

Clean Cities Technology Conference

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A NEW WAY TO DRIVE....

Introducing *Plug-In Texas*



An **AEP** Company



Luminant



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Plug-In Texas is a statewide industry coalition of automotive, electric and environmental interests dedicated to promoting the use of plug-in hybrid, hydrogen fuel cell and all-electric vehicles (EVs) in Texas. *Plug-In Texas* also advocates for the adoption of other alternative fuels such as natural gas.



Key Points

Today's Trends

- EVs adoption trend at an inflection point with bold forecasts of future EV penetration; one-half of new vehicles sold will be electric in 2040
 - EV sales are increasing
 - 871k on the road; ~30% annual growth
 - 550,000 in 2016
 - More EVs with larger batteries are coming to market
 - Longer range, e.g. 200+ mile range
 - Battery sizes of 60 kWh to 100 kWh
 - Charging power (for DC fast charging) is increasing
 - Moving to 120 - 350 kW per cord
- EVs hold great potential for cities as an air quality tool, improving public health and lowering vehicle operating costs
- Fleet funding opportunities exist with State of Texas TERP program, Volkswagen Settlement

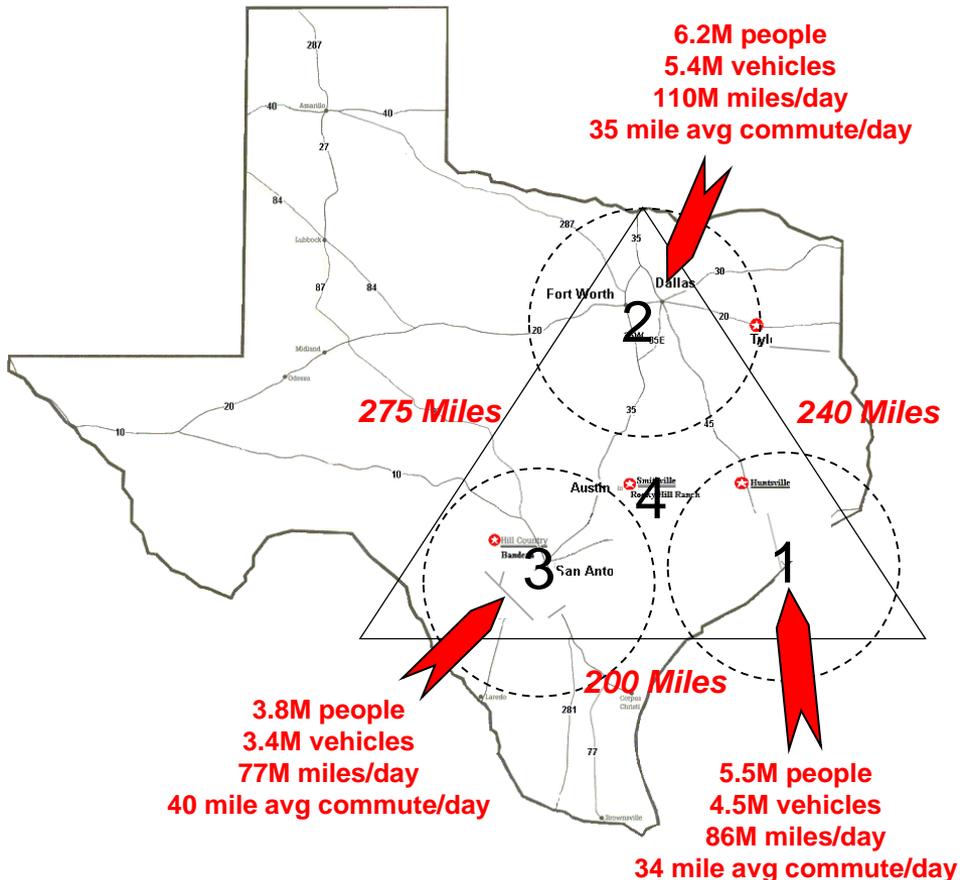
More Work To Do!

- Elevating EV awareness through customer education
- Expand public charging infrastructure (easy to find, easy access, reliability, easy to use, clear pricing)



Transportation in Texas Today

- Texas is the second largest state auto market in the US:
 - 28 million people
 - 24 million cars
 - 75,000 Square Miles
 - 4 of 15 Largest Cities
 - 2 of 10 Largest Airports
 - 4 of 10 Largest Ports
- There are approximately 17,000 licensed motor vehicle dealers in Texas, responsible for generating \$3.3 billion in motor vehicle sales tax revenues. The state is the second largest auto sales market in the US.
- Mobile sources account for 53 percent of NOx emissions statewide, 68 percent in Houston and 66 percent in DFW.
- Five Texas cities are under EPA non-attainment status, and several others must improve air quality or will soon be added to the list.



