North Central Texas Council of Governments

Electric Vehicles North Texas

Dallas-Fort Worth CLEAN CITIES

"EV-Ready" or Not! Electric Vehicles in Texas

Texas Public Works Association Short Course

Killeen, TX

February 6, 2017

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Presentation Contents

- Air Quality Basics: NAAQS and Ozone
- Benefits of EVs
- EV and EV Charging Basics
- Obstacles to Adoption
- Achieving EV Readiness
- Additional Resources

Why EVs? NAAQS and Ozone

- National Ambient Air Quality Standards (NAAQS)
  - Established by the Environmental Protection Agency (EPA)
  - Address Six "Criteria" Pollutants:

Air Pollutant	Abbreviation	DFW Region Status
Carbon Monoxide	CO	In attainment
Lead	Pb	In attainment
Nitrogen Dioxide	NO_2	In attainment
Ground-level Ozone	O_3	*Nonattainment*
Particulate Matter	PM	In attainment
Sulfur Oxides	SO	In attainment

  - Impacts of Nonattainment Status
    - Health
    - Economic

NAAQS and Ozone

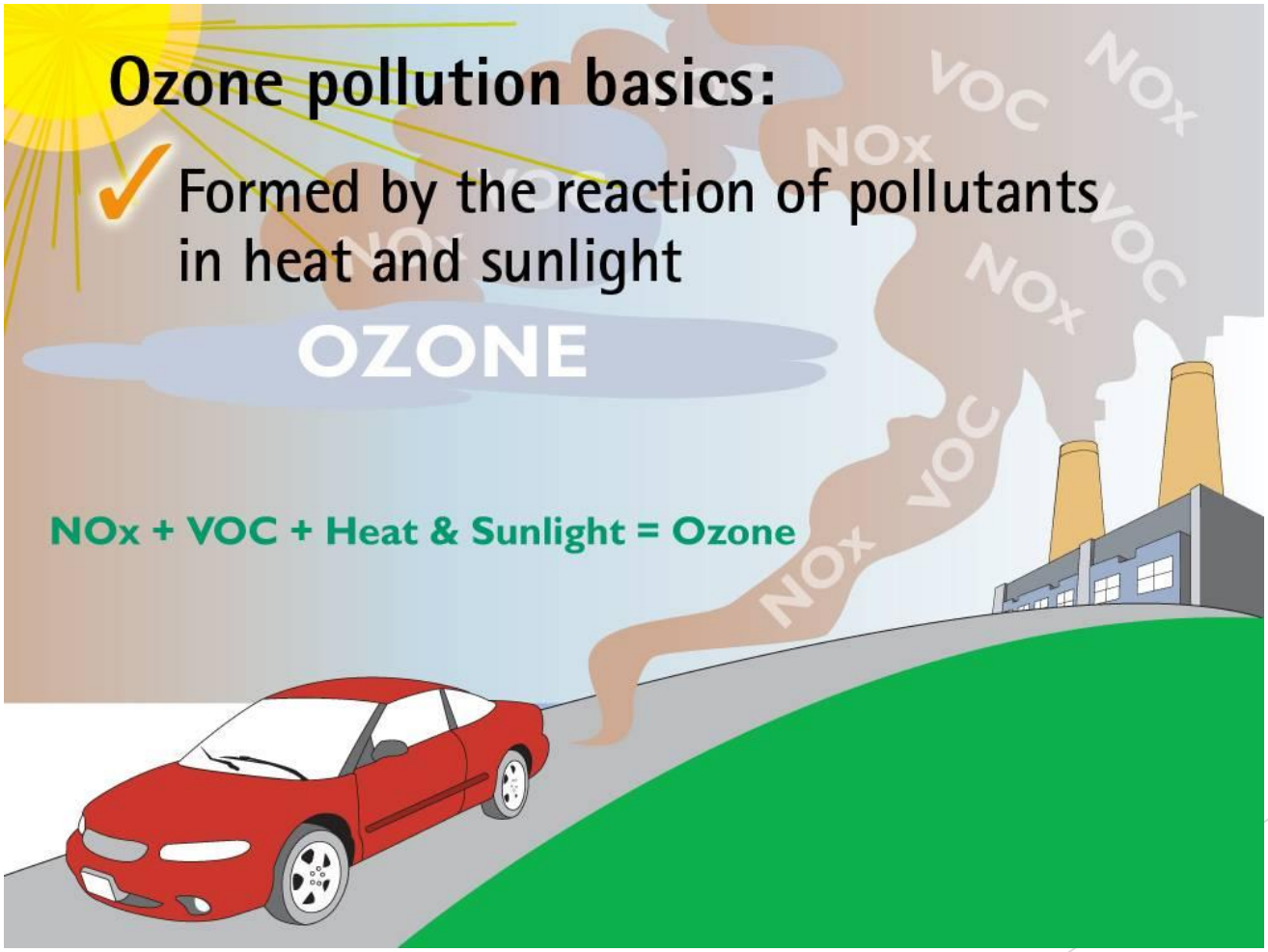
Criteria Pollutants

- Impact Human Health
- Are Addressed in Federal Legislation
  - Clean Air Act

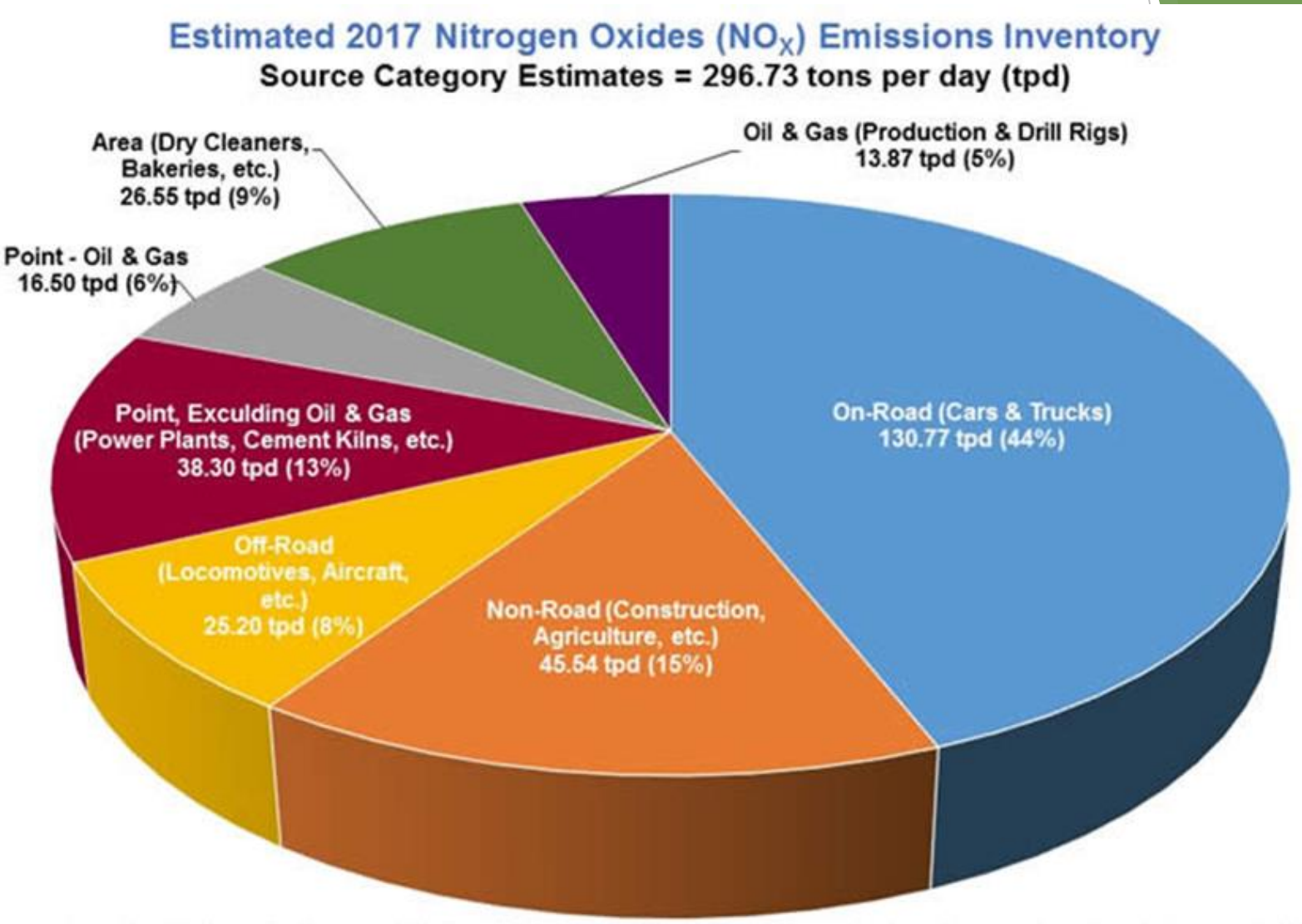
Greenhouse Gas (GHG) Pollutants

- Taken Individually, Are Not Necessarily Damaging to Human Health
- Affect the Environment by Trapping Heat in the Earth's Atmosphere Over Time

