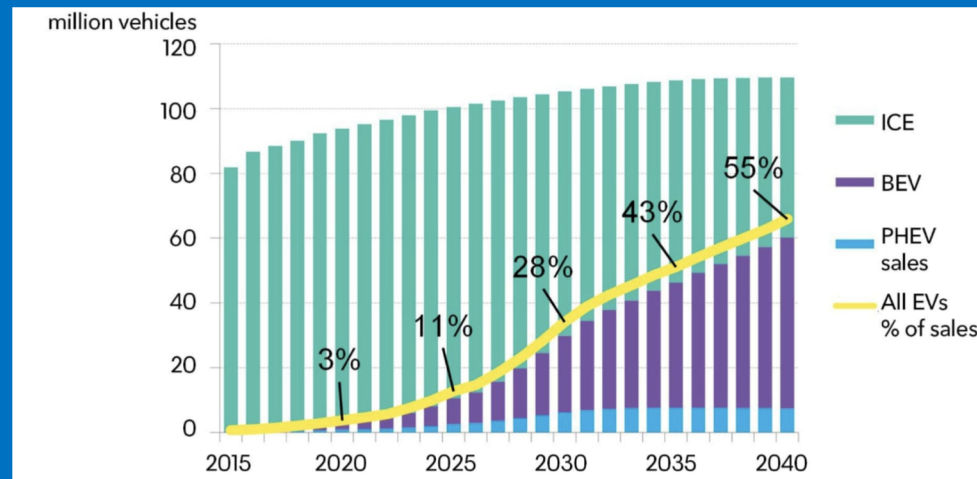
\$63.6B

Investments Targeted for USA

61

Companies

In Texas, this transition will be market driven with minor incentives.

