Monday, September 11 2017

EV 101

National Drive Electric Week Webinar Series

- Ron Swanson, North Texas Electric Auto Association
- Ryan Daley, Electrification Coalition
- Kristina Ronneberg, North Central Texas Council of Governments

Dallas-Fort Worth CLEAN CITIES

evnt Electric Vehicles North Texas

#texasEV

Ron Swanson

President North Texas Auto Association

1888

1914

1974

A Brief History

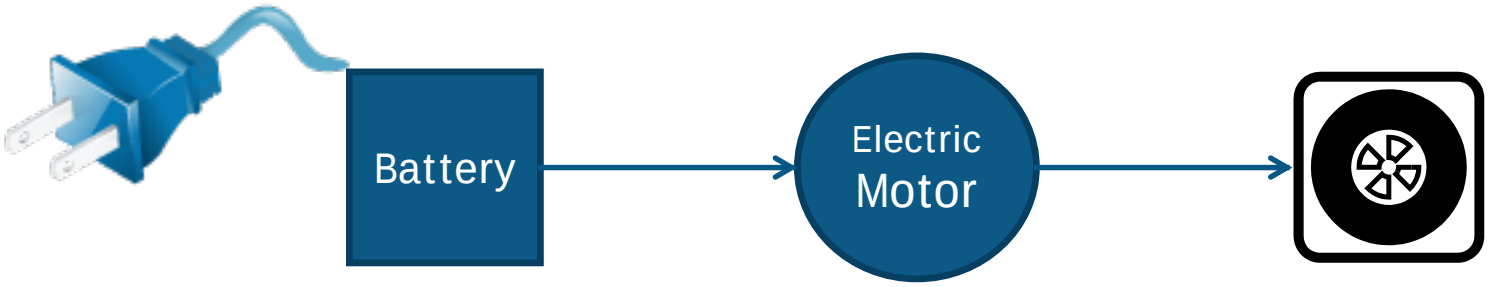
- **Began in 1837 in Scotland**
- **First in US in 1890, ended by 1920**
- **Revived in the 1970's (oil embargo/prices)**
- **Modern era began in 1989**

1997

2009

2017

How Do They Work?



There is a black box that is also involved to handle the “controlling” of the batteries and the motor.

How Far Do They Go?

Current production cars have a range of from 65 to 300 miles on a full charge.

For Example:

- IMev 65 miles
- Soul 93 miles
- Focus 100 miles
- Leaf 109 miles
- Bolt 238 miles
- Tesla S 300 miles

A Word about Charging

There are 3 ways to charge your EV

- Plug in standard charger to any 110 volt outlet
- Use a 240 volt charger (home or commercial)
- Use a 480 Volt commercial charger.

The rate of charging ranges from 4 miles per hour to over 100 miles per hour

What about Gasoline?

Facts and Figures

- 5 Kwh to make a gallon of gasoline (average car 25 mpg)
- Typical EV goes 20 miles on 5 Kwh
- Cost of a gallon of gas $2.50
- Cost of 5 Kwh $0.45 (9 cents a Kwh)

Oh yeah, you have to go to a gas station to get it

Closing Thoughts

- There are 13 production electric vehicles available in 2017 (and 17 plug in hybrids)
- The performance/acceleration of an electric car is superior to most ICE vehicles
- They are virtually silent.
- They are almost maintenance free.

Range Anxiety:
Think of it this way, when was the last time you ran out of gas?


The Electrification Coalition

Agenda

1. Introduction to the EC
2. Benefits & Economics of Electric Vehicles
3. Applications Best Suited for EVs
4. State of the Market

SAFE and the Electrification Coalition

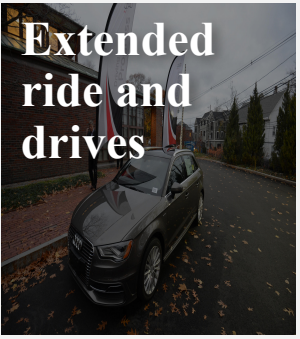
The Electrification Coalition is a nonpartisan, not-for-profit group of business leaders committed to promoting policies and actions that facilitate the deployment of electric vehicles on a mass scale.

fleets for the future

Workplace charging

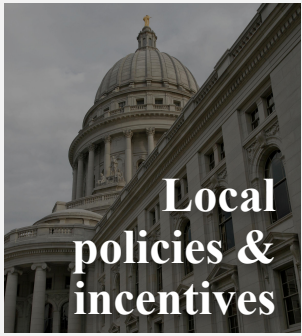
Group buy programs


Educational workshops


Extended ride and drives

EV accelerator Communities

Northern Colorado, Orlando, Rochester


Local policies & incentives

Drive Leadership programs


Increased dealer inventory


Light duty TNC, taxi, or public fleet electrification

City of Atlanta Partnership

- Formed an MOU with the City of Atlanta in Summer 2016 creating a year long technical advisor position housed at City Hall

- Assisting Atlanta with implementing best policy practices for electric vehicles locally and State-wide

- **Goals:**
  - Secure strategic partnerships with OEMs and cities to support EV initiatives and fleet transitions
  - Identify barriers cities experience with transitioning to electric vehicles
  - Develop transferrable communication tools that can be shared through networks of cities and OEMs for successful EV deployments

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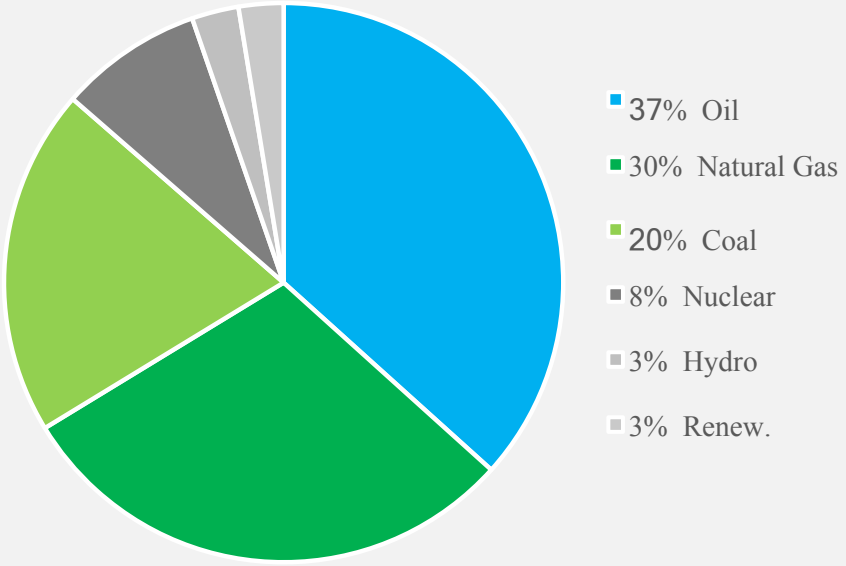
Reduce our National Dependence on Oil

Electrification of transportation system is our best solution for reducing U.S. oil dependence, insulating our economy from oil price volatility.

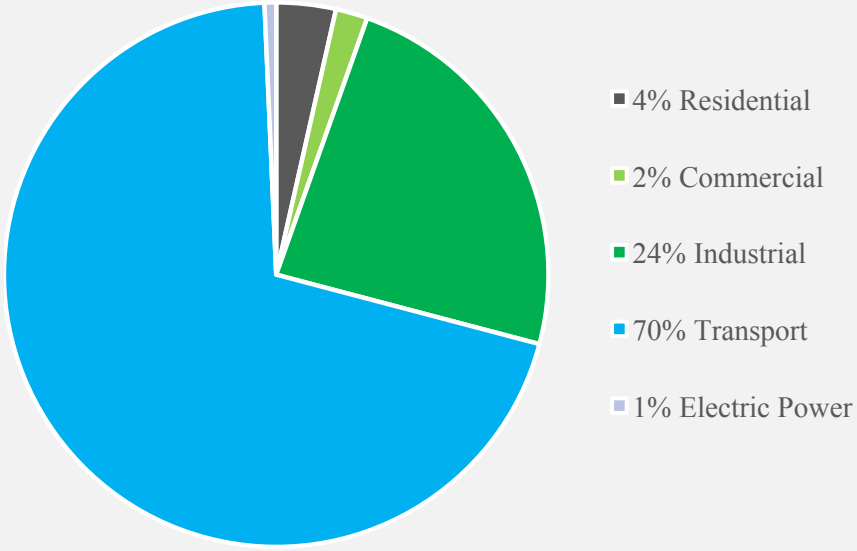
- Approximately 70 percent of U.S. oil consumption occurs in the transportation sector, with 40 percent in light-duty vehicles
- Transportation is 94 percent reliant on oil-based fuel for energy