NAAQS and Ozone



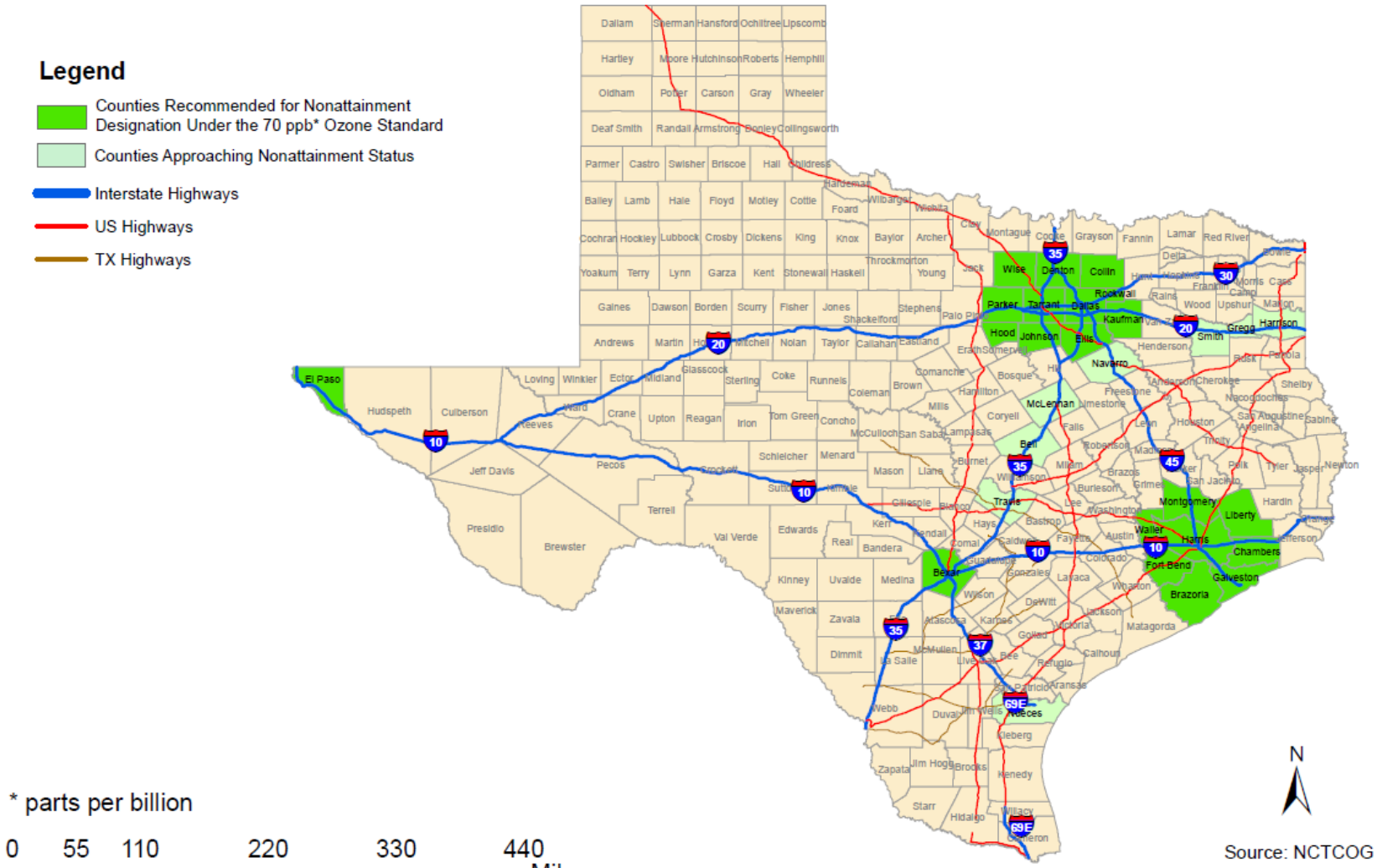
Air Quality in North Texas



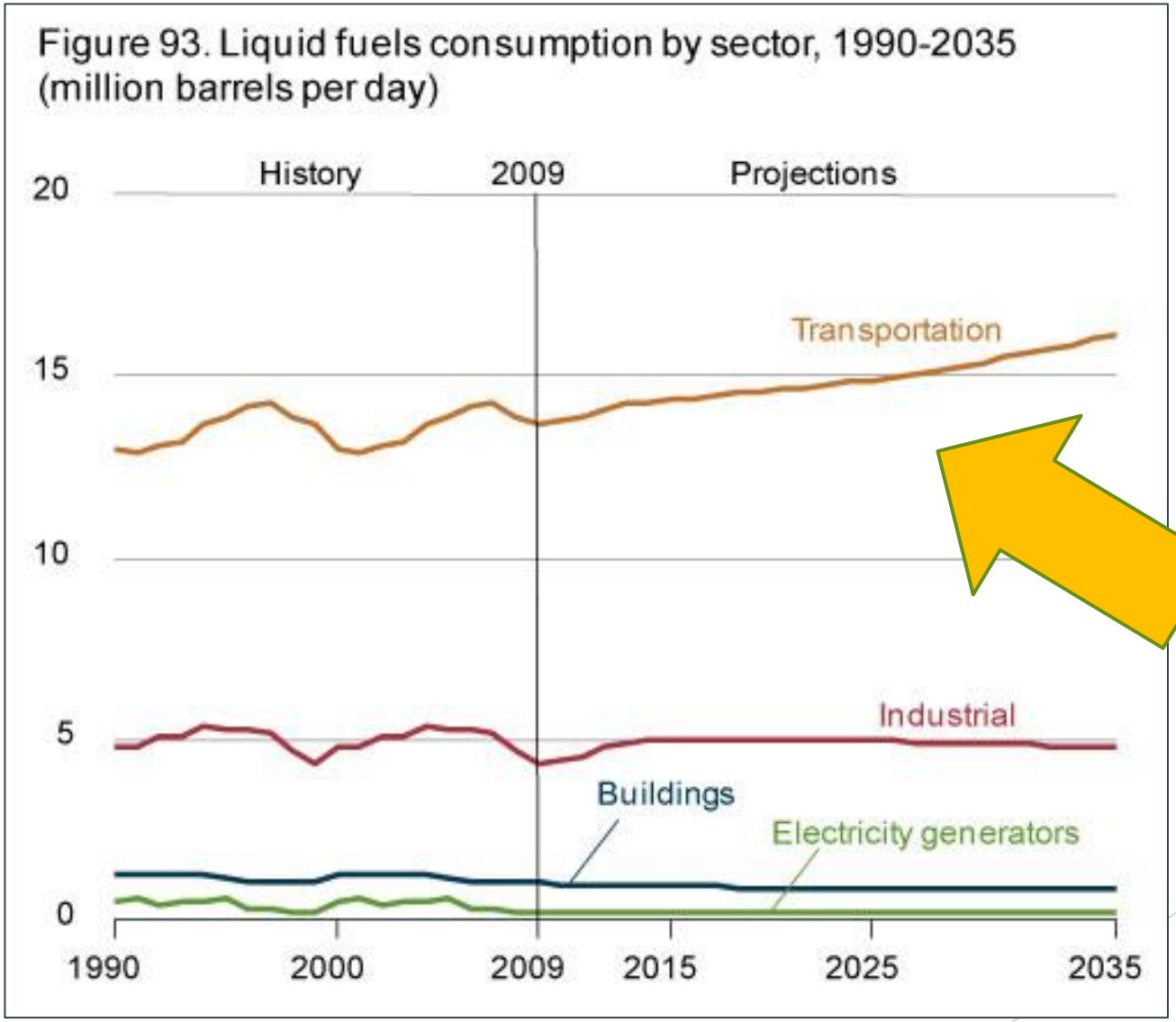
Source: Texas Commission on Environmental Quality, *2017 Dallas-Fort Worth 8-hour Ozone Attainment Demonstration State Implementation Plan*