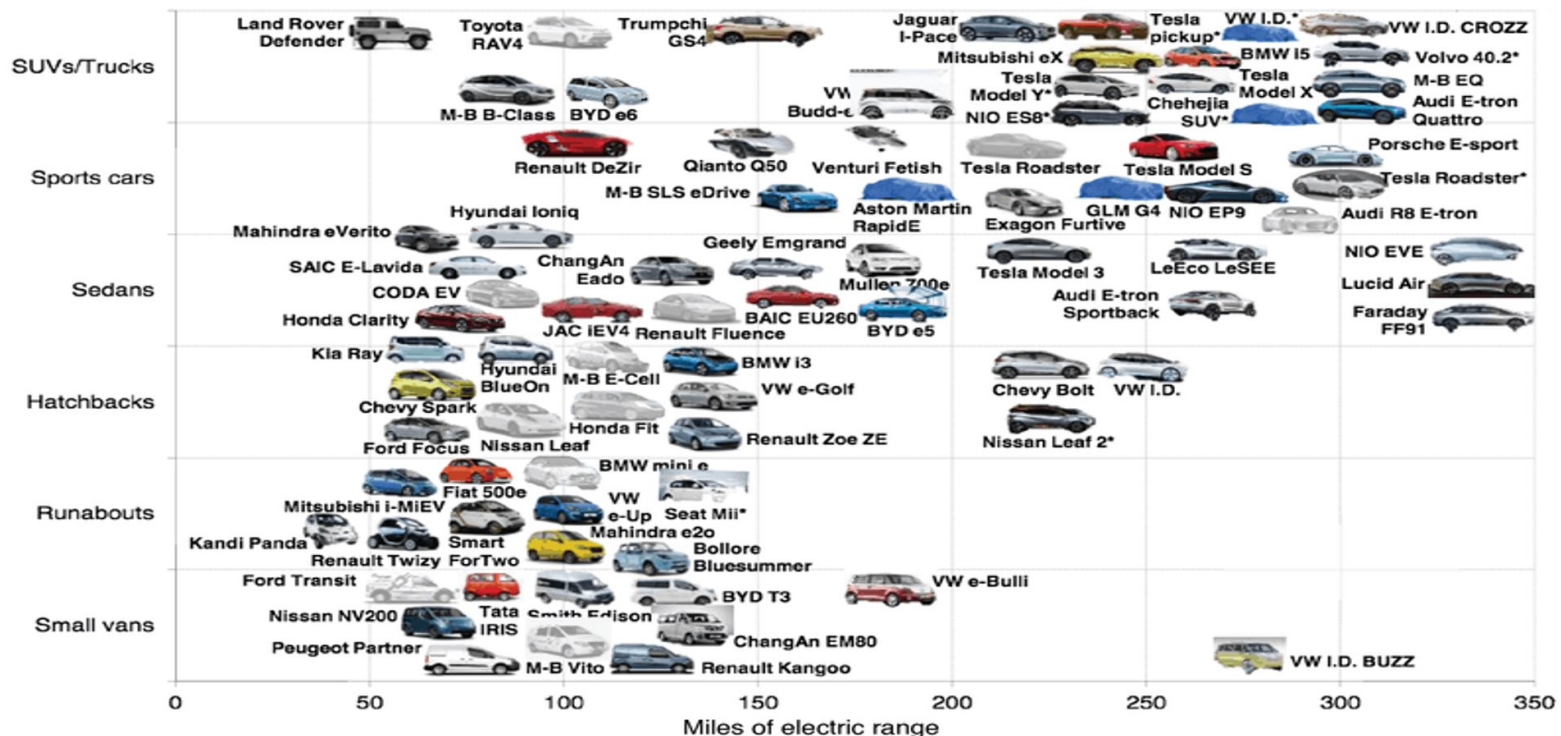


Over 200 EV Models Will Be On The Road by 2022

Including 10 Pick-Up Trucks

Electric-Car Boom

Models by style and range available through 2020

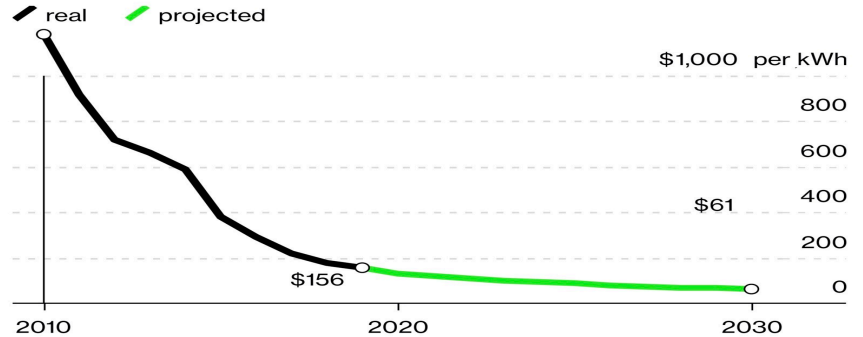


Declining Battery Costs are Causing the Shift

Innovative Technology
is Driving the Battery
Cost Decline

Charging Ahead

The cost of lithium-ion batteries continue to fall each year

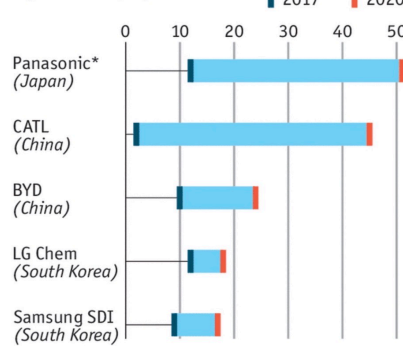


Source: BloombergNEF
Note: 2019 USD prices

Battery Density
Has Increased
6-7% Per Year

Electric dreams

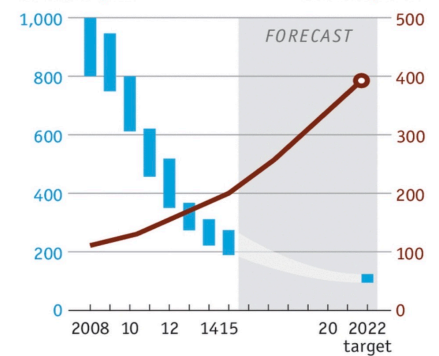
Manufacturing capacity
Gigawatt-hours per year