U.S. PRIMARY ENERGY DEMAND, 2013



Source: DOE, EIA

PETROLEUM FUEL DEMAND BY SECTOR, 2013



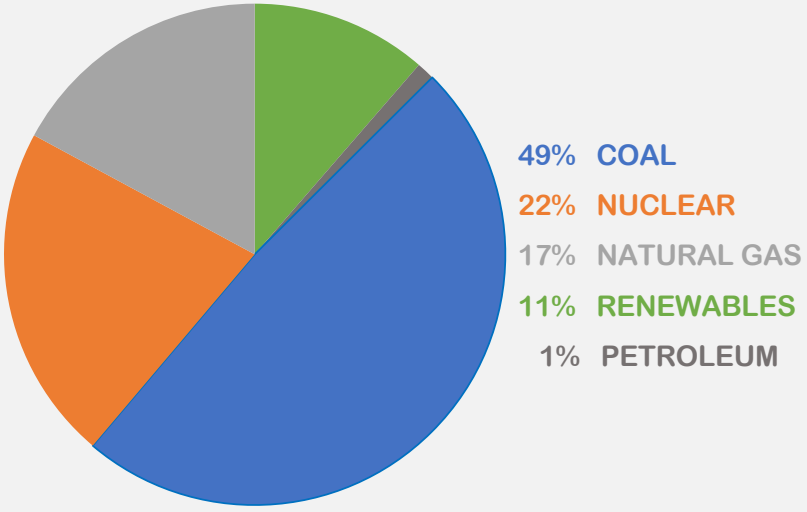
Source: DOE, EIA

Diversify the Transportation Fuel Supply

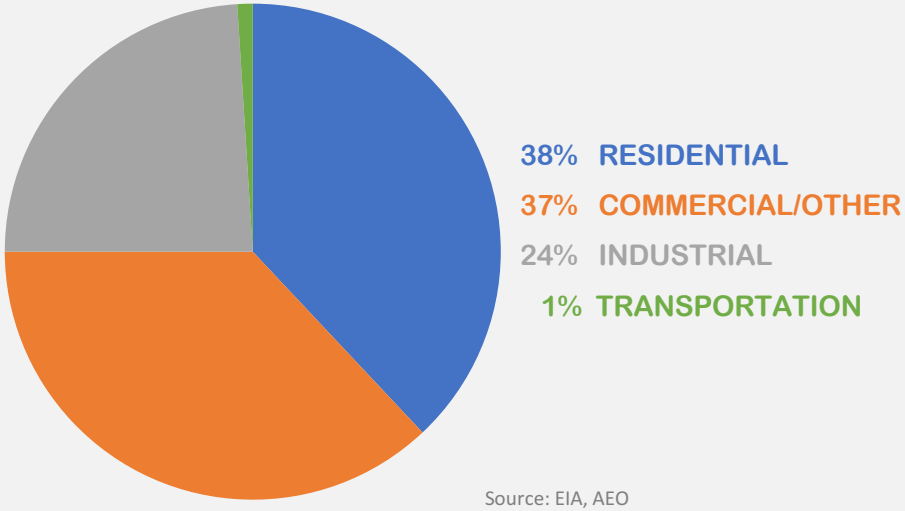
Electricity is ubiquitous, reaching every corner of the U.S.
The fuel supply is diversified, and almost entirely domestically produced.

- Electricity is generated from a diverse portfolio of domestic fuels
- The power sector has substantial spare capacity
- System Scale: the network of infrastructure already exists
- It's getting 'greener': carbon intensity of the US grid is at the lowest levels since WWII