Ozone in Texas

Texas Ozone Nonattainment Status by County



US Petroleum Use by Sector



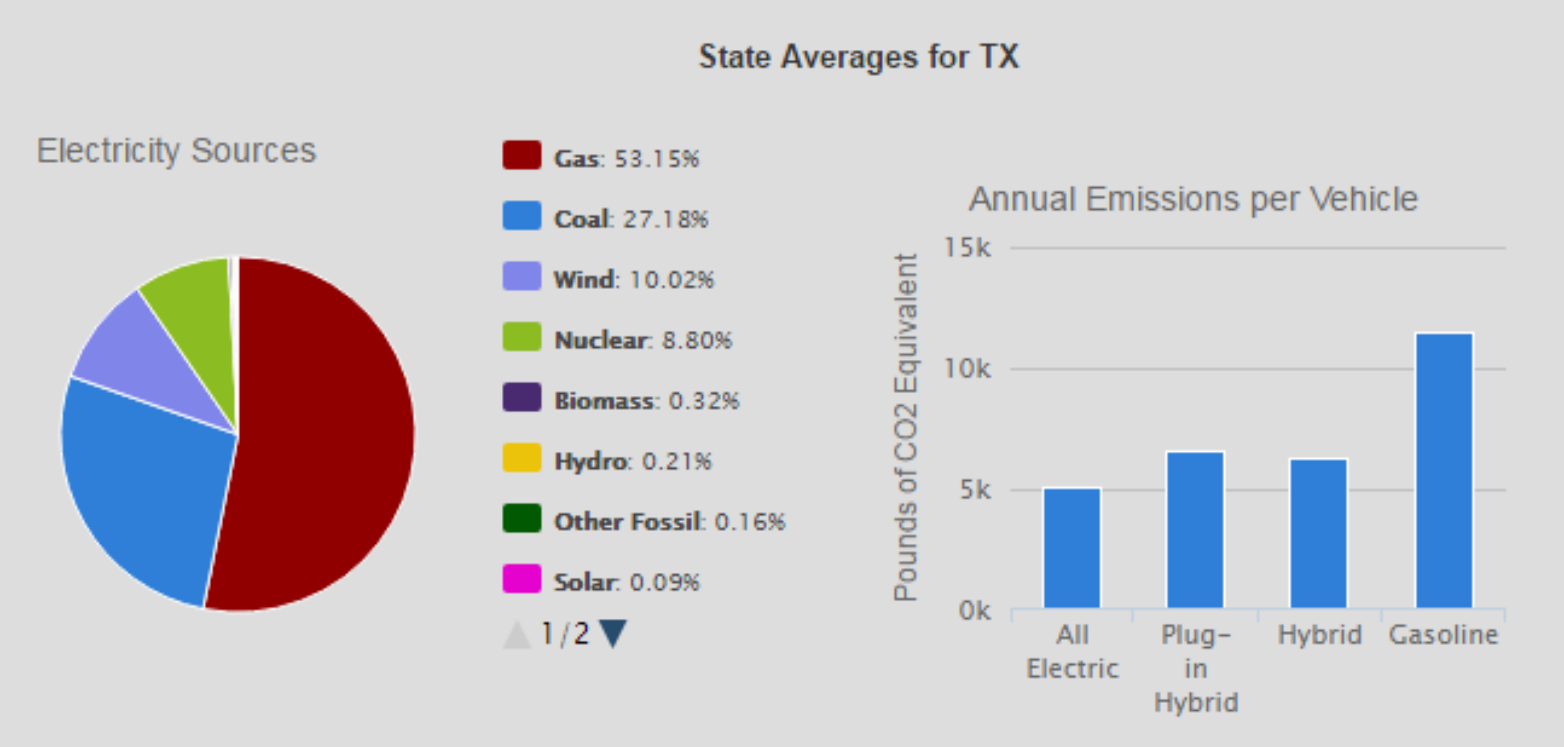
http://www.eia.gov/forecasts/aeo/source_oil.cfm

Benefits of EVs

- Zero Tailpipe Emissions, Lower Well-to-Wheels Emissions
- Energy Security
- Noise-free Driving Experience
- Local Economic Support
- Lower Fuel and Maintenance Costs

Benefits of EVs

- Well-to-Wheels Emissions Comparison



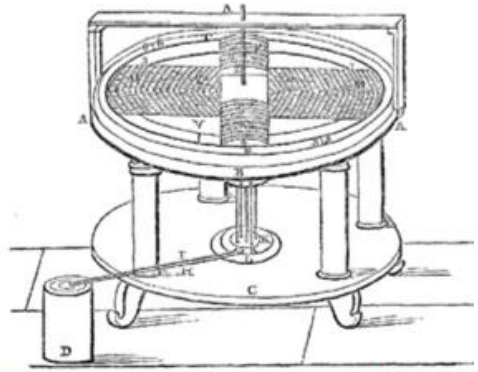
Benefits of EVs

- Lower Fuel and Maintenance Costs

	Mileage	Internal Combustion Engine		Electric Vehicle	
		$	Trips	$	Trips
Tires	Every 7,500 miles	$400	13	$400	13
Oil Change	Every 5,000 miles	$400-$800	20	$0	0
Automatic Transmission Fluid	At 100,000 miles	$30-$100	1	$0	0
Fuel[7]	varies	$7,142	400	$3,500	166
Park Plugs & Wires	within first 100,000 miles	$200	1	$0	0
Muffler	within first 100,000 miles	$100-$250	1	$0	0
Brakes[8]	2x within first 100,000 miles	$400	2	$200	1
Big 100,000	100,000 miles				
	Timing Belt	$600-$800	1	$0	0
	Water Pump	$300 (if combined with timing belt service)	1	$0	0

EV Basics: History

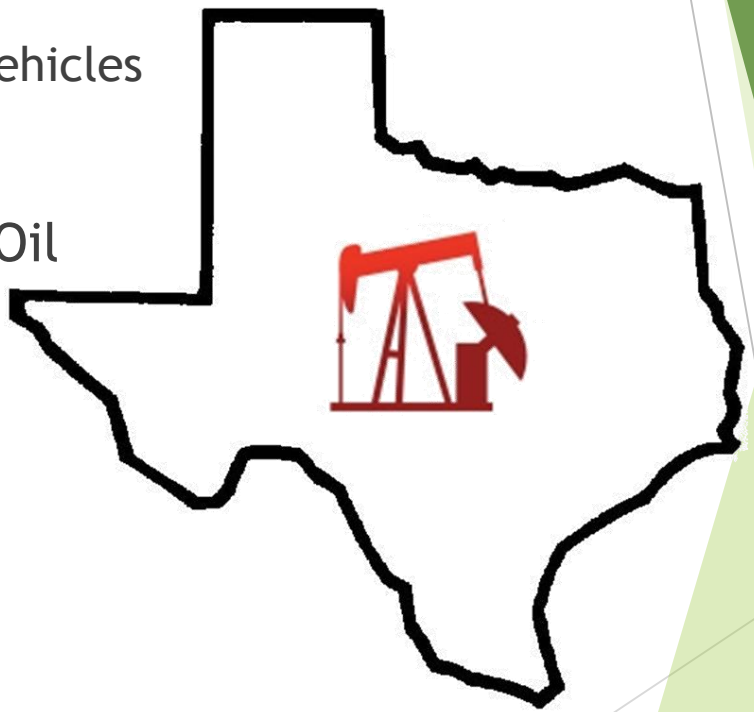
- EVs Were First Invented in the 1830s
- First Road-Ready EV – 1890
- First Electric Taxi Cabs – New York City, 1897