Sources: Cairn ERA; US Department of Energy

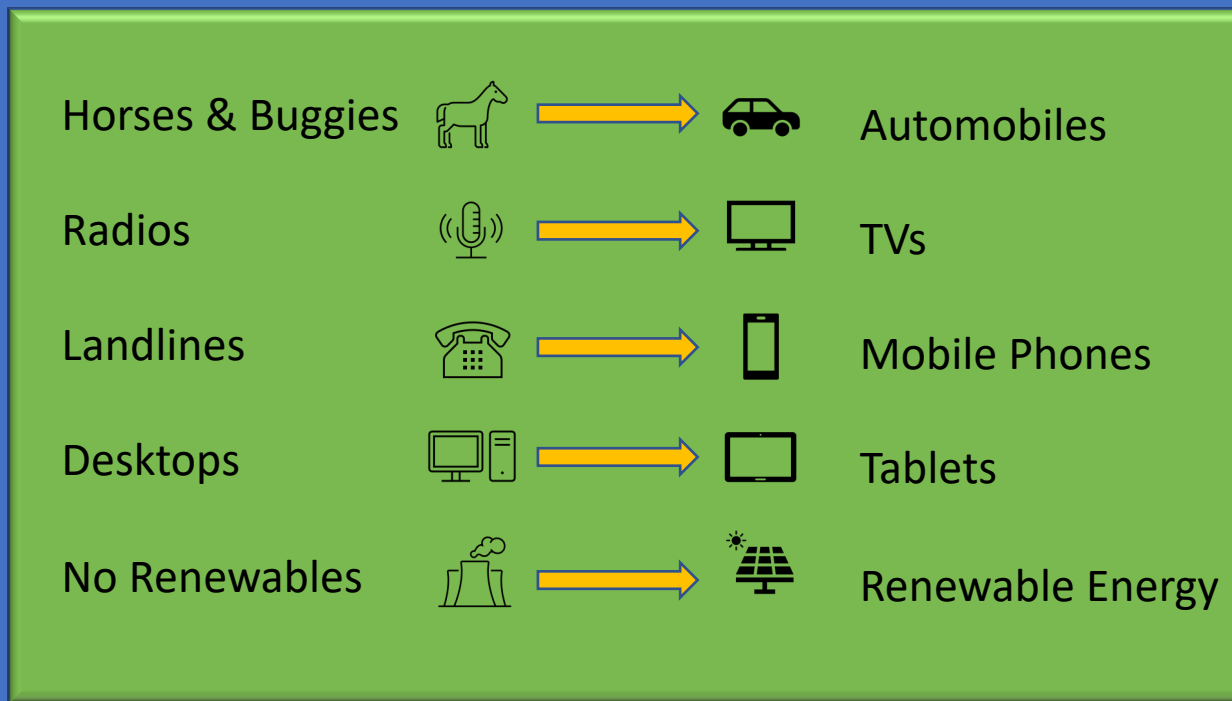
Battery cost
Worldwide, \$/kWh

Battery energy density
Watt-hours per litre

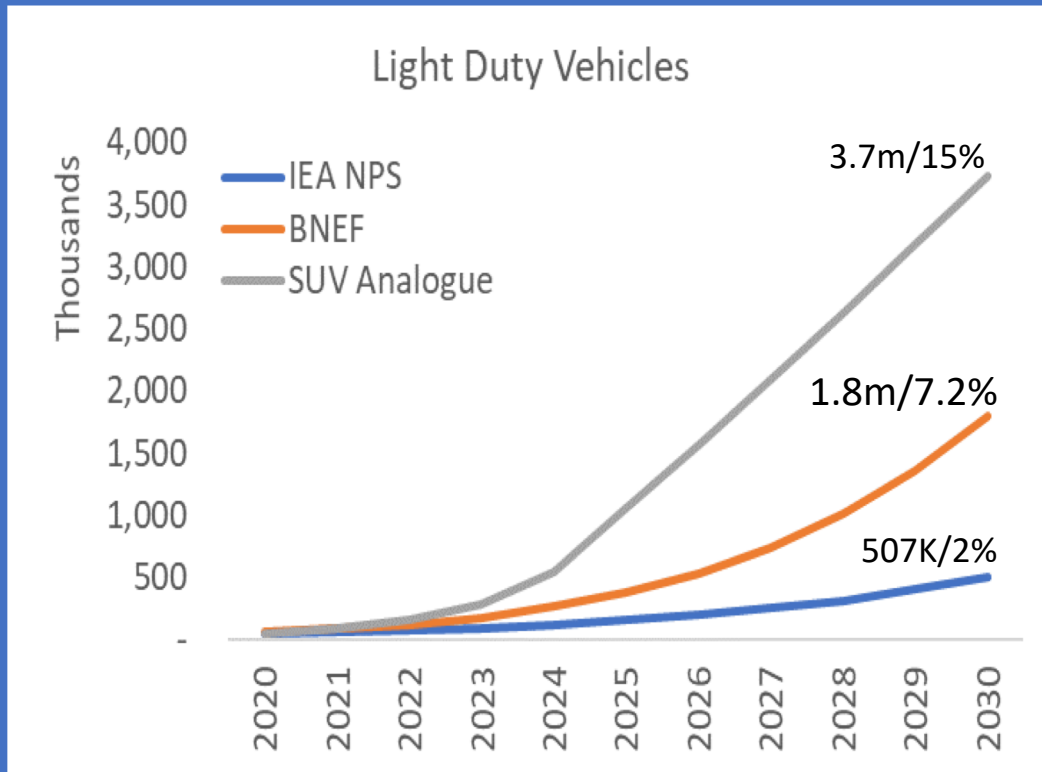


*Includes Tesla gigafactory

Transition to EVs Could Occur in 15 Years or Fewer As has Occurred in These Technologies



EV Projections for 2030



If EVs transform the market as fast as SUVs, we predict by 2030 EVs will be 41% percent of light duty sales and 15% of the light duty fleet.

