

# Improving Truck Sustainability with Regional Haul Electric Trucks

Mike Roeth, NACFE, [Mike.roeth@nacfe.org](mailto:Mike.roeth@nacfe.org)

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# North American Council for Freight Efficiency