Davenport's patented motor, February 1837

EV Basics: History

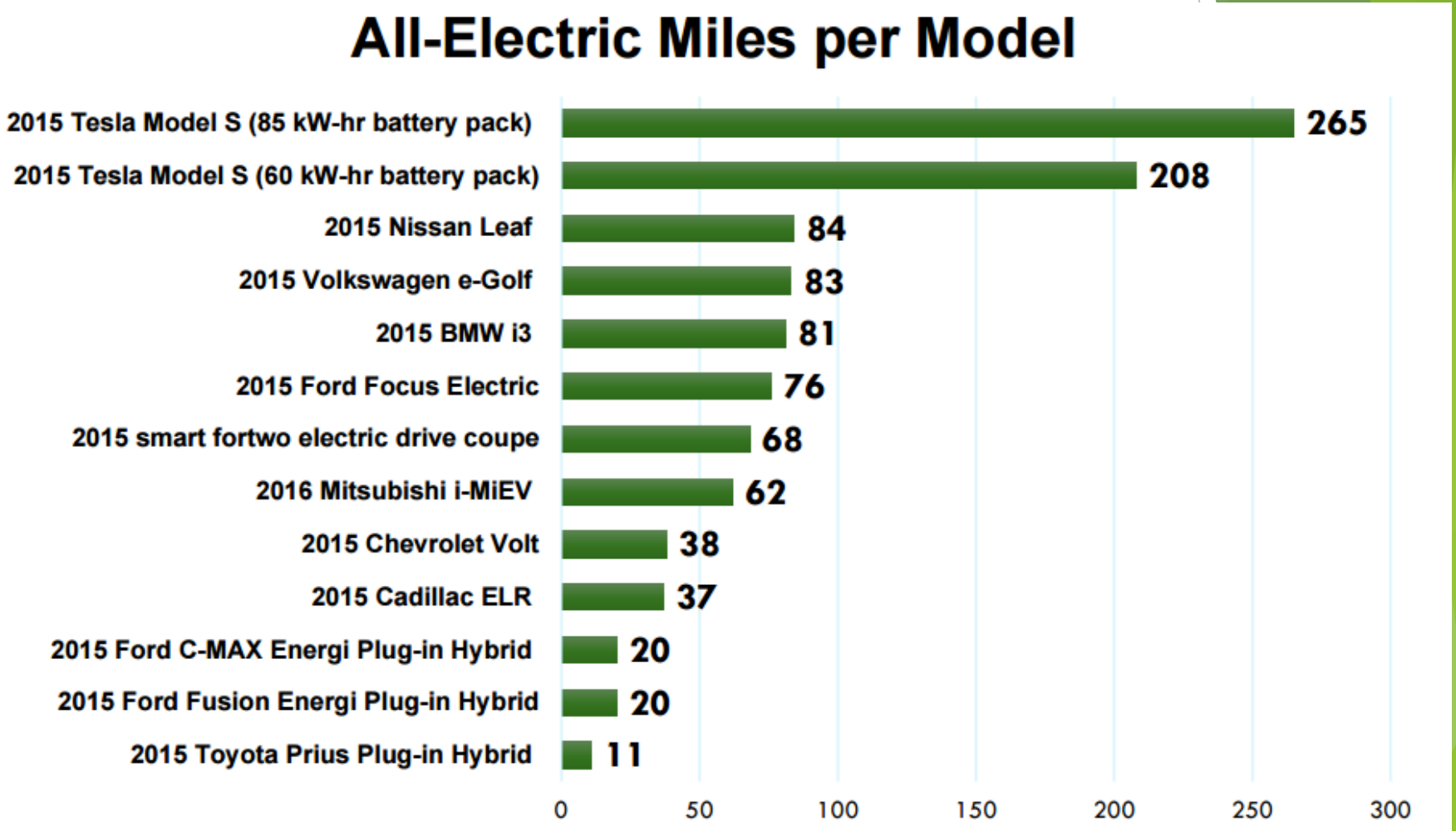
- Downfall of the Early EV
  - 1908 – Model T
  - Desire for Longer-Distance Vehicles
  - Lack of Horsepower
  - Discovery of Texas Crude Oil
  - Electric Starter



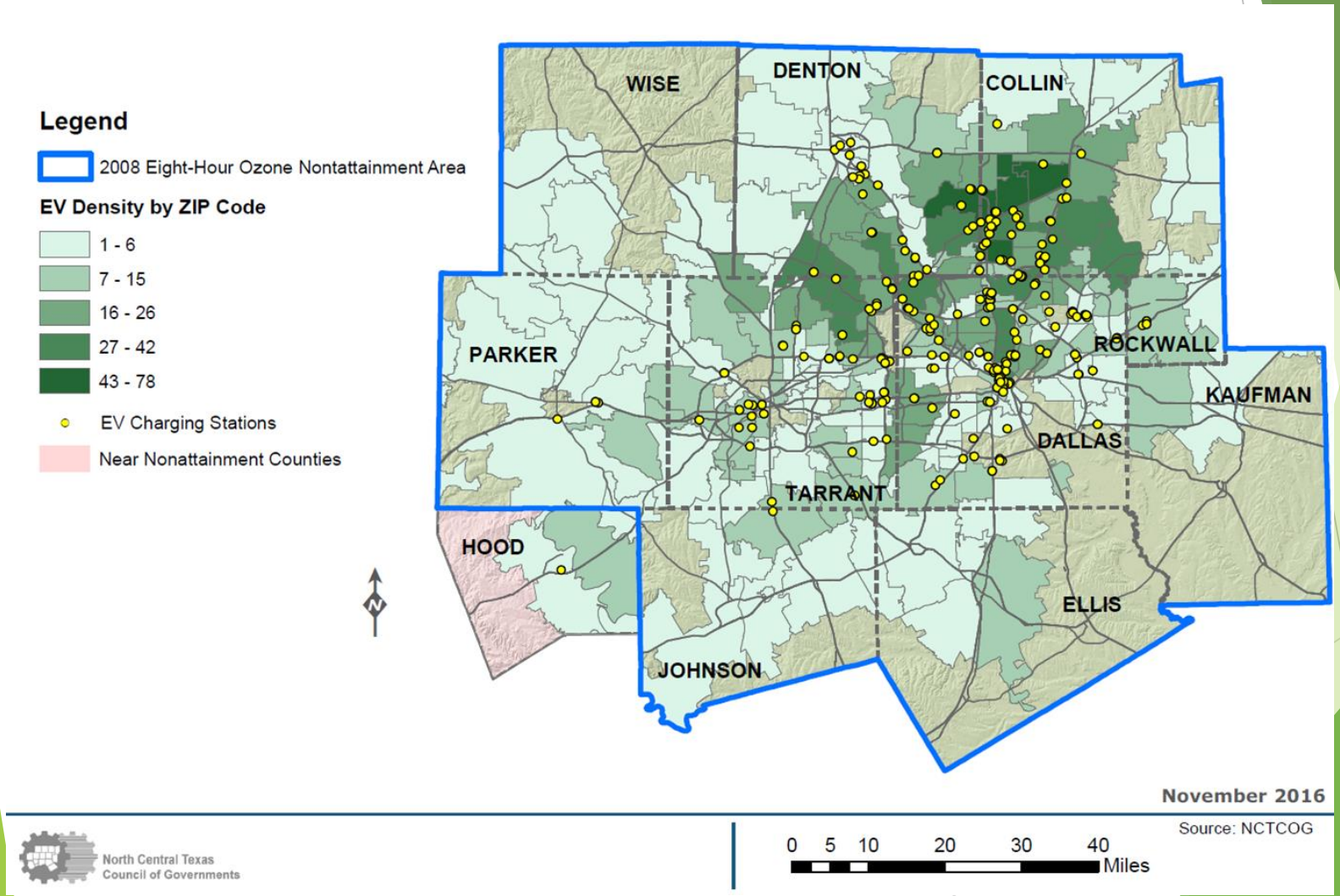
Introduction to EVs

Hybrid Electric Vehicle (HEV)	Plug-In Hybrid Electric Vehicle (PHEV)	All-Electric Vehicle (EV) or Plug-In Electric Vehicle (PEV)