Why Truckers Will Be The Biggest Users of EVs

200 Mile Fuel Costs



Diesel 8 MPG

\$4/Gallon

\$100



Electric

1.6 kWh/Mile - \$0.12 kWh

\$23

Charging Patterns

Single Family Residential	>80% of EV owners	Level 1 & 2	120 V AC
Multifamily Residential	<20% of EV owners Lower income on average	Level 2	200-240 V AC
Workplace	>85% workers drive to work	Level 2	200-240 V AC
Urban Public DCFC	Commuters, consumers Co-location opportunities Overlap with inter-city	DC fast charging	400 V – 1000 V DC
Inter-city DCFC	travelers – fun/work Inter-city freight Co-location opportunities	DC fast charging	400 V – 1000 V DC



Charging Pattern for EVs by Type and Hour

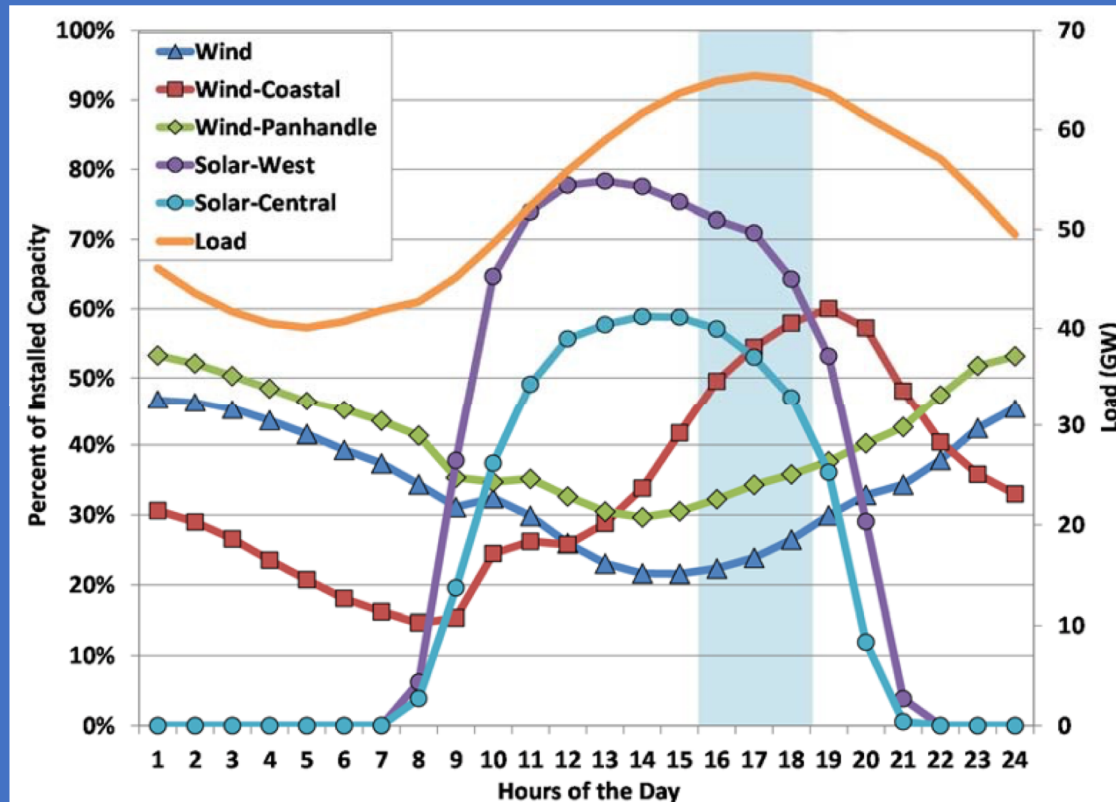
Most cars were assumed to charge overnight so that they would be fully charged before 5am.

Trucks and buses were assumed to charge around noon and again overnight.



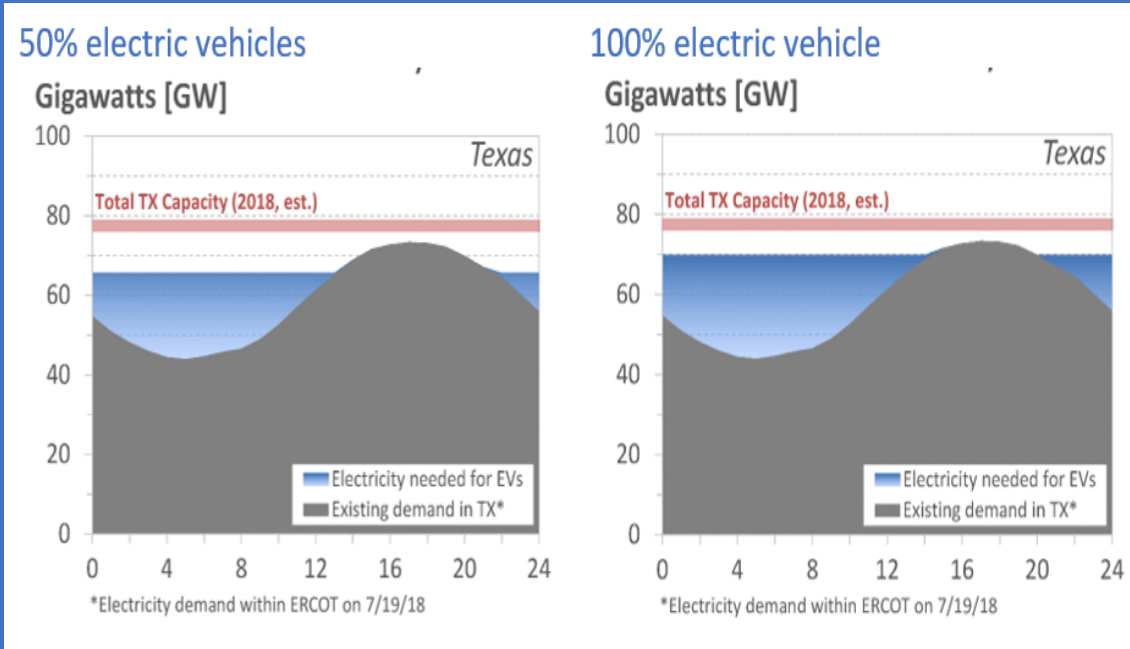
Renewables Power EV Charging Cycles Almost Perfectly