U.S. ELECTRICITY GENERATION BY FUEL



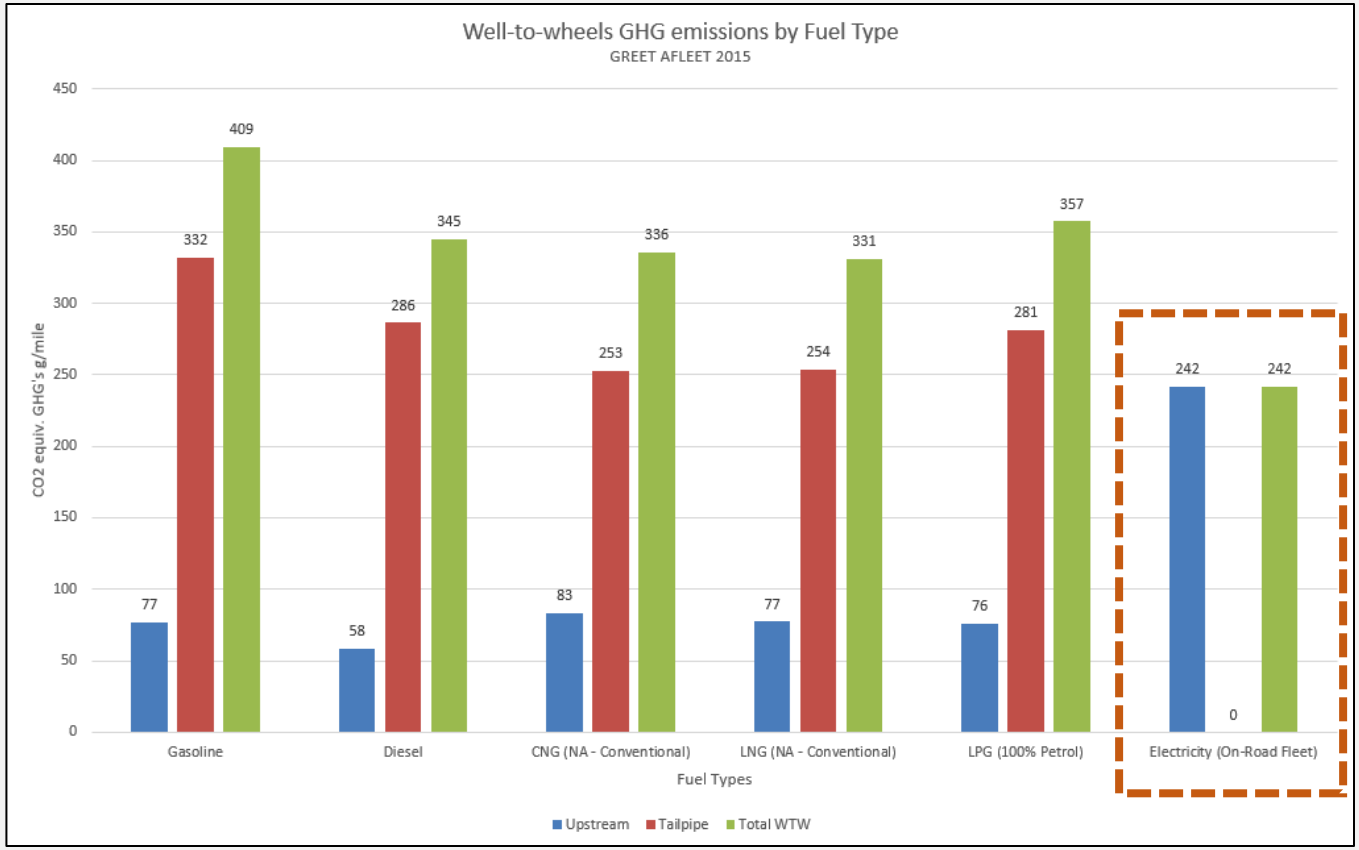
U.S. ELECTRICITY DEMAND BY SECTOR



Source: EIA, AEO

Emissions Benefits of Electric Vehicles

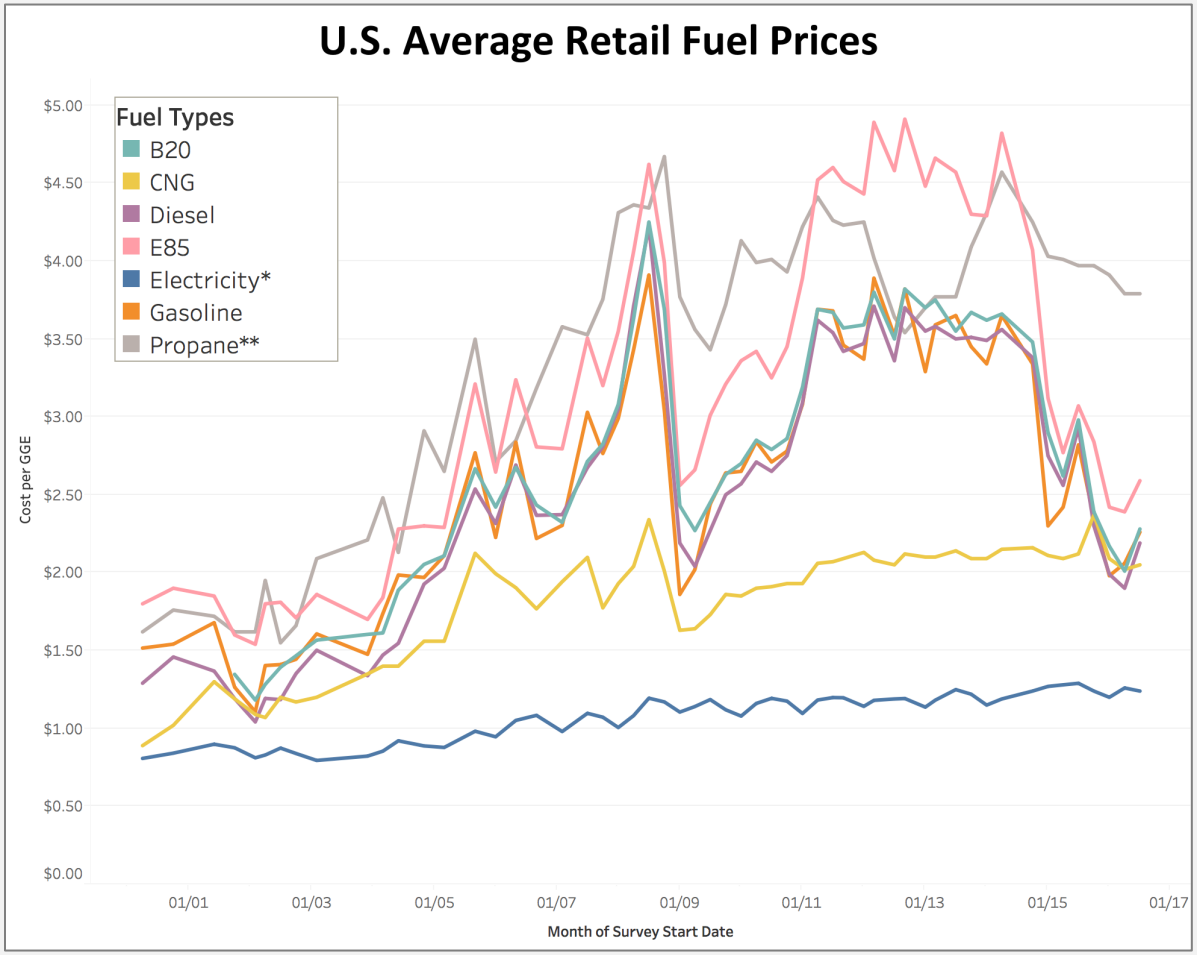
EVs have significant, but varying, greenhouse gas (GHG) emissions benefits over conventional vehicles.



- When operating on battery power – no tailpipe emissions
- Upstream emissions from electricity generation vary by region
- Electricity source aside, higher efficiency of EVs results in net reduction of GHG emissions
- The ONLY fuel source with the potential to get substantially 'greener' over time

Economic Benefits of Electricity as a Fuel

The price volatility of other transportation fuels threatens U.S. and household economic security. EV operating costs are mush lower than ICE.



- Even with greater oil production, the U.S. cannot avoid price volatility driven by global market forces
- In comparison, electricity prices remain relatively flat and predictable
- In 2012, the average U.S. household spent a record $2,912 on gasoline
- Fuel Costs:
  - EV ~ $0.035 /mi
  - ICE ~ $0.12 / mi

Source: DOE AFDC

*Electricity prices are reduced by a factor of 3.4 because electric motors are approximately 3.4 times as efficient as internal combustion engines

Total Cost of Ownership

Compared to your existing vehicles, the TCO/mi may make sense. Compared to a new ICE, the tax credit monetization matters, a lot.

Make/Model				
	Nissan Leaf	**Ford Focus**	**Chevy Volt**	**Ford Focus**
Category	BEV	BEV	PHEV	ICE
Battery Size	30 kWh	23 kWh	18.4 kWh	2.0 L - V4
MSRP	$34,200	$29,170	$33,170	$23,225
Incremental Cost	$10,975	$5,945	$9,945	$0
All-Electric Range	107 miles	76 miles	53 miles	n/a
EPA MPG Rating	112 MPGe	105 MPGe	106 MPGe	31 MPG
Charge Time (240v)	8 hours	4 hours	4 hours	n/a
Est. Annual Fuel Cost	$550	$600	$800	$1,000
TCO/mi	$0.46	$0.42	$0.46	$0.41
TCO/mi (w/ TC)	$0.39	$0.35	$0.40	$0.41
TCO/mi (w/ TC & $3.50 gas)	$0.39	$0.35	$0.41	$0.45
TCO/mi ($3.5 gas & 15k mi)	$0.36	$0.33	$0.38	$0.36

Estimates are based on an example with the $7,500 federal credit. Fuel costs are estimated at $0.12/kWh and $2.24 / gallon. Use assumes 12k miles per year over 10 years. Estimates will vary significantly when adjusted for specific local circumstances. TC = Tax Credit.

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Applications for Light-Duty PHEVs & EVs

Commercially available, non-luxury brand, BEV's and PHEV have some general, common characteristics to consider prior to deployment

BEV

- Subcompact and compact sedans
- Not a lot of cargo space
- Can seat 4 adults comfortably
- Well suited for urban settings with lots of stop-and-go traffic and where speeds generally remain below 45 MPH



PHEV

- Compact and midsize sedans
- Medium amounts of cargo space
- Can seat 4-5 adults comfortably
- Well suited for a wide range of activities with the gasoline engine as backup when the battery power is depleted



Medium- & Heavy-Duty EVs

MD/HD EV options are growing, but presently characterized by niche manufacturers establishing scalable supply chains and vehicle availability

Transit Busses

PHEV bucket trucks

Delivery/Box Trucks

Yard Trucks

Electric Pickup Trucks?

Unveiled May 2017 at ACT Expo, production vehicles in late 2018.

Workhorse W-15

- Plug-in, range extended pickup
- 80-mile all-electric range, 310 miles on range extender
- 75 MPGe all-electric, 30 MPG on gasoline
- 460 horsepower
- Towing capacity: 5,000 lbs.
- Payload capacity: 2,200 lbs.
- True all-wheel drive (AWD)

The EV market is evolving, expanding!