Introduction to EVs

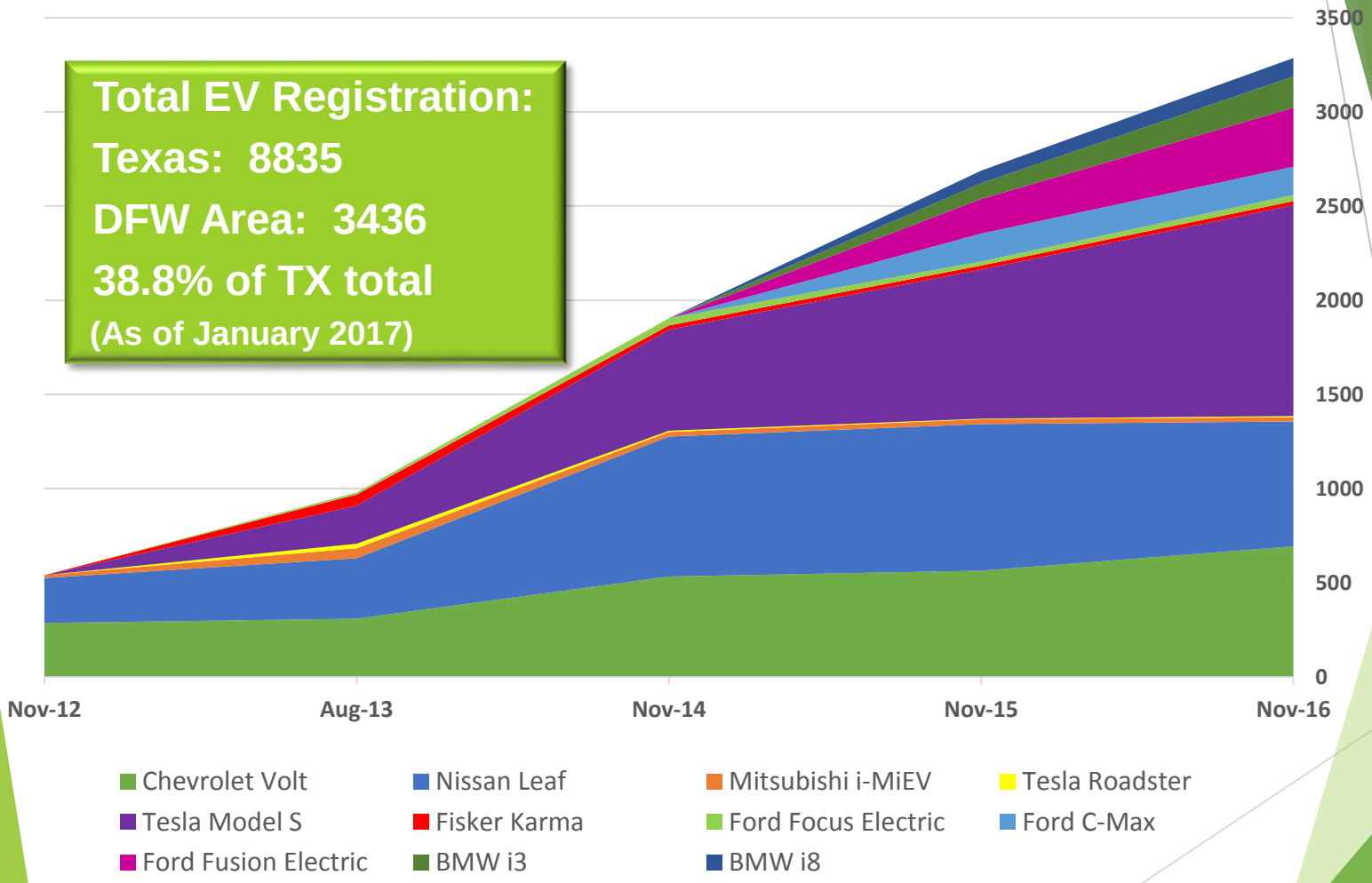


North Texas EV Registration and EVSE Distribution



Registration by EV Model in North Texas

Total EV Registration:
Texas: 8835
DFW Area: 3436
38.8% of TX total
(As of January 2017)



*NCTCOG staff plans to include additional models including: Cadillac ELR, Chevrolet Spark, Fiat 500e, Honda Accord Plug-In & Fit EV, Toyota Plug In Prius, & RAV4 EV

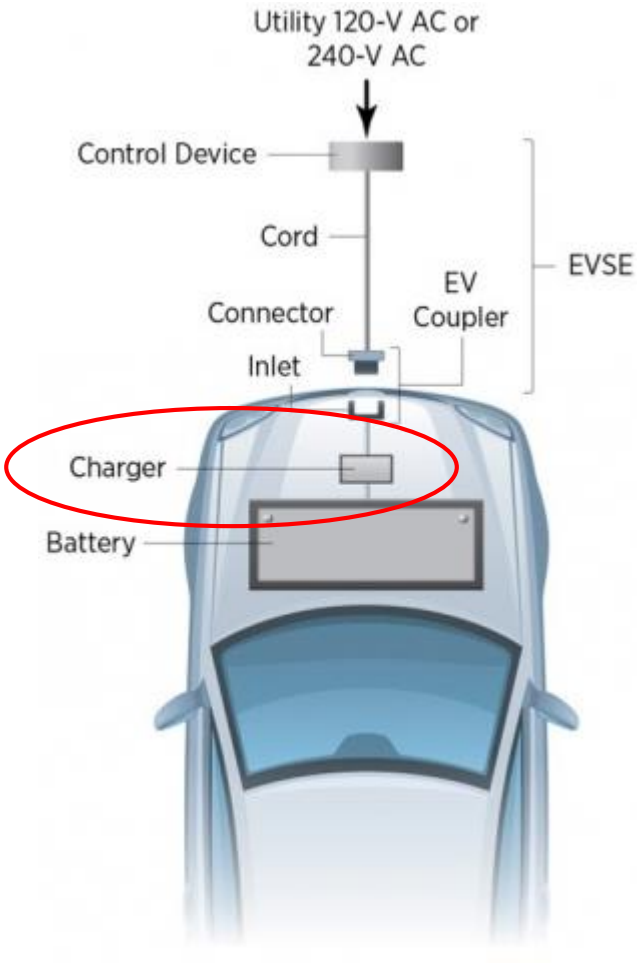
Introduction to Electric Vehicle Supply Equipment (EVSE)

Type	Specifications	Time Needed to Charge 10 Miles
Level 1	AC 110–120 V 12 or 16 amps 1.44, 1.92 KW	1h 40 min
Level 2	AC 208–240 V 16 - 80 amps 3.3 - 19.2 KW	~ 30 min
Fast Charging	DC 200–450 V ≤ 200 amps ≤ 90 KW	< 5 min