Solar and Wind Production 2018



You Can Eliminate Peak Overloading By Encouraging EVs To Charge Off Peak Through Time Of Use Rates and Demand Controls

A recent UT study showed that if charging is managed in Texas, we could charge 100% of electric fleet vehicles without overloading the grid.



“MJ Bradley & Associates conducted cost benefit analyses of EV adoption in 17 states. Taking Florida, Arizona, South Carolina, and Kentucky, for example, on average in these states, EVs will increase utilities net revenue by \$176 to \$1,100 per EV over its lifetime (depending on the state).”

According to MJ Bradley, this could result in cumulative utility bill savings of more than \$1.6 to \$31 billion state-wide by 2050 (net present value), with additional savings to EV drivers (again, depending on the state).

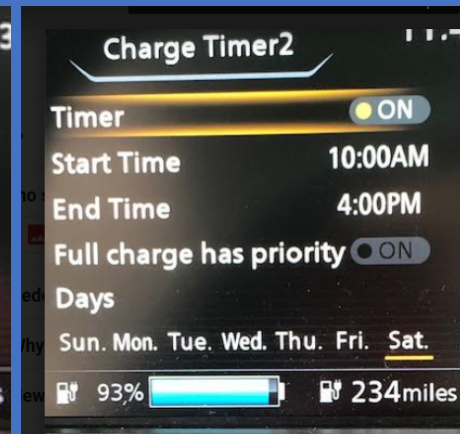
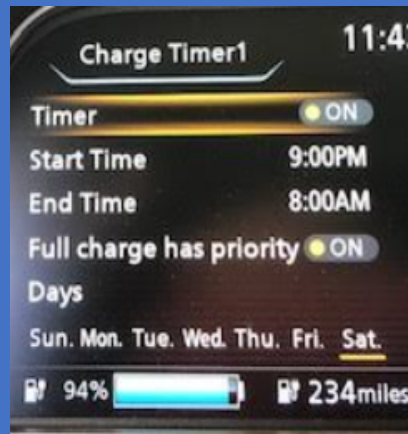


How Do We Assure Charging Occurs At The Best Time To Reduce Pollution?

Smart chargers can delay or reduce charging on peak.

