

Advanced Grid  
Research

OFFICE OF ELECTRICITY  
US DEPARTMENT OF ENERGY



# Plugged In and Trucking

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July 15, 2020



# Guidance On Electric Trucks

**# 1**

**Electric Trucks: Where They Make Sense**

May 2018



Now Free Online at

<https://nacfe.org/emerging-technology/electric-trucks-2/>



**MD Electric Trucks: Cost Of Ownership**

October 2018

**# 2**

**Viable Class 7 & 8 Electric, Hybrid & Alt Fuels Tractors**



**# 4**

December 2019

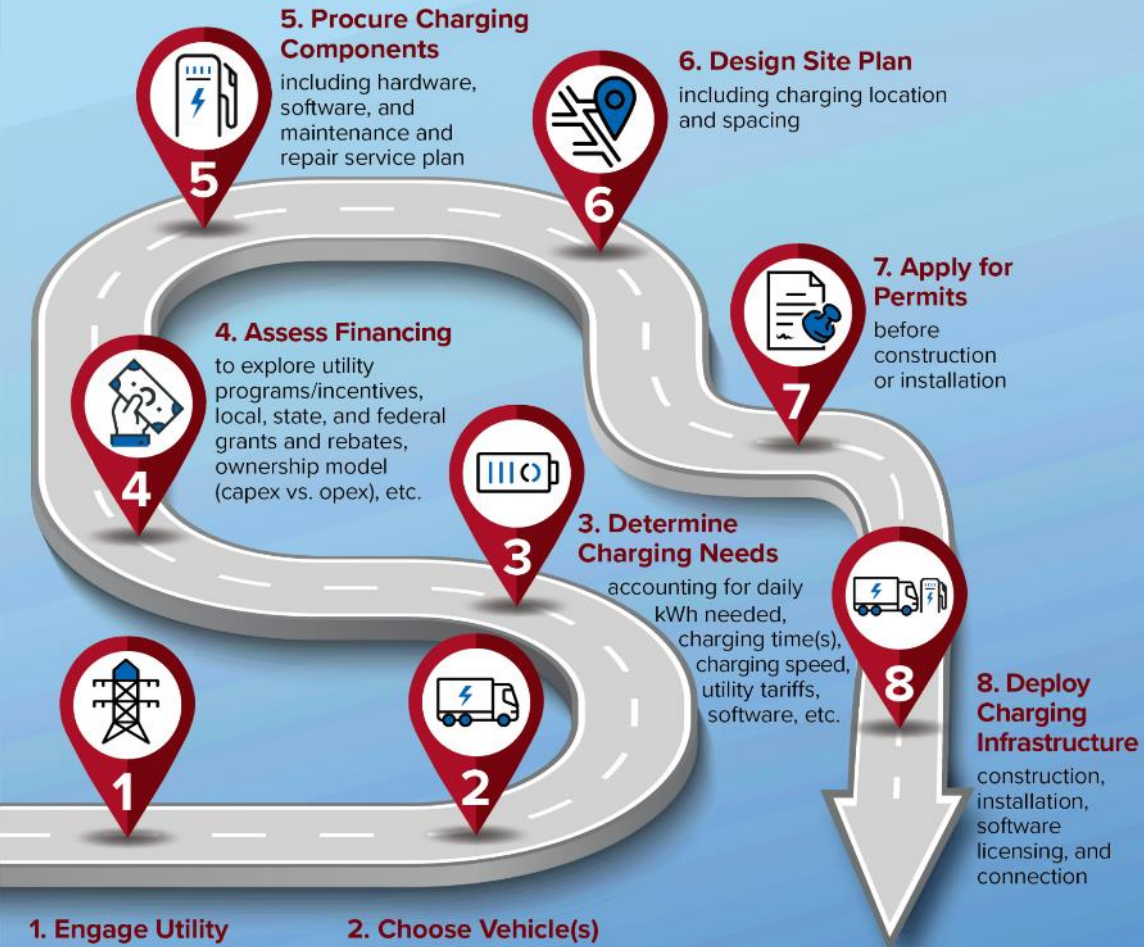
**# 3**

**Electric Trucks: Charging Infrastructure**

March 2019



## Charging Procurement Roadmap



**1. Engage Utility**  
to evaluate existing infrastructure, programs, case studies, etc.

**2. Choose Vehicle(s)**  
and consider duty cycle, range, dwell time, battery capacity, charge port, etc.

**3. Determine Charging Needs**  
accounting for daily kWh needed, charging time(s), charging speed, utility tariffs, software, etc.