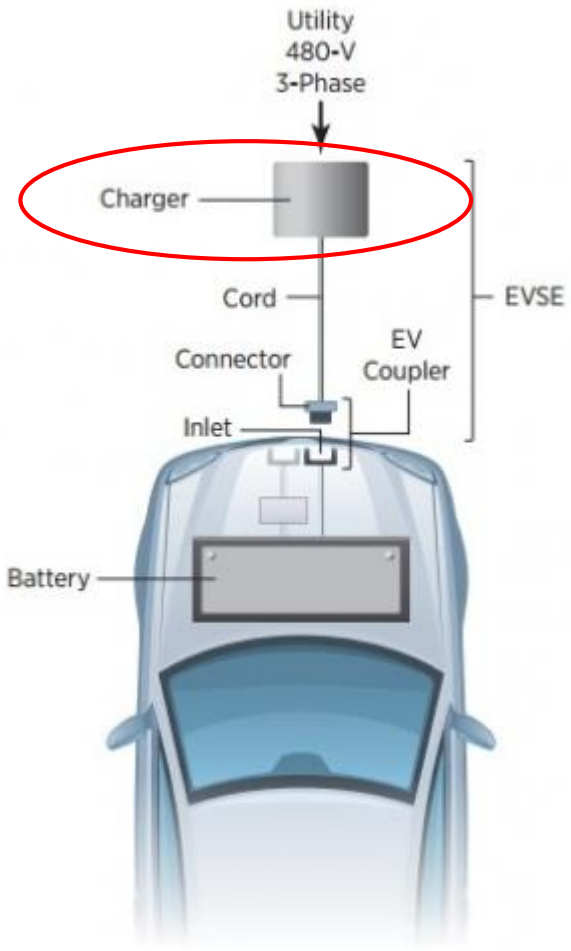
Image Source: NCTCOG

Introduction to EVSE

Level 1 and Level 2 Chargers

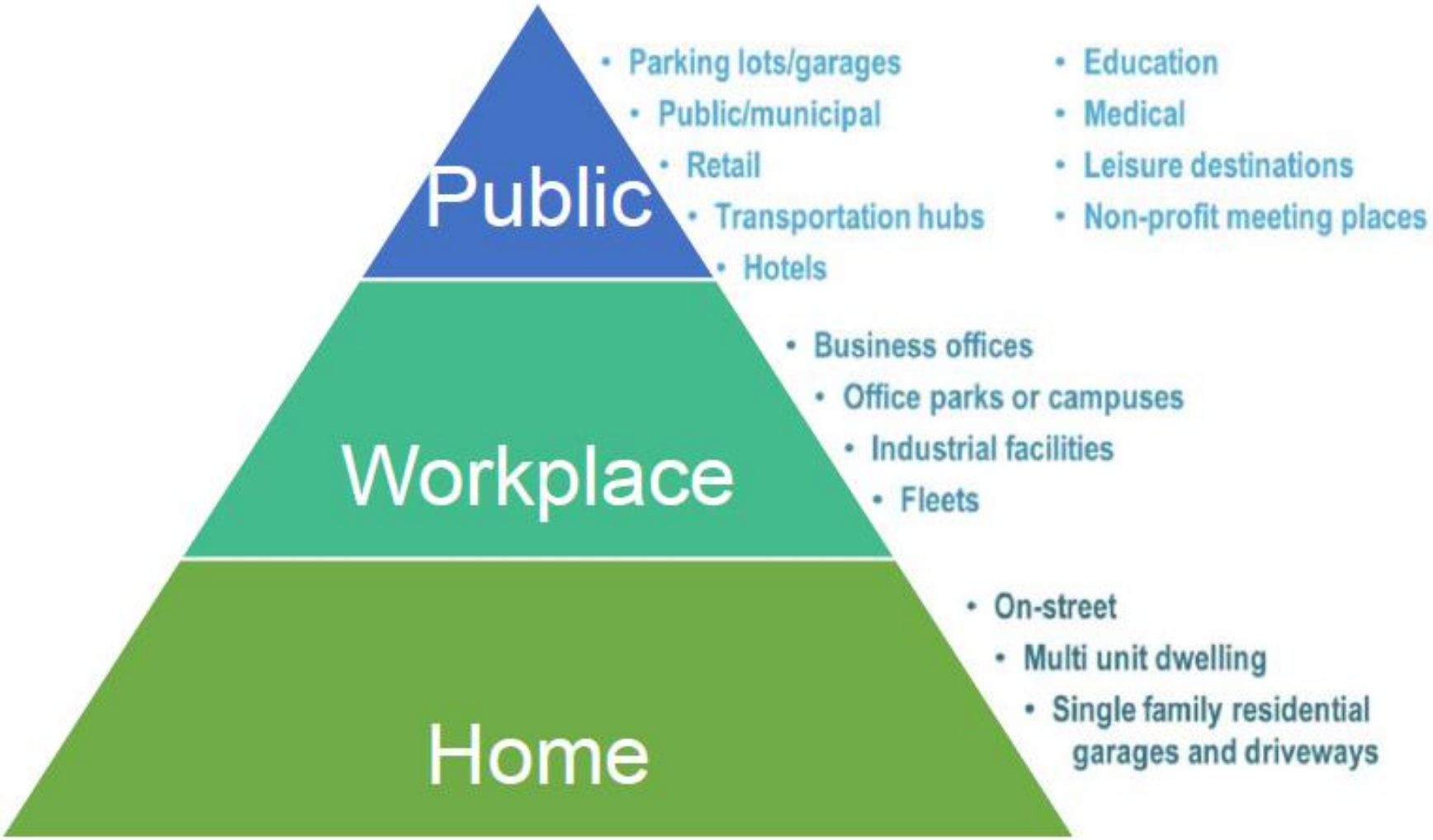


DC Fast Chargers



Images Courtesy of National Renewable Energy Laboratory

EVSE Hierarchy



Public EVSE Management Options

- Host-Owned EVSE
  - Business or Property Owner Pays to Own and Install EVSE
  - Charging Time-Based or Provided as a Free Public Service
- Network-Owned EVSE
  - Installation Company (e.g. Chargepoint, NRG EVgo, Blink, etc.) Contracts with Host to Install EVSE
  - Installation Company Retains Ownership of EVSE
  - Users Pay Fee, Often Time-Based or Monthly Membership
- In Both Cases: Installation Requires Licensed Electrician Only

Obstacles to EV Adoption and Deployment

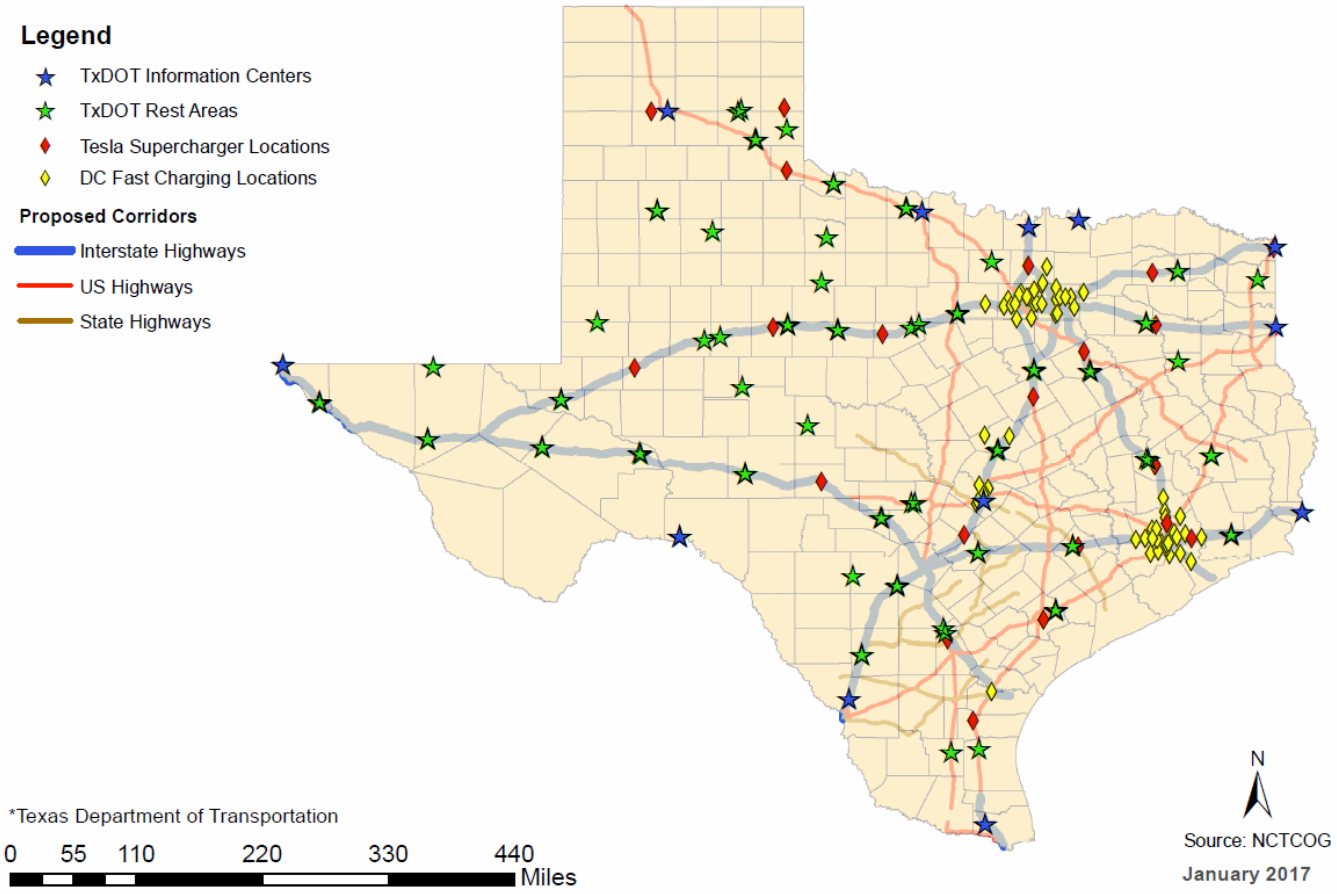
- Range Anxiety
  - Charging Time
  - Public Charging Availability
  - Interoperability
- Up-Front Costs
- Lack of Information
- Lack of Automaker Marketing
- Lack of Media Coverage/Publicity