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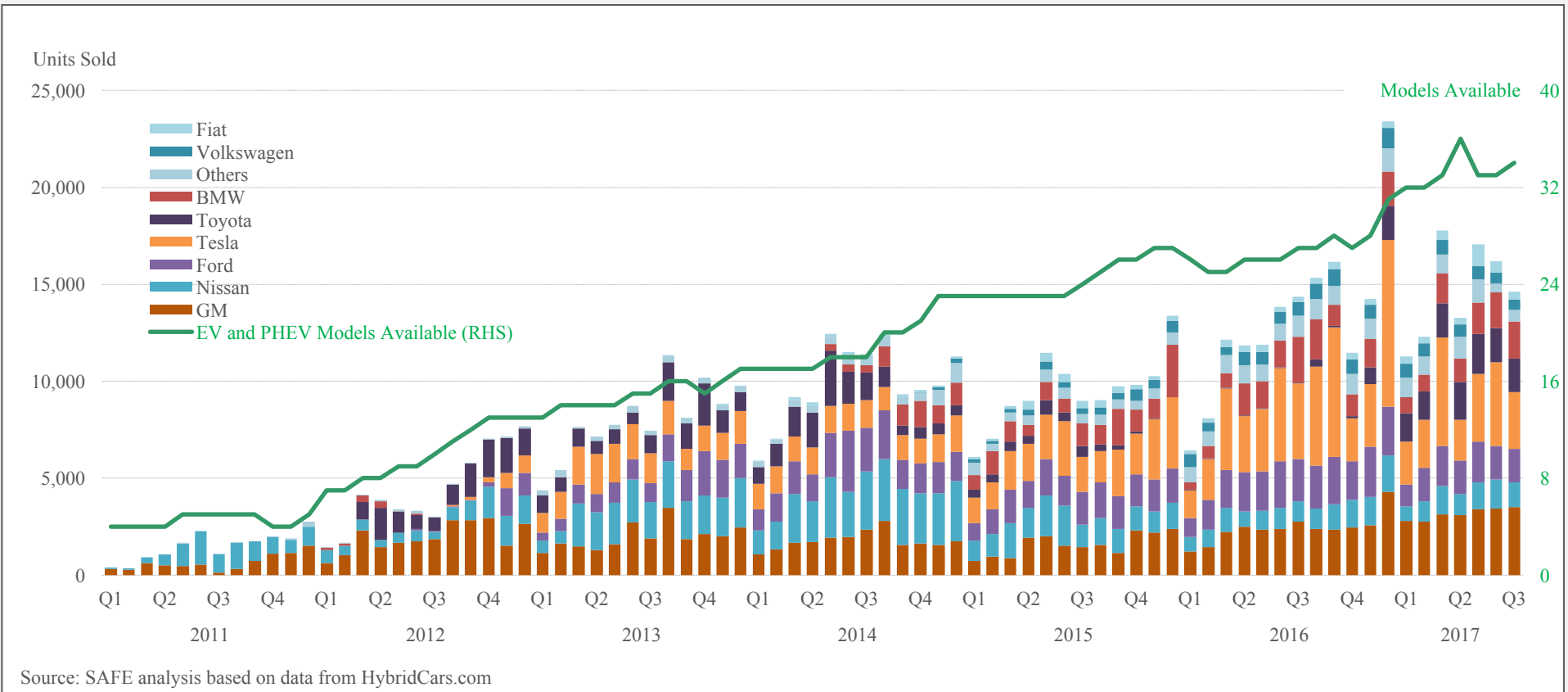
State of the Market – July 2017

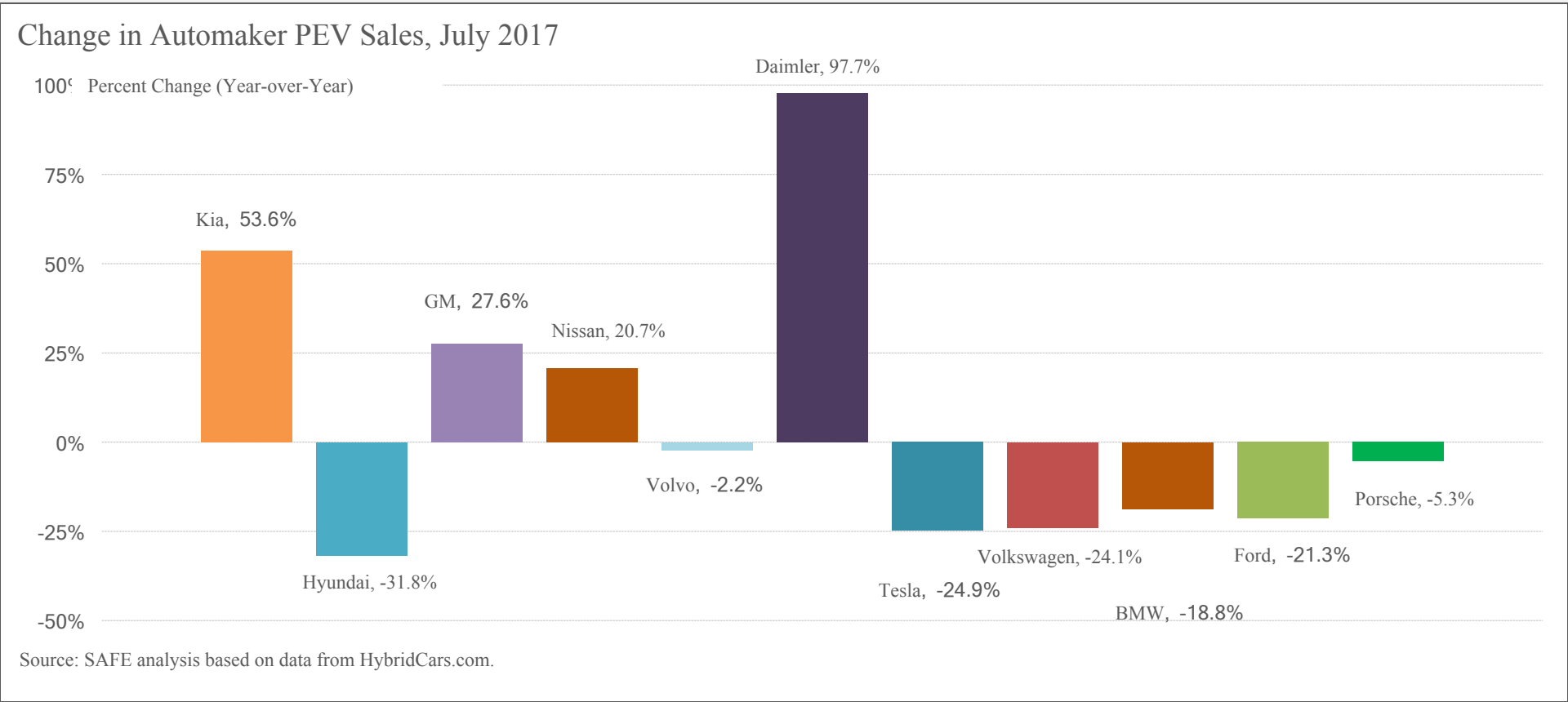
- Market grew by 6% YOY on 15,175 PHEV & BEV sales
- There were 21 PHEV and 13 BEV models in the U.S. market
- Approximately 661,000 EVs sales overall since 2011
- EVs constitute just 1.1% of all vehicles on the road in the U.S.



Source: SAFE analysis based on data from HybridCars.com

State of the Market – Automaker Sales

- Tesla is the most visible, but other automakers catching up
- Expect more growth from GM (Bolt) & Nissan (2018 Leaf)
- Kia and Daimler (Mercedes-Benz) have newest products
- BMW has made a strong push, but sales have slowed



The Electrification Coalition

Revolutionizing Transportation and Achieving Energy Security

Online:
www.electrificationcoalition.org
www.energysecurecities.org
www.driveelectricnoco.org