**4. Assess Financing**  
to explore utility programs/incentives, local, state, and federal grants and rebates, ownership model (capex vs. opex), etc.

**5. Procure Charging Components**  
including hardware, software, and maintenance and repair service plan

**6. Design Site Plan**  
including charging location and spacing

**7. Apply for Permits**  
before construction or installation

**8. Deploy Charging Infrastructure**  
construction, installation, software licensing, and connection

# Infrastructure

- Complex
- Large amount of power fast
- Involve all stakeholders early
- Time to complete with truck availability
- Be flexible



# HD Tractors Technology Bridge

## PRESENT: 2020

Technology immature  
Many unknowns  
& challenges



## "MESSY MIDDLE": 2030

Many optimized solutions  
Growing infrastructure  
Multi fuel choices

Innovation & maturation  
Facts replace estimates  
Learning curves

## FUTURE: 2040

Fast charging everywhere  
Long life, low cost batteries  
Acceptable weights



Legacy Diesels  
Natural Gas

Diesel Advancements  
Natural Gas

Battery Electric  
Hydrogen Fuel Cells  
Renewable Natural Gas & Diesel

CBEV from  
Clean Energy

# Getting to Know Each Other



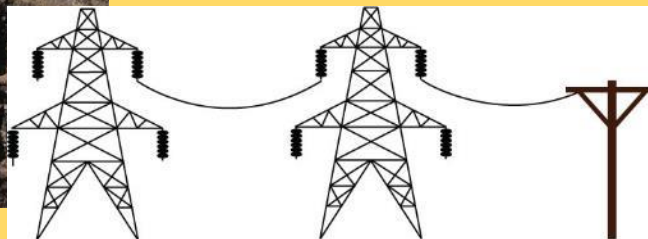
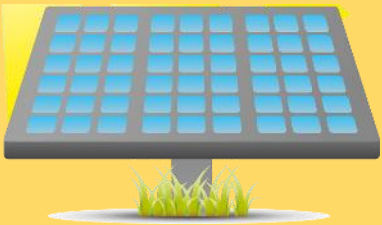
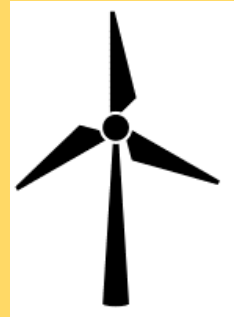
## FLEETS



2 Pager:  
FLEETS  
on  
UTILITIES



2 Pager:  
UTILITIES  
on  
FLEETS



## UTILITIES

June 2020

# Why Consider Electrification Now?

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## Financial

- Incentives are/will be available that can cover some of the costs of conversion

## Facilities

- Obtain required power levels BEFORE your neighbors
- Obtaining power/infrastructure can take years
- Might be easier to relocate than upgrade
- Physical layout of your lot will change

## Change is Coming: Even with diesel

- Regulations & tech changes for NOx & GHG



# Electric Trucks

## Collaboration

- Fleets
- OEMs (Existing *& New*)
- Suppliers
- Dealerships (Sales/Service)
- Governments
- *Charging System Suppliers*
- *Utility Companies*