Sources: TxDOT, Federal Highway Administration, NCTCOG CARS Program

EV Adoption Poised to Advance Rapidly

2025

EVs reach cost parity with standard vehicles

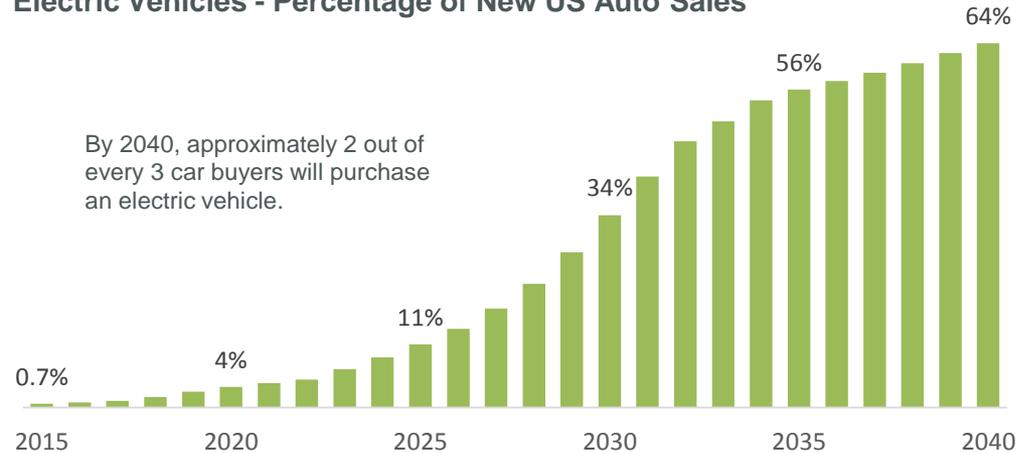
34%

EV percentage of US auto sales in 2030

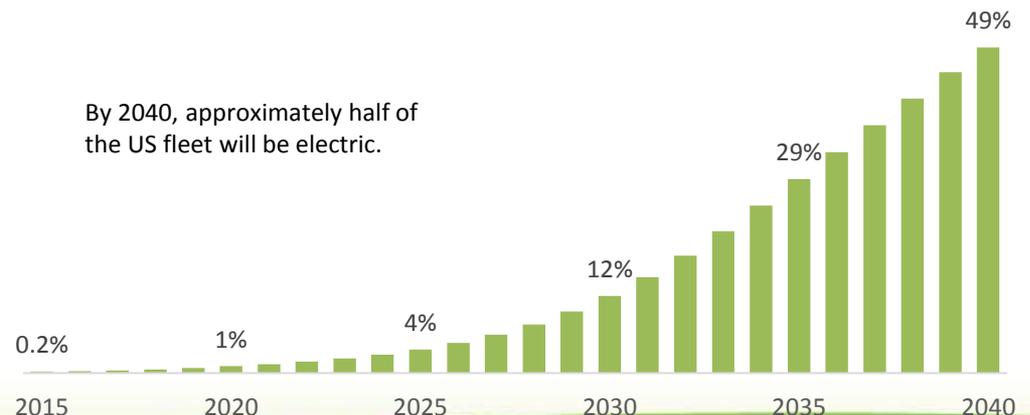
40%

Reduction in overall cost per mile of mobility

Electric Vehicles - Percentage of New US Auto Sales



Electric Vehicles - Percentage of Fleet on US Roads



EVs in the Marketplace – Light Duty

All major automakers announced plans to introduce all-electric and/or plug-in hybrid electric vehicles by 2015, as well as several start ups that have focused on a high-performance niche.

Most all major manufacturers now make EVs including Audi, BMW, Chevrolet, Daimler, Fiat, Ford, GM, Honda, Hyundai, Infiniti, Mitsubishi, Nissan, Toyota, Volkswagen and Volvo.



Chevrolet Volt



Ford Fusion



Toyota Prius Prime

EVs in the Marketplace – Trucks, Buses

The number of fully electric buses delivered for use in public transit in the US grew 83% in 2017, with 333 E-buses in service.