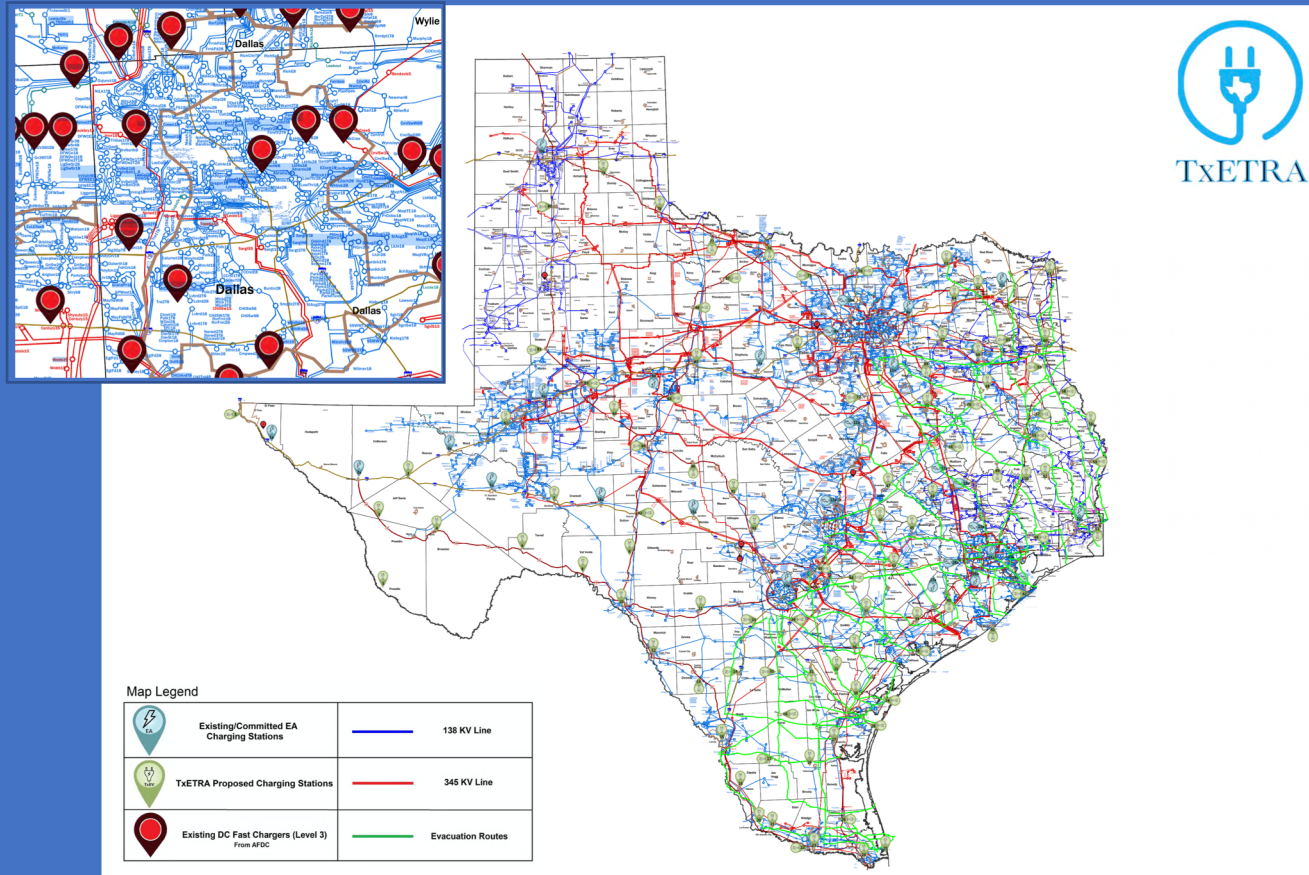
Most EVs have charging controls.

2020 Nissan Leaf Controls set to use
wind and solar



Ultra- Fast Charging Can Impact Our Transmission Grid So Texas Needs to Plan to Put Them Where the Power Lines are Adequate

Texas needs to develop a border-to-border charging network.

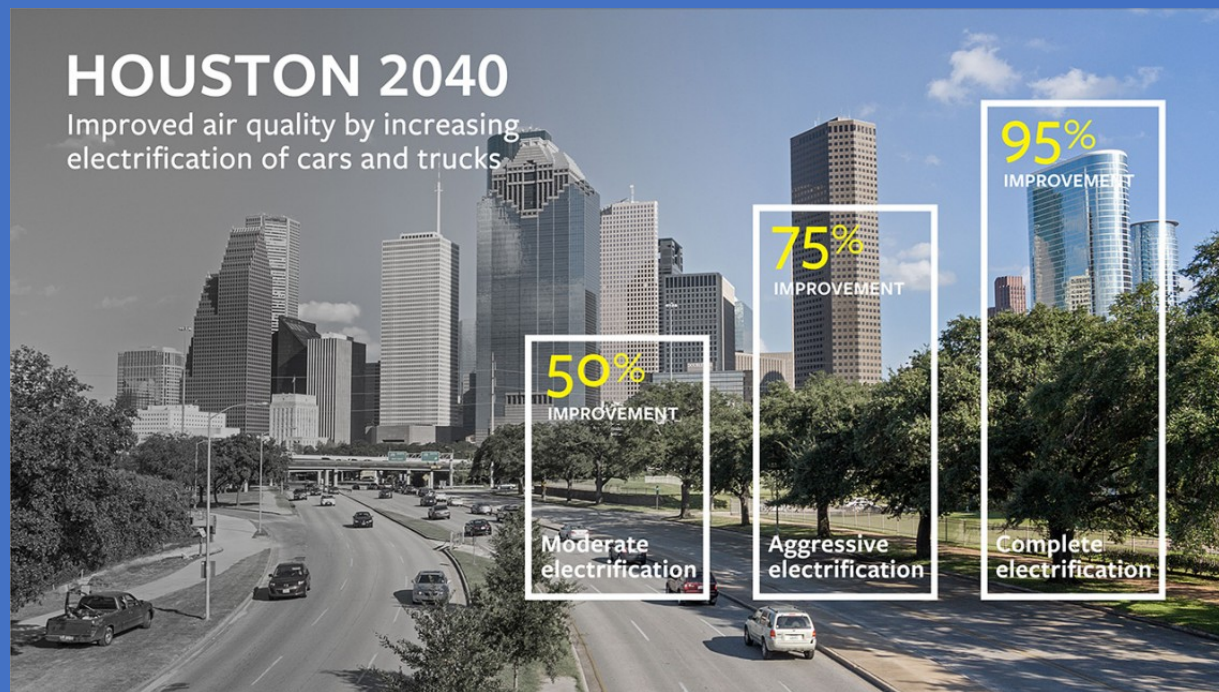


This map shows locations about 50 miles apart where T&D is adequate for HD charging stations.