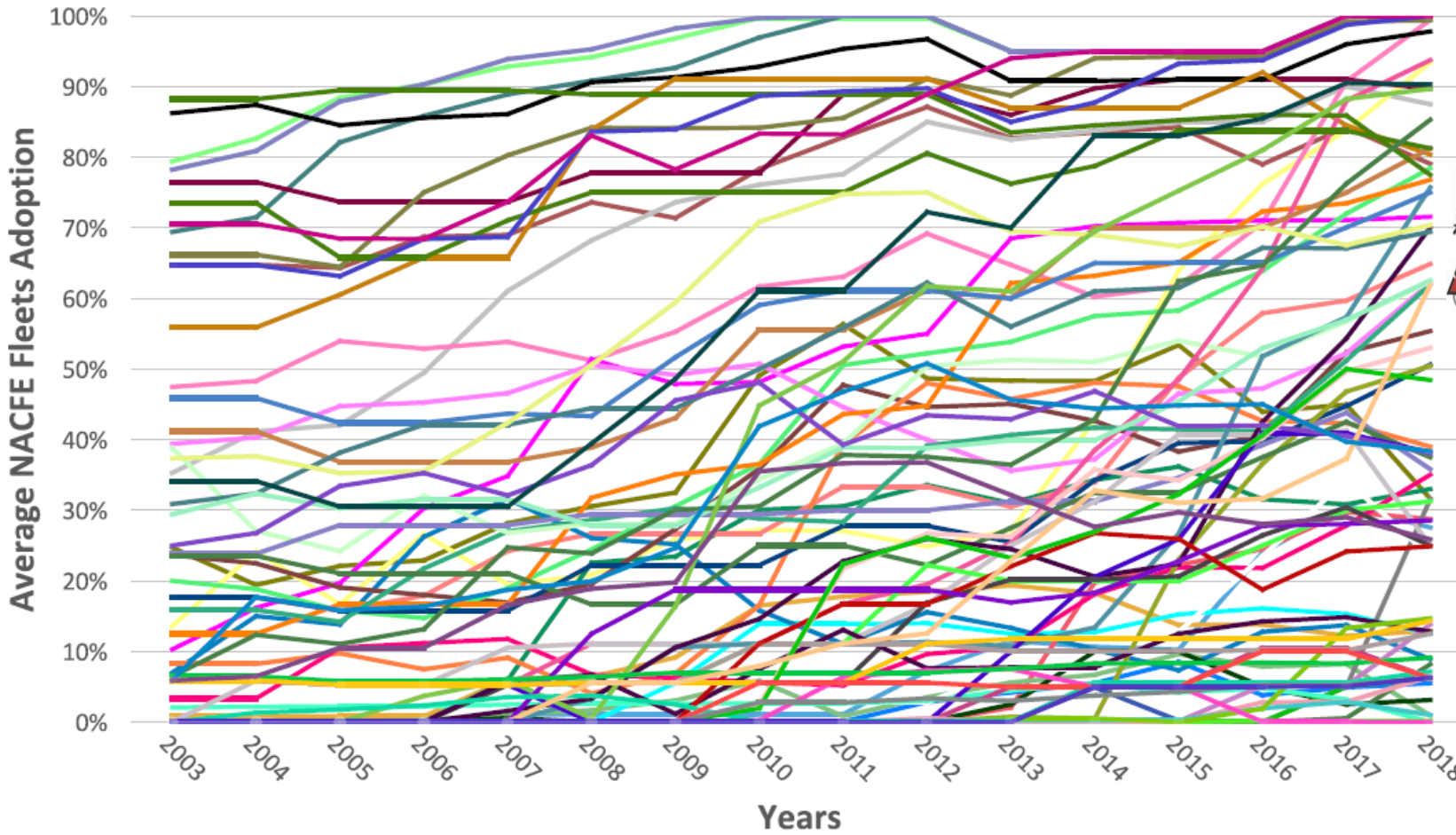
# Electrification Forecasts

Organization	Study	Scenario	% EV Sales 2030 MD Vehicles	% EV Sales 2030 HD Vehicles	Geography
NREL	<a href="#">Electrification Futures Study (EFS) (2018)</a>	Reference	0.3%	0%	US
		Medium	9.5%	3.3%	US
		High	20.0%	13.5%	US
BNEF	<a href="#">EV Outlook 2019</a>	Long-term EV Outlook	12.5%	7.6%	Global
McKinsey	<a href="#">New reality: electric trucks and their implications on energy demand (2017)</a>	Late adoption	11%	0%	US
		Early adoption	18%	2%	US

# 2019 Annual Fleet Fuel Study



## All Technologies



<https://nacfe.org/annual-fleet-fuel-studies/>



# Supporting Research

## Trucking Industry Operations

- Regional Haul Overview: [More Regional Haul: An Opportunity for Trucking](#)
- Fleet purchasing reluctance: [Barriers to Adoption of Fuel Efficiency Technologies](#)
- Fleet Technology Adoption: [Annual Fleet Fuel Study](#)