Download the Electrification Roadmap: www.electrificationcoalition.org/policy

Contact:
Ben Prochazka (303) 717-3657
BProchazka@electrificationcoalition.org

Electrification Coalition

1111 19TH STREET NW
SUITE 406
WASHINGTON, DC 20036

TEL: 202-461-2360
FAX: 202-318-8934
ELECTRIFICATIONCOALITION.ORG

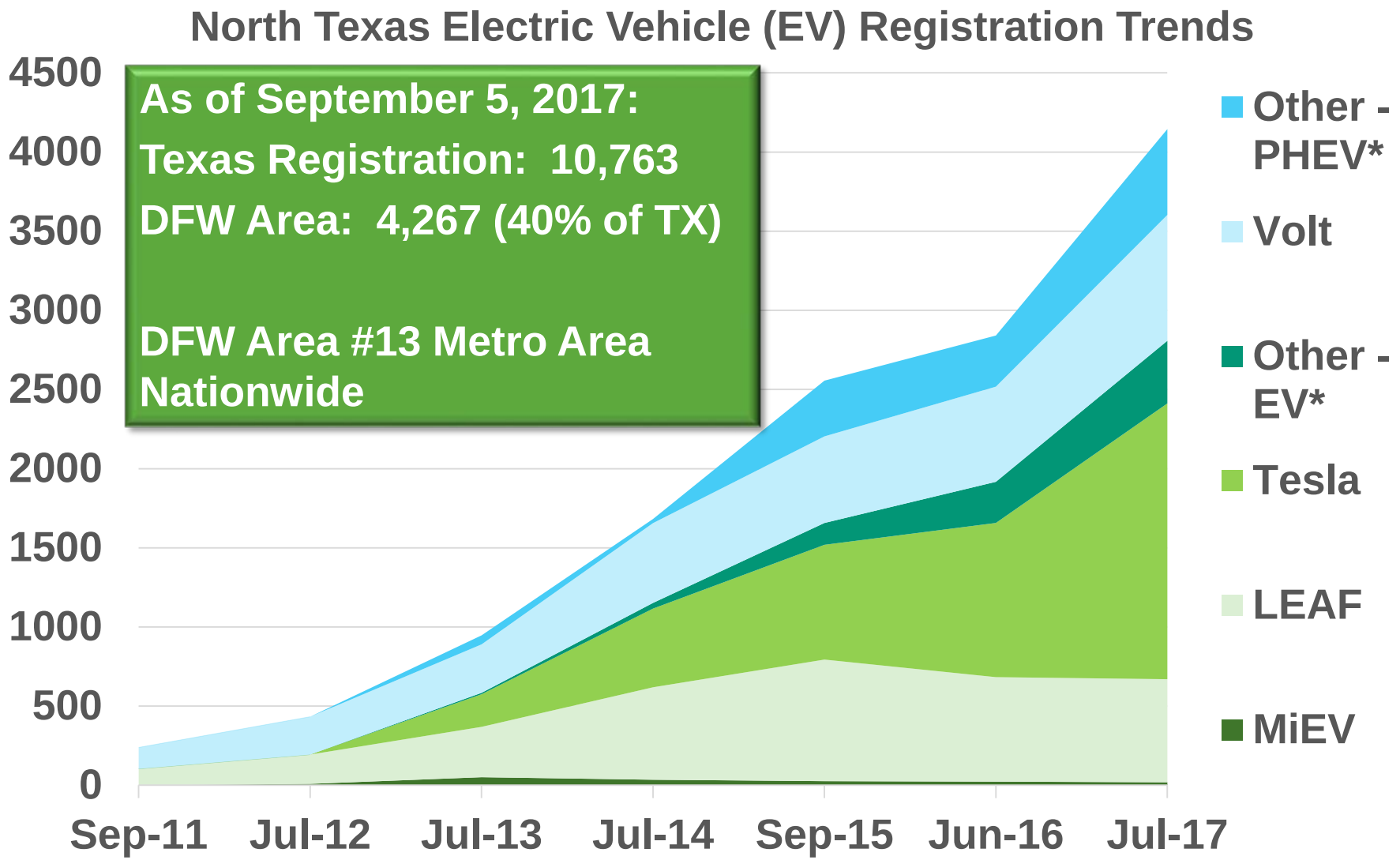
Regional Electric Vehicle (EV) Efforts

Dallas-Fort Worth
CLEAN CITIES

evnt
Electric Vehicles North Texas

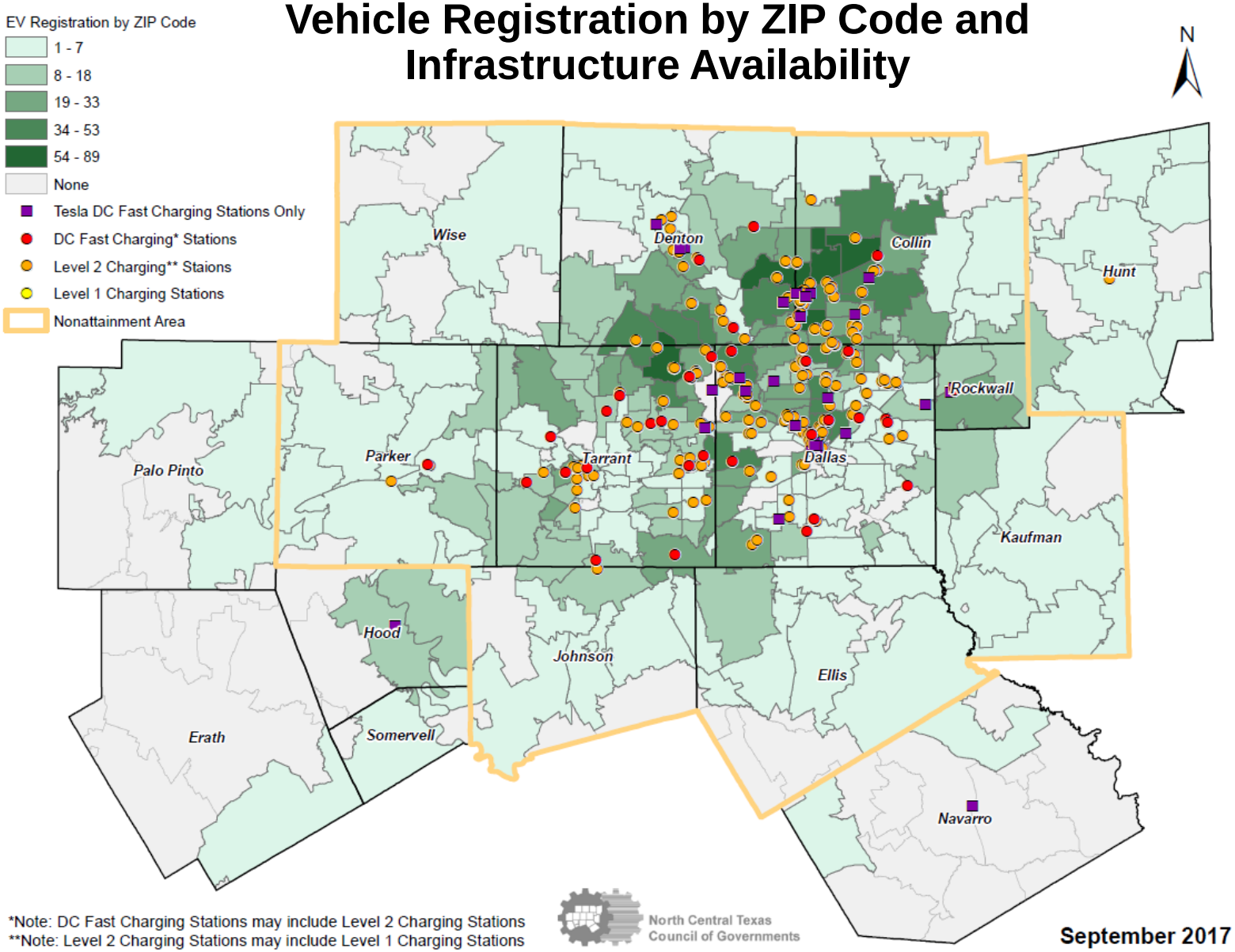
Website: www.dfwcleancities.org/evnt

Regional Data Trends



*Other EV includes the BMW i3, Chevrolet Bolt, Fisker Karma, Ford Focus Electric; Other PHEV includes the BMW i8, Ford C-Max Energi, Ford Fusion Electric, Chevrolet Bolt, Chevrolet Spark EV, Fiat 500e, and Mercedes B250e