Workhorse Electric Truck



GreenPower All-Electric School Bus

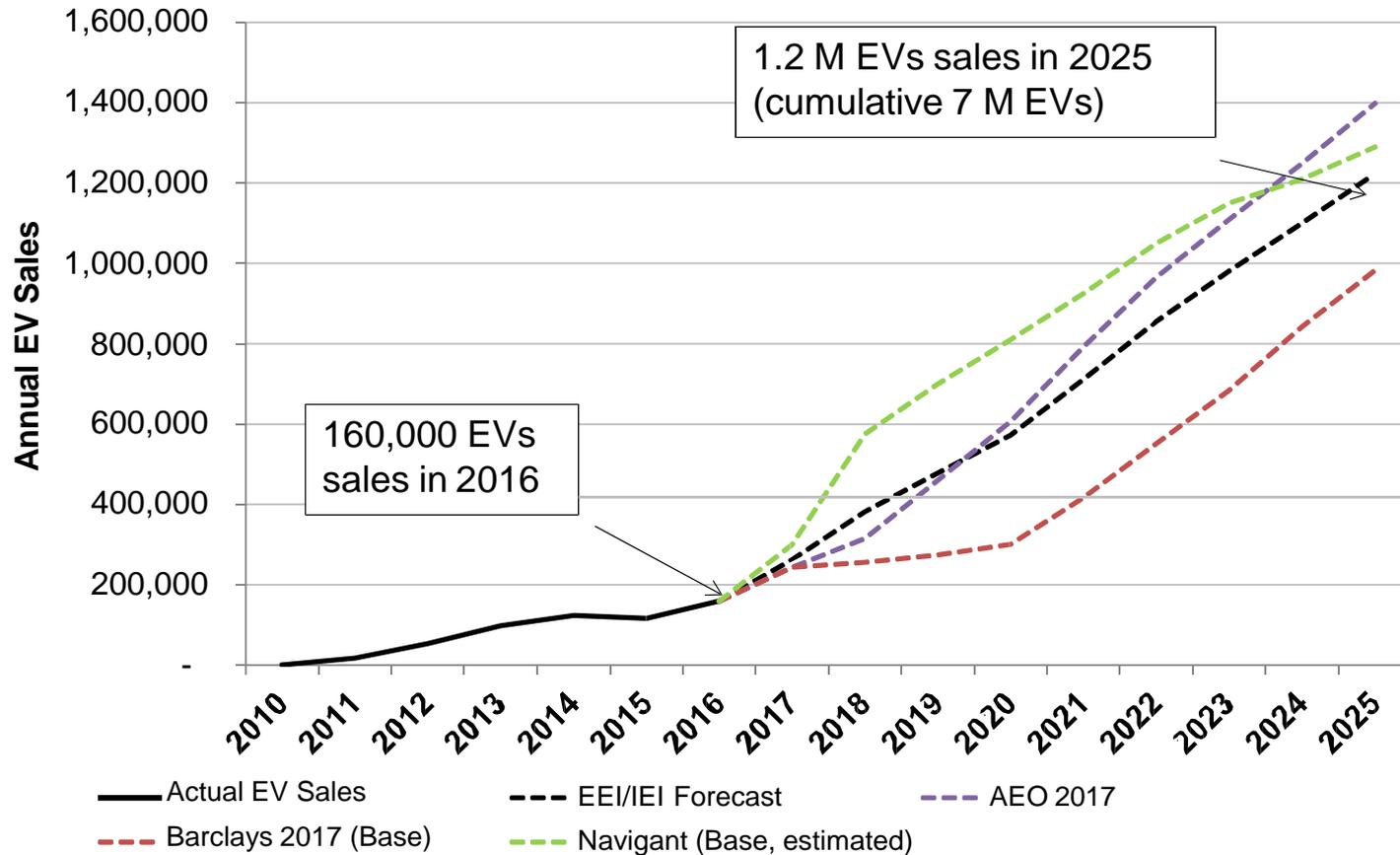


Proterra Electric Bus



Peterbilt Electric Class 8 Truck

EV Sales Forecast



Source: EEI

Charging Options

There are three levels of charging stations: Level 1 (for residential setting typically); Level 2 (likely the most common model at homes, retailers, offices); and Level 3 (a faster, more expensive option). Level 1 chargers are packaged with the car at the point of sale and can take 8-10 hours for a full charge. Level 2 chargers are faster – 3 to 5 hours for a full charge – with a 240-volt outlet, for use in the home, office building garages and retail establishments. Level 3 devices, which require a much higher electric flow, are onsite at fleet parking areas and at retail sites and service stations for a quick, 15-20 minute, full-battery recharge. There are also inductive and wireless commercial fast chargers.