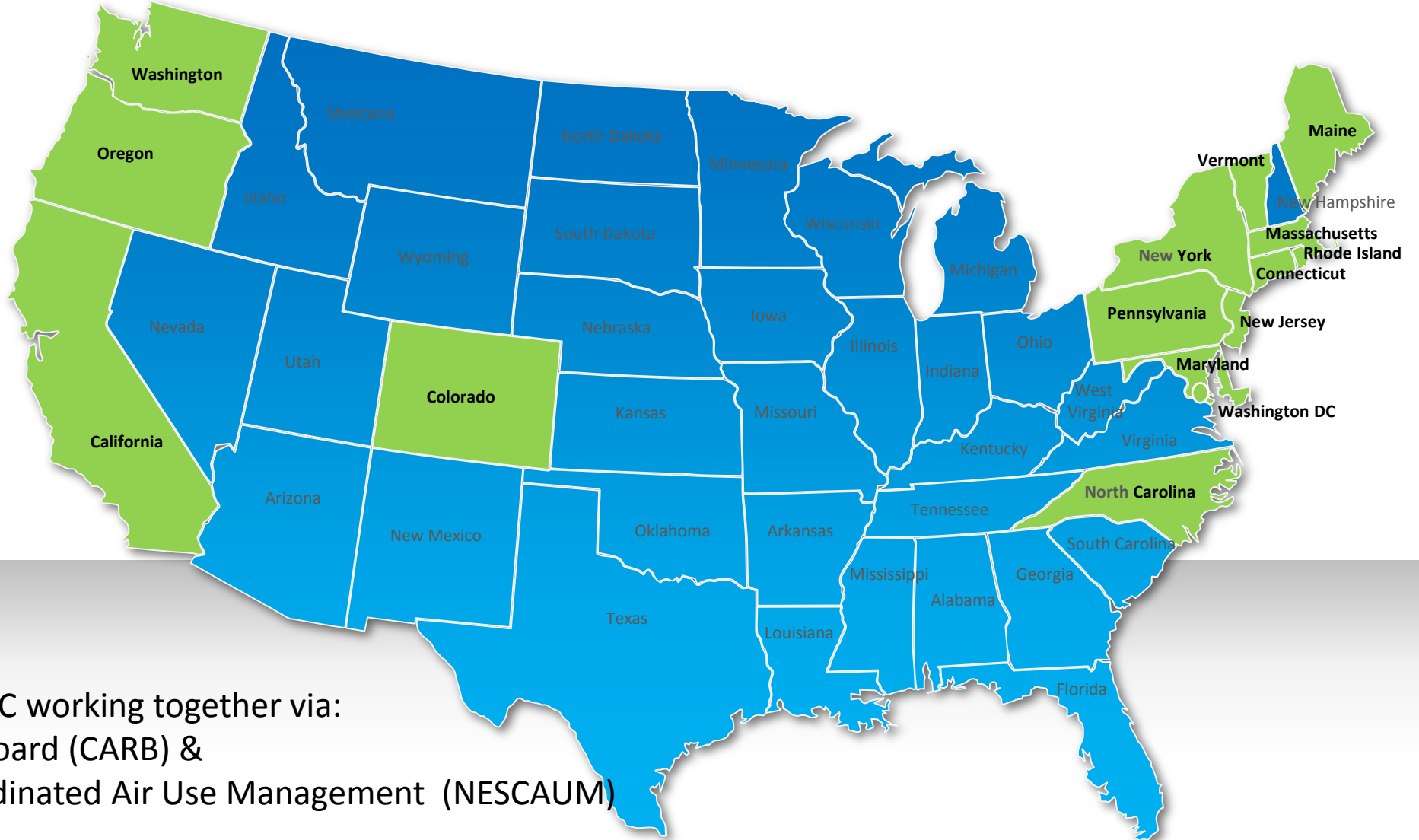
## Run On Less Regional

- Run on Less Regional data analysis: [RoLR final report](#)
- NREL/NACFE Report: [Battery Electric Powertrains](#)
- Ballard/NACFE Report: [Hydrogen Fuel Cell Trucks in Regional Haul](#)
- Free [downloadable data set](#)

**More work is underway:  
*Should we collaborate with you?***



# Transition to Zero-Emission Trucks (& Buses)



15 States & Washington DC working together via:  
California Air Resources Board (CARB) &  
Northeast States for Coordinated Air Use Management (NESCAUM)

# Wave Of Changes Coming



Covid-19  
Autonomous Vehicles  
Driver Retirement  
Electrification  
IMO 2020  
Hours Of Service  
2 Truck Platooning  
GreenHouse Gas Phase 2  
Alternative Fuels  
Solar  
Cameras  
Lightweighting  
Parking Shortage  
Artificial Intelligence  
Driver Retention  
Blockchain  
BIG DATA

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