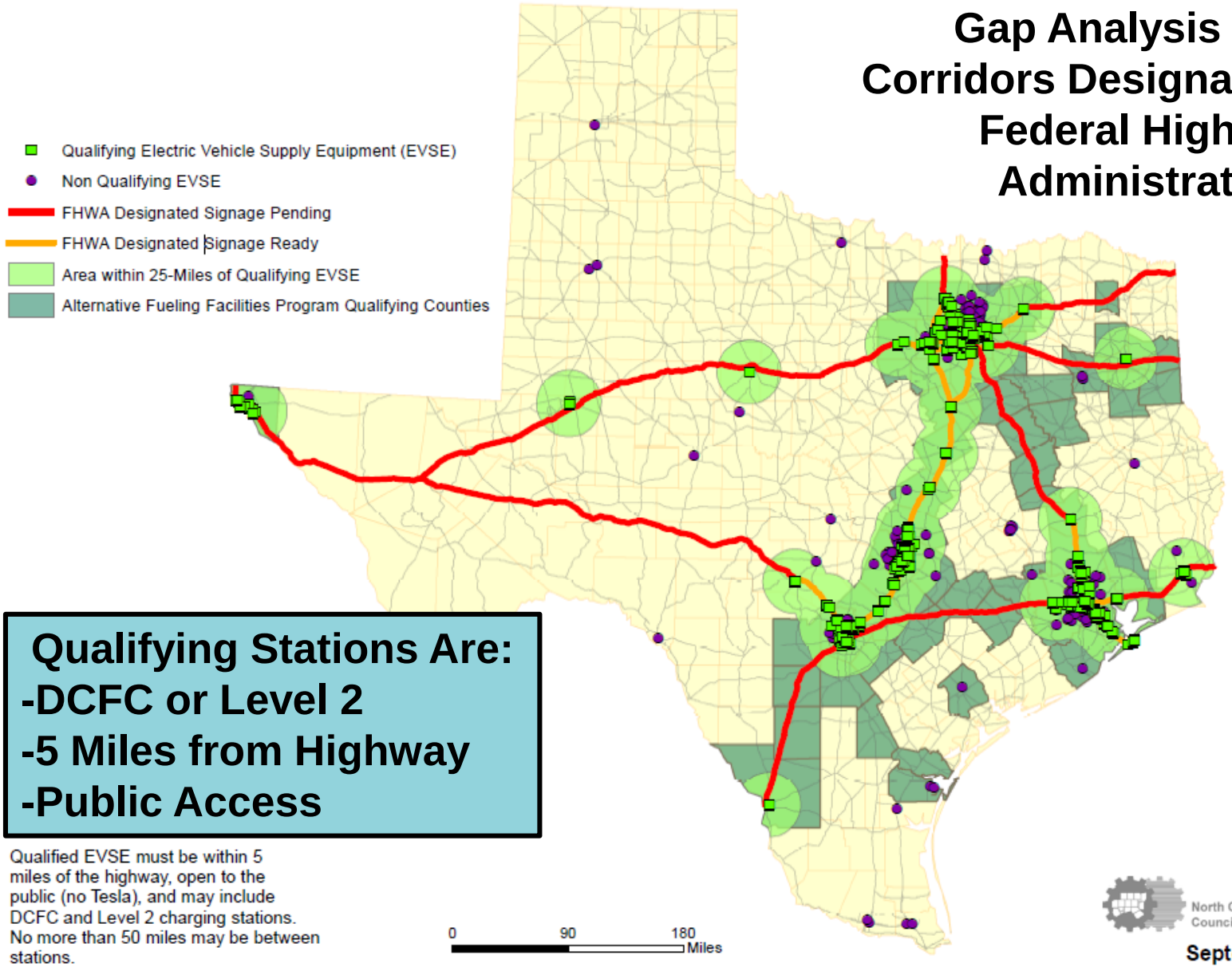
Regional Data Trends



Regional EV Efforts and Resources

Website: https://www.dfwcleancities.org/evnt

Collaborative Efforts: Alternative Fuel Corridors

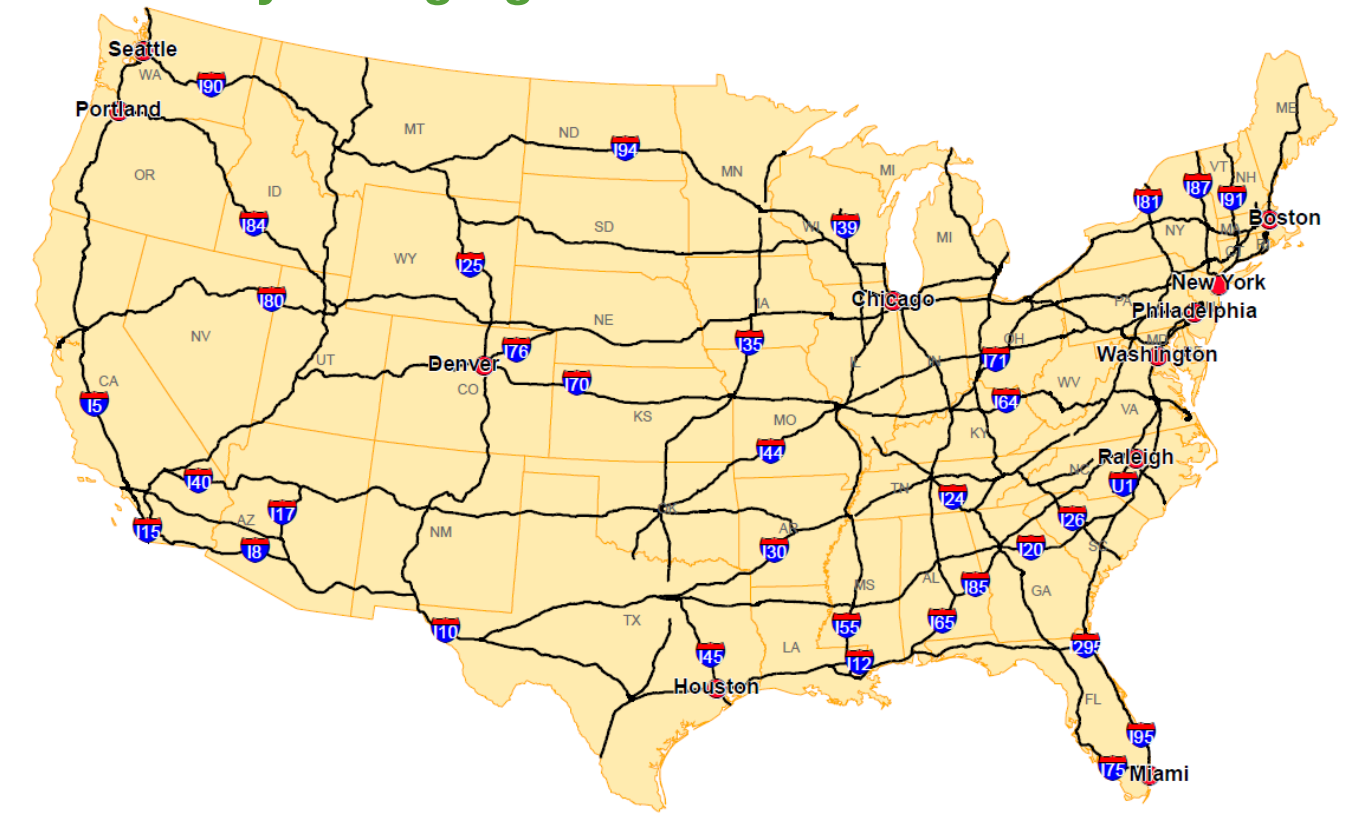


Collaborative Efforts: Volkswagen Settlement

$250 Million Being Invested Through 2019 in New Charging Infrastructure