Electric Vehicles Would be a Breath of Fresh Air for Houston and Other Metro Areas

U of H researchers say replacing at least 35 percent of Houston's diesel trucks with electric vehicles by 2040 will reduce pollution and improve air quality by 50 percent. (June 11, 2019)

A recent TCEQ report said if 2.2% of light duty vehicles were electric it would reduce emissions by .8 to 2.2%.



EVs Offer Big Savings Over Traditional Gas-Powered Cars

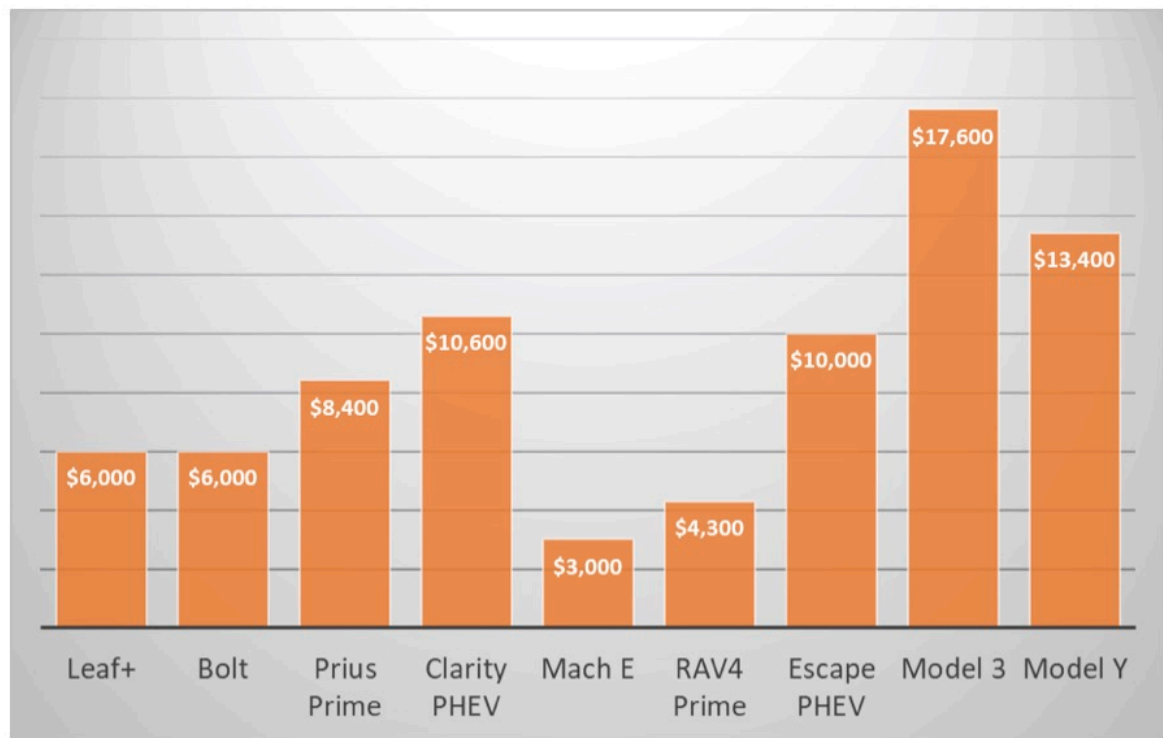


Figure 4.1. Lifetime Savings From EVs vs. Best-Selling ICE Vehicles in Class⁵⁴

Consumer Reports shows that when total ownership cost is considered – including such factors as purchase price, fueling costs, and maintenance expenses – EVs come out ahead, especially in more affordable segments

Texas Should Ensure That Lack of Access to Charging Facilities Does Not Create a New "Digital Divide"

Without regulatory action, charging facilities in some areas will unlikely be able to develop.

- Rural towns
- Multi-family apartment complexes
- Low-income communities
- Interstates and secondary roads



ET Manufacturing in Texas

19th Century - Texas emerged as global energy leader in oil and gas production

2000s - Texas added renewable energy to the portfolio

Currently - Leads the nation in wind energy production (and ranks 5th in the world)

It's time for Texas to transform once again as a leader in this new EV world.

- **Tesla** building a new billion-dollar manufacturing plant near Austin
- **Peterbilt** already builds electric trucks in Denton
- **Navistar** will begin manufacturing trucks and school buses in San Antonio
- **Hyliion** produces electrified powertrains in Cedar Park
- **Lone Star Specialty Vehicles** makes electric terminal tractors in Texarkana
- **Toshiba** makes motors and transmissions for Ford EVs in Houston
- **Ayro** manufactures small delivery trucks in Round Rock
- **Volcon** makes electric motorcycles and off-road vehicles in Round Rock

Texas Electric Transportation has Created Thousands of Jobs



Electric Transportation added \$690 million to Texas' 2019 Gross State Product (GSP).