Level I Charger



Level II Charger



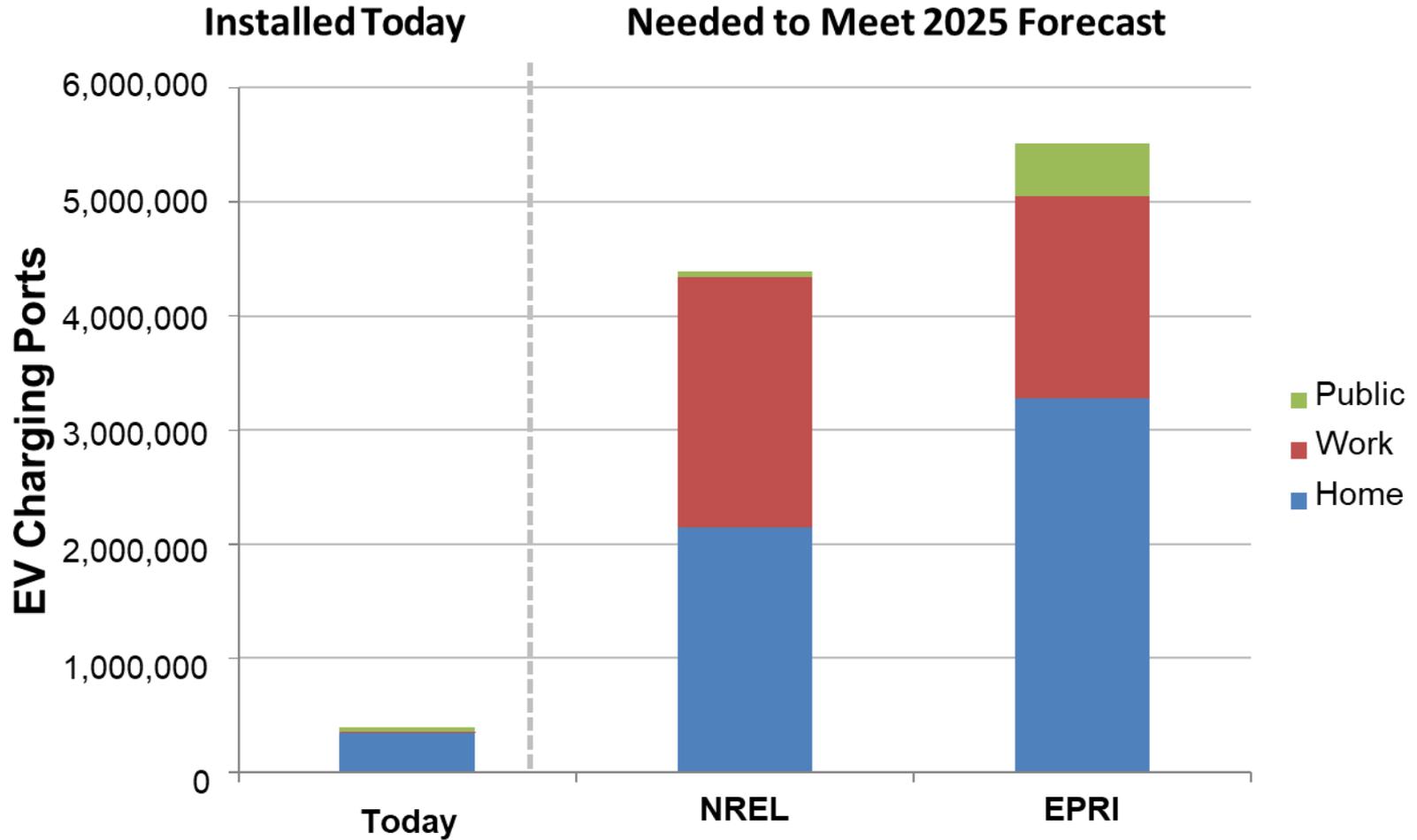
Level III /DC Fast Charge



Overhead Fast-Chargers

95% of people surveyed in a report from the Electric Power Research Institute (EPRI) say they would prefer to charge their electric vehicle at home, and 83 percent have home access to a 240-volt outlet.

Charging Infrastructure



TERP Programs, Volkswagen Settlement

- Texas party to multi-state legal settlement following emissions scandal; Texas to receive \$209 million for air quality, improvements
- Texas Draft plan released in August; public comment period recently ended, final draft plan expected in November 2019
- Units of government eligible for electric trucks, bus, tractor grants
 - Counties, cities, universities, ports, school districts
- \$31 million proposal for EV charging infrastructure

EV Benefits for Texas Communities

- Improved air quality, EVs (cars, buses, trucks, fleets) help in federal Clean Air Act SIP compliance
- Improved public health outcomes
- Provides clean, reliable energy as fuel source
- Savings on fleet operations
- Future generations will demand EVs and infrastructure
- Federal and state financial incentives for EVs exist
- Reduce congestion (most all future AV passenger vehicles will be electric drive)

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