Long Distance Highway Network ~$190 Million

Community Charging ~$40 Million

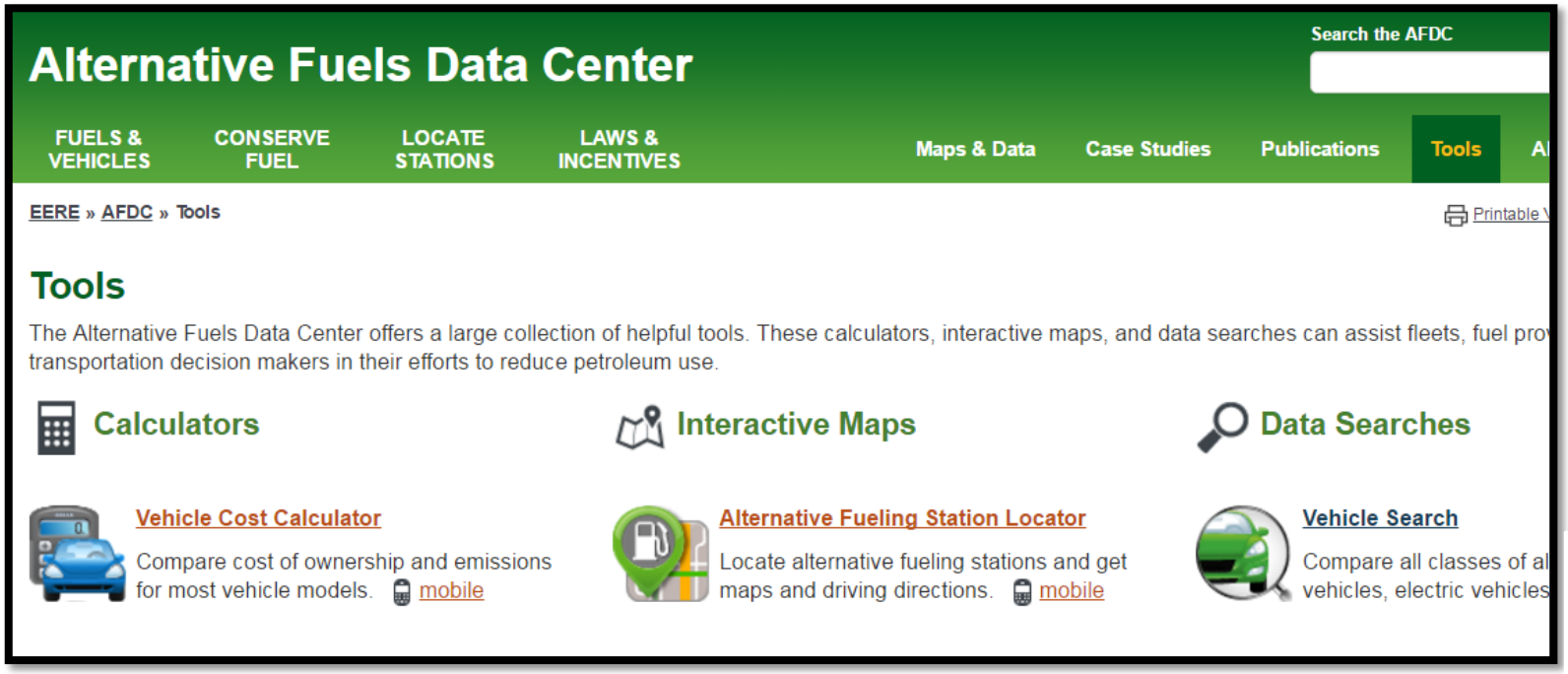


National Resources

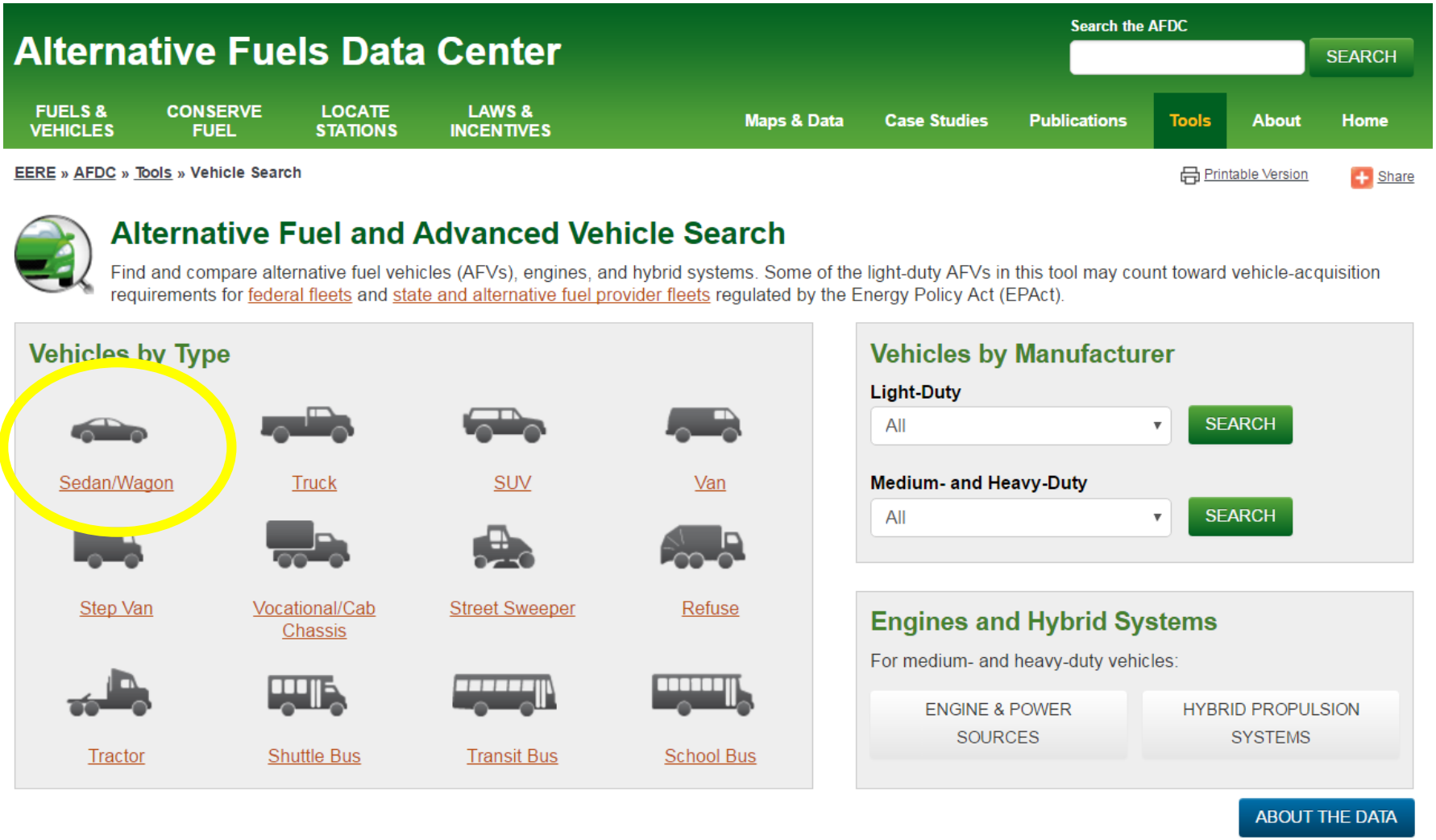
Alternative Fuels Data Center (US Department of Energy)

www.afdc.energy.gov

- **Vehicle Search**
- **Vehicle Cost Calculator**
- **Alternative Fueling Station Locator**