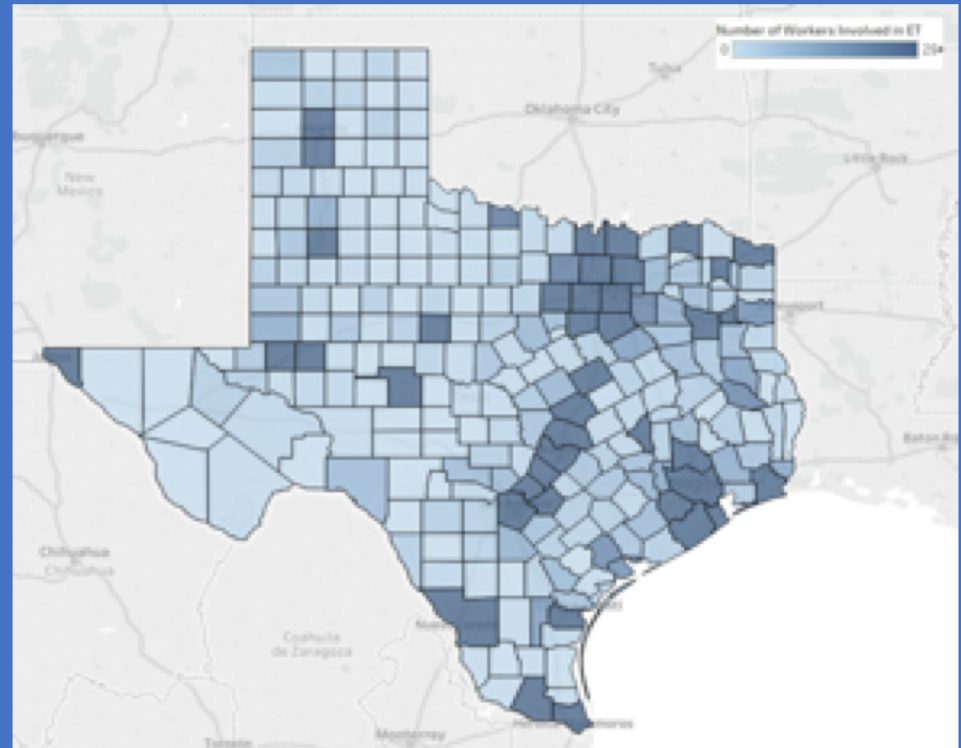
Equal to the GSP of convenience stores & more than twice that of guided missile and space vehicle manufacturing.

7,100 Texas workers currently participate in ET-related activities, most in manufacturing, working in 1,234 businesses in 203 counties throughout the state.

ET Jobs Can Be Found In 203 of the 254 Texas Counties

Most counties have some ET employment, with the highest numbers found in population centers, including:

- **Harris County** (1,400 jobs)
- **Dallas County** (900 jobs)
- **Tarrant County** (700 jobs)
- **Bexar County** (600 jobs)
- **Travis County** (5,000 projected)





By 2024, a projected 13,500 workers in Texas will be involved in ET, including the Tesla factory currently under construction outside of Austin, which will add an estimated 5,000 ET jobs to the state.

The Navistar logo, consisting of the word 'NAVISTAR' in a bold, blue, sans-serif font with a registered trademark symbol, set against a white rectangular background.

While population centers have the greatest number of ET workers, ET workers make up a greater share of the labor force in some suburban and rural counties, including Titus, Cook, Lamar, Calhoun, and Dallam Counties.



Biden's EV Platform

500,000 chargers funded nationwide by 2030
should equate to 65,000 in Texas

100% sales of light duty EVs by 203?

Continues and expands EV tax credits

Cash for clunkers and replacement with EVs



Last Session the Legislature asked Agencies to Study EVs In SB 604

PUC study on EVs found that EV charging demands can be handled, but definitions need to be changed to clarify the charging companies are not utilities

TCEQ EV emissions impact study found that if 2.2% of light duty vehicles were electric by 2028, it would reduce emissions by .8 to 2.2%- however it did not look at medium and heavy duty trucks

DMV study found that a \$100 fee would be equivalent to the fees paid by gas cars

Proposed Omnibus Electric Transportation Act

Clarifies the definition of a retail sale of electricity to exclude electric vehicle charging

TDLR would set standards and disclosures for electric vehicle charging

DMV would establish an annual road use fee for EVs of \$100

TCEQ would expand its Light Duty Incentive to include pick-ups, require the dealer to credit incentive to buyer at time of sale and allow them to serve as a funnel for federal funds

TXDOT would create a multi-agency Texas Transportation Electrification Council to develop a comprehensive charging infrastructure plan

Now is the Time to Prepare for the EV Boom

We have an opportunity to set policy ahead of the demand

Other countries and states have gone before us, so we can use the best practices they have developed

If we plan now, we can accelerate through the boom