Achieving EV Readiness

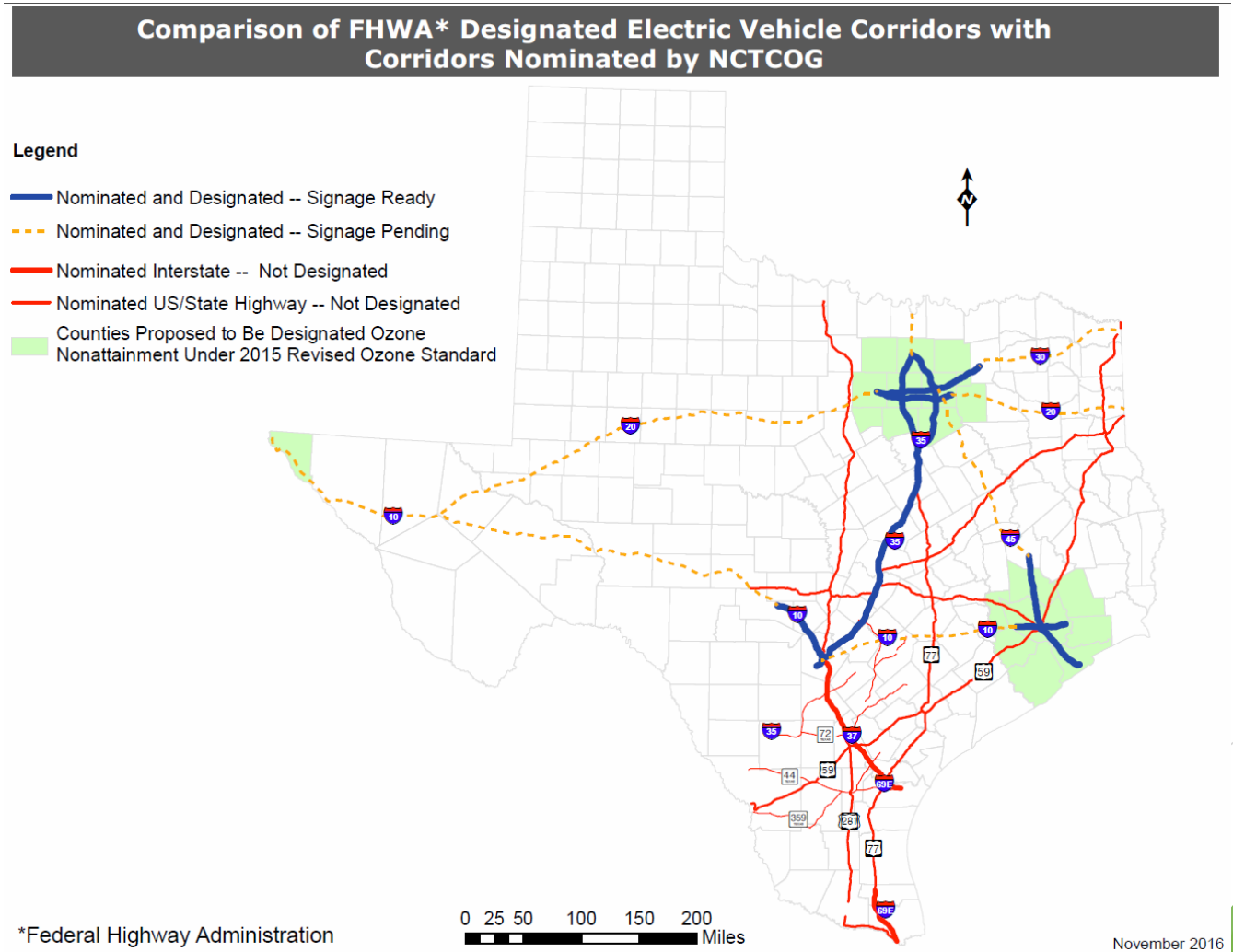
- Long-Term Vehicle and Infrastructure Planning
- Market Conditions
- Utility Involvement
- Education and Outreach
- Laws, Incentives, and Financing
- EVSE Permitting and Inspection Process

Long-Distance EV Infrastructure Planning

Map 2: Locations of TxDOT* Rest Areas and Information Centers, Electric Vehicle Fast Charging



FAST* Act Designated EV Corridors

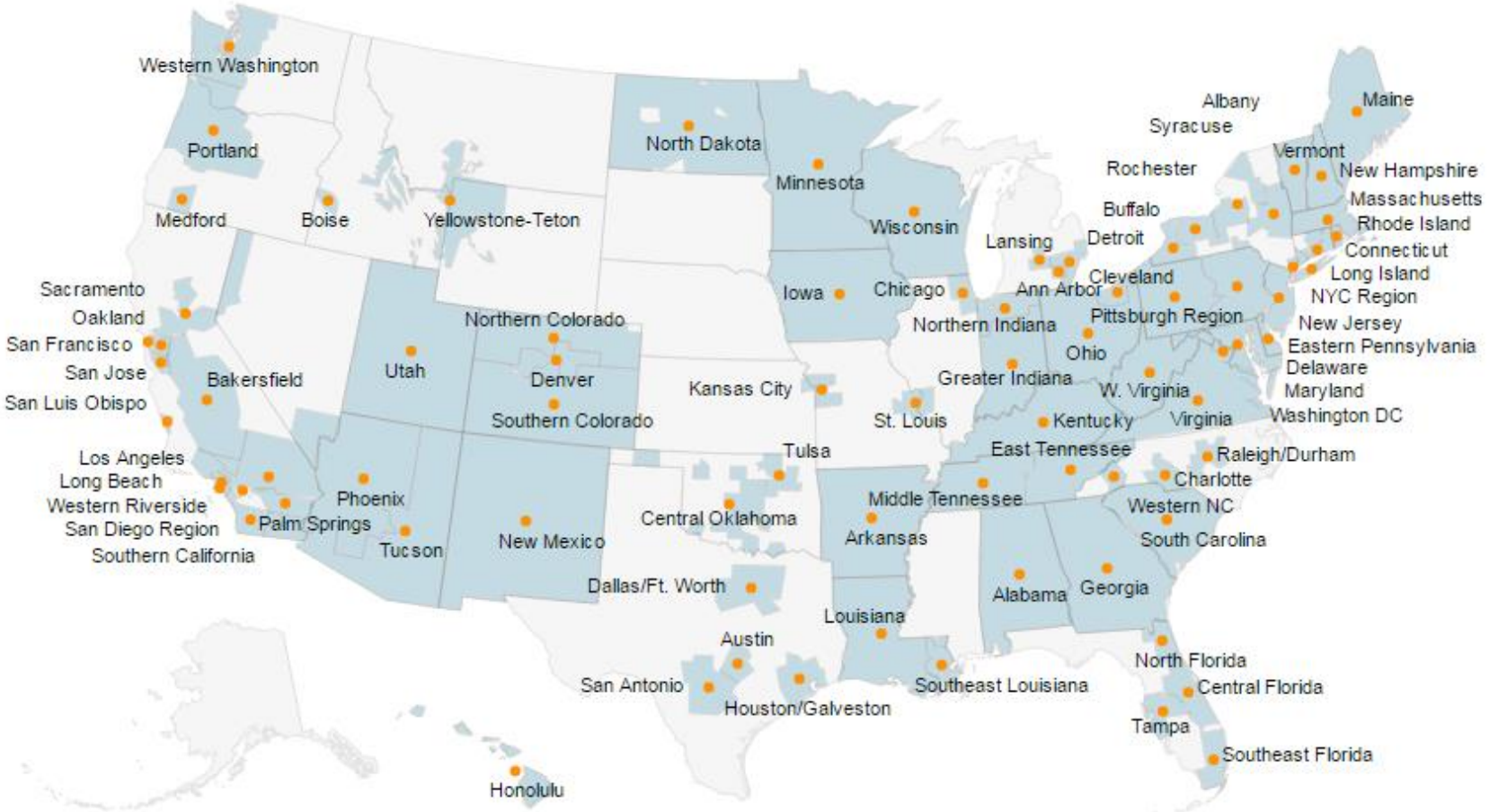


Clean Cities Coalitions

- **Goals:**
  - Reduce Petroleum Consumption
  - Facilitate Use of Alternative Fuel Vehicles and Supporting Infrastructure
  - Accelerate Sales of Electric and Hybrid Electric Vehicles
  - Promote Informed Consumer Choice on Fuel Economy
  - Encourage Use of Idle Reduction Strategies