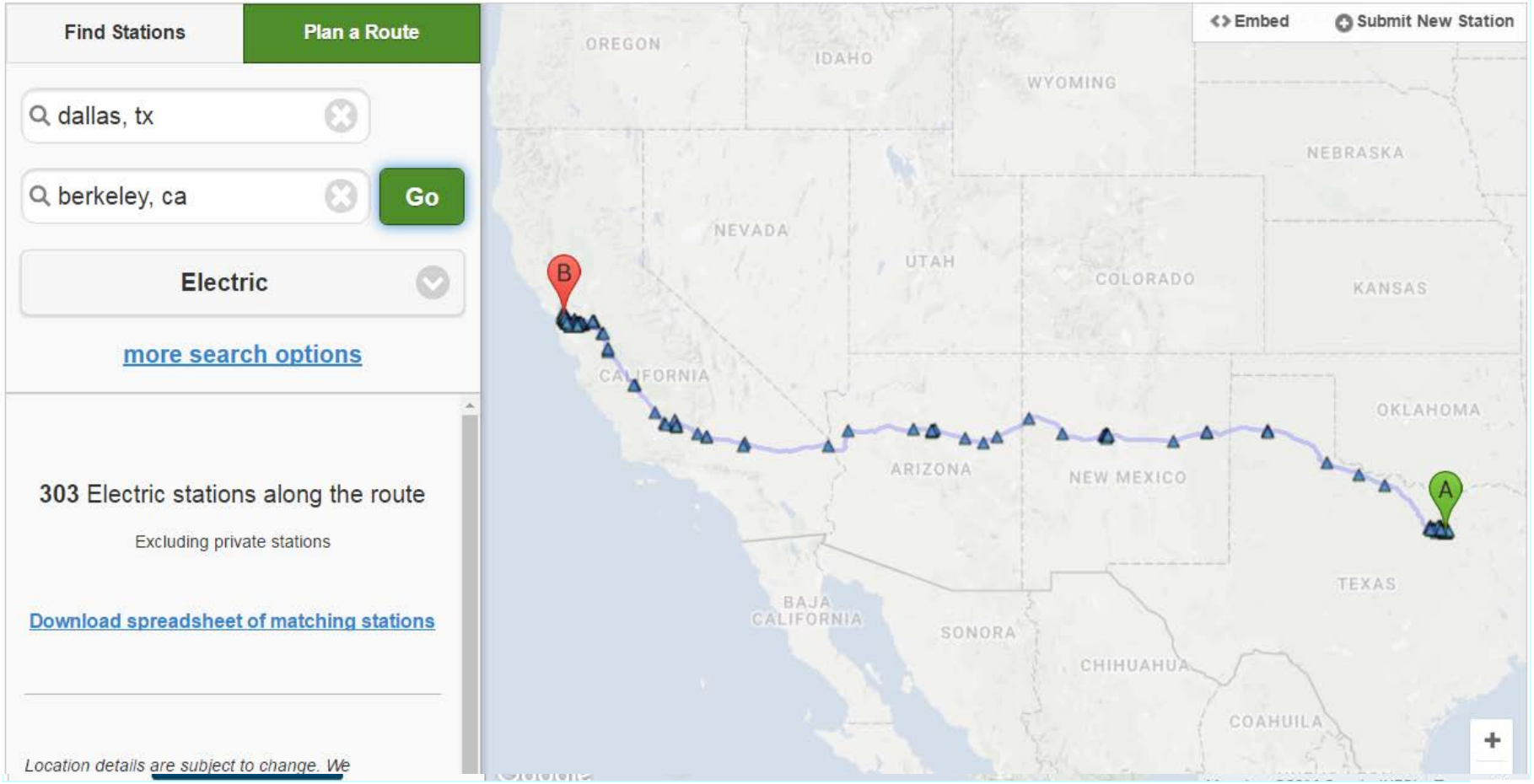
Resources


Alternative Fuels Data Center
Search the AFDC
SEARCH
FUELS & VEHICLES
CONSERVE FUEL
LOCATE STATIONS
LAWS & INCENTIVES
Maps & Data
Case Studies
Publications
Tools
About
Home
EERE » AFDC » Tools » Vehicle Search
Printable Version
Share
Alternative Fuel and Advanced Vehicle Search
Find and compare alternative fuel vehicles (AFVs), engines, and hybrid systems. Some of the light-duty AFVs in this tool may count toward vehicle-acquisition requirements for federal fleets and state and alternative fuel provider fleets regulated by the Energy Policy Act (EPAct).
Vehicles by Type
Sedan/Wagon
Truck
SUV
Van
Step Van
Vocational/Cab Chassis
Street Sweeper
Refuse
Tractor
Shuttle Bus
Transit Bus
School Bus
Vehicles by Manufacturer
Light-Duty
All
SEARCH
Medium- and Heavy-Duty
All
SEARCH
Engines and Hybrid Systems
For medium- and heavy-duty vehicles:
ENGINE & POWER SOURCES
HYBRID PROPULSION SYSTEMS
ABOUT THE DATA

Alternative Fuels Data Center Tools: Station Locator & Route Planner

Alternative Fueling Station Locator

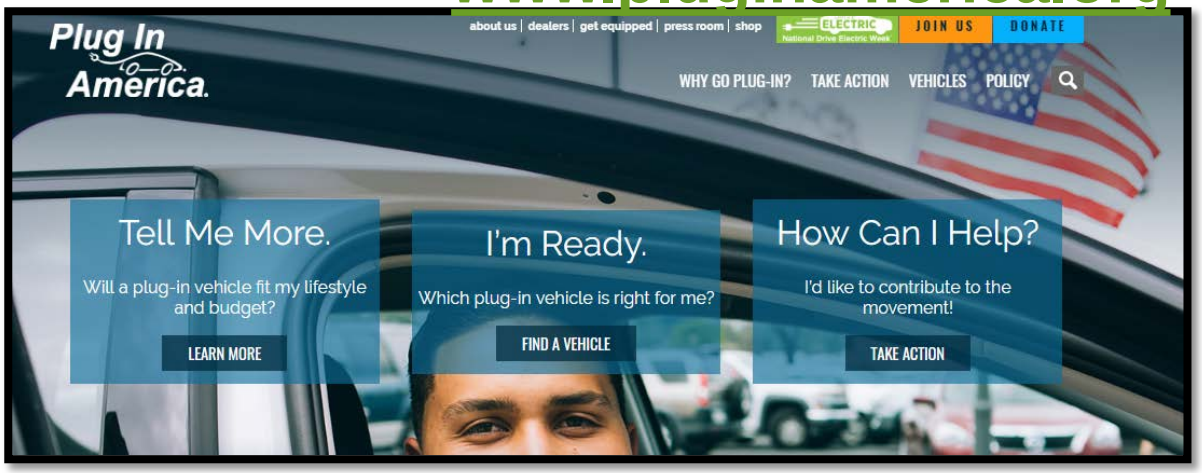
Find alternative fueling stations near an address or ZIP code or along a route in the United States. Enter a state to see a station count or see stations data by state.



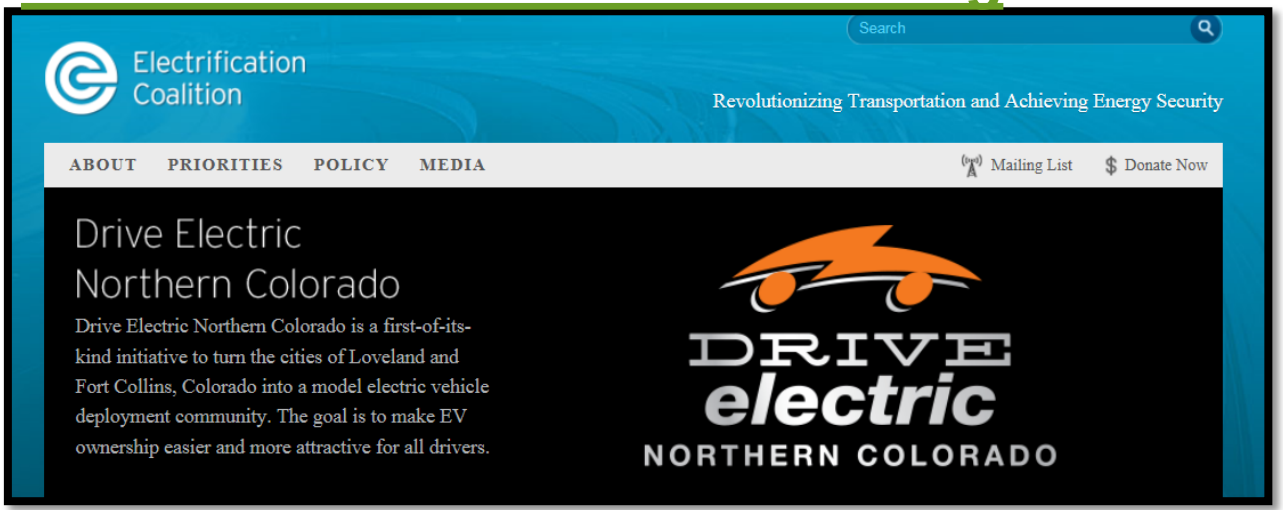
http://www.afdc.energy.gov/

National Resources

Plug In America:
www.pluginamerica.org



The Electrification Coalition
www.ElectrificationCoalition.org



Available Incentives

Qualified Plug-In Electric Drive Motor Vehicle Tax Credit (Federal)

- **Ranges from $2,500 - $7,500; IRS Form 8936**

Light-Duty Motor Vehicle Purchase or Lease Incentive Program (State)

- **Up to $2,500 Rebate on EV Purchase/Lease; Anticipated Spring 2018**

Alternative Fueling Facilities Program (State)

- **Up to 50% Grant for Public-Access Infrastructure; Coming Fall 2017**

AirCheckTexas Drive a Clean Machine Program (Regional)

- **$3,500 to Replace a Vehicle that Fails Emissions Inspections or is More than 10 Years Old**

EV Benefits

Image source: The noun project

Questions & Discussion

Contact Information

Ron Swanson, President
North Texas Electric Auto Association
rswanson@swbell.net

Ryan Daley, Program Manager
Electrification Coalition
rdaley@electrificationcoalition.org

Kristina Ronneberg, Air Quality Planner
North Central Texas Council of Governments
kronneberg@nctcog.org