Dallas-Fort Worth
CLEAN CITIES

Clean Cities Coalitions

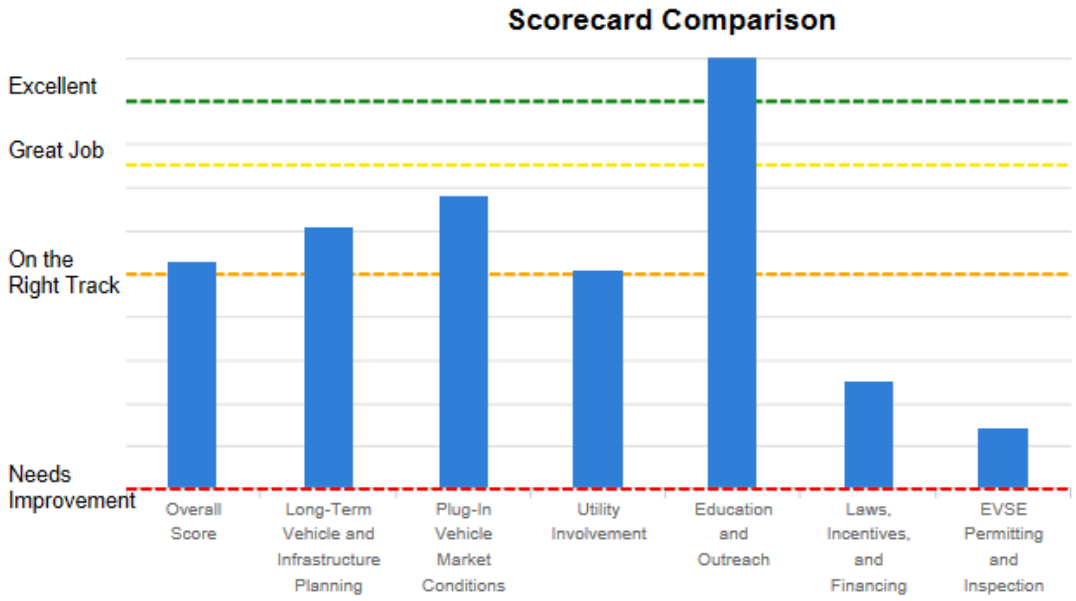


Electric Vehicles North Texas: Initiatives and Focus Areas

- Promote EV Adoption
- Promote EV Readiness
- Evaluate EV Registration Data with Infrastructure Sites
- Engage Local Businesses in Workplace Charging Challenge
- Develop Marketing/Educational Materials
- Host National Drive Electric Week Events
- Create Region-Specific Fact-Sheets
- Monitor Local Interest-Group Activities
- Raise Awareness - #TexasEV

Alternative Fuels Data Center Tools: Plug-In EV Readiness Scorecard

- Assess Readiness for Wide-Scale EV and EVSE Adoption
- Receive Feedback about Strengths and Ways to Improve
- Record and Track Progress



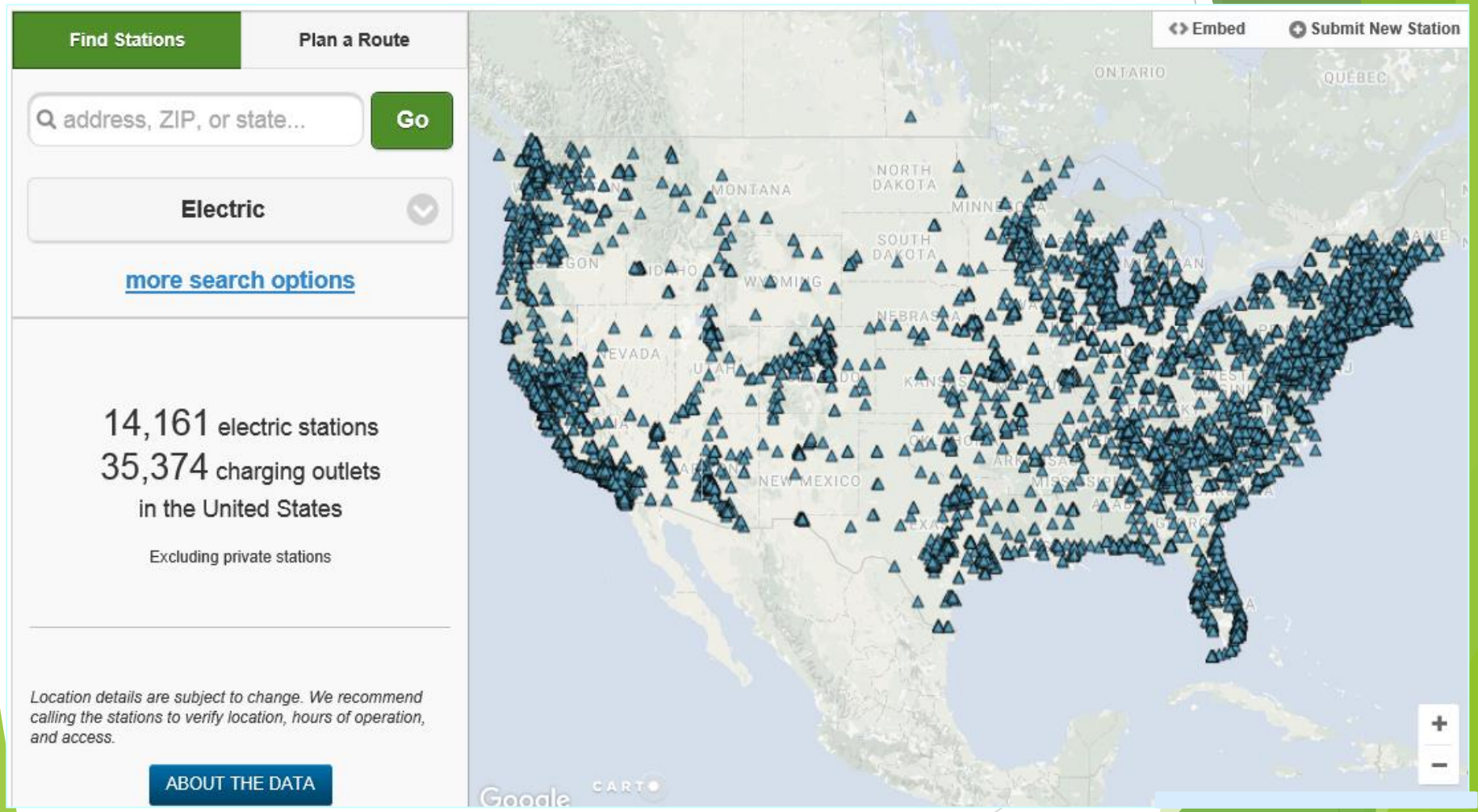
http://www.afdc.energy.gov/

Workplace Charging Program

- Program of the Department of Energy
- EVNT Provides Support By:
  - Tenant Surveys
  - Fact Sheets and Online Resources
  - In-Person Consultation
  - Customized Events

https://energy.gov/eere/vehicles/workplace-charging

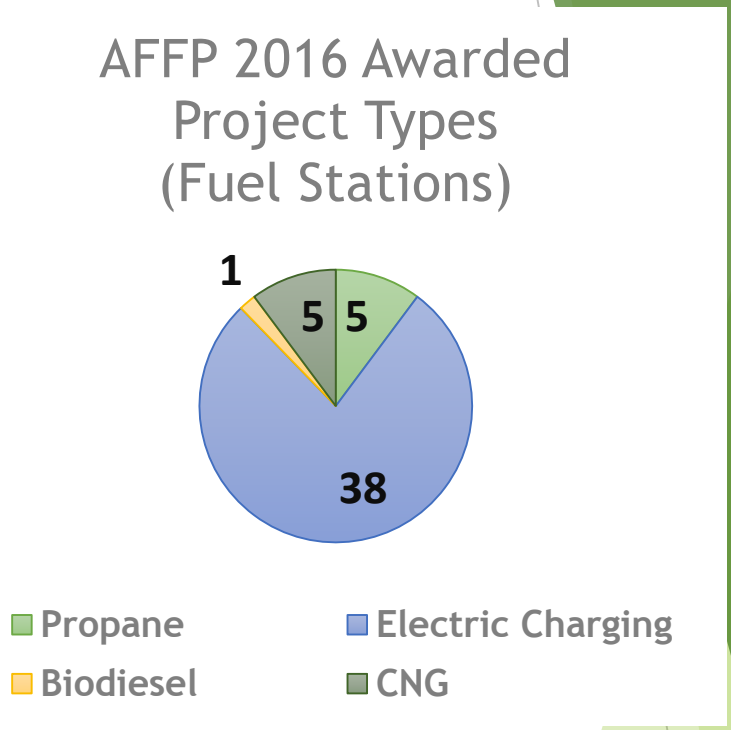
Alternative Fuels Data Center Tools: Station Locator



http://www.afdc.energy.gov/

Available Incentives

- Texas Commission on Environmental Quality (TCEQ) Texas Emission Reduction Plan (TERP) Alternative Fueling Facilities Program (AFFP)
  - Provides grants of up to 50% of total eligible costs or a max. of $600,000 for the construction or expansion of alternative fueling stations in specific counties



www.terpgrants.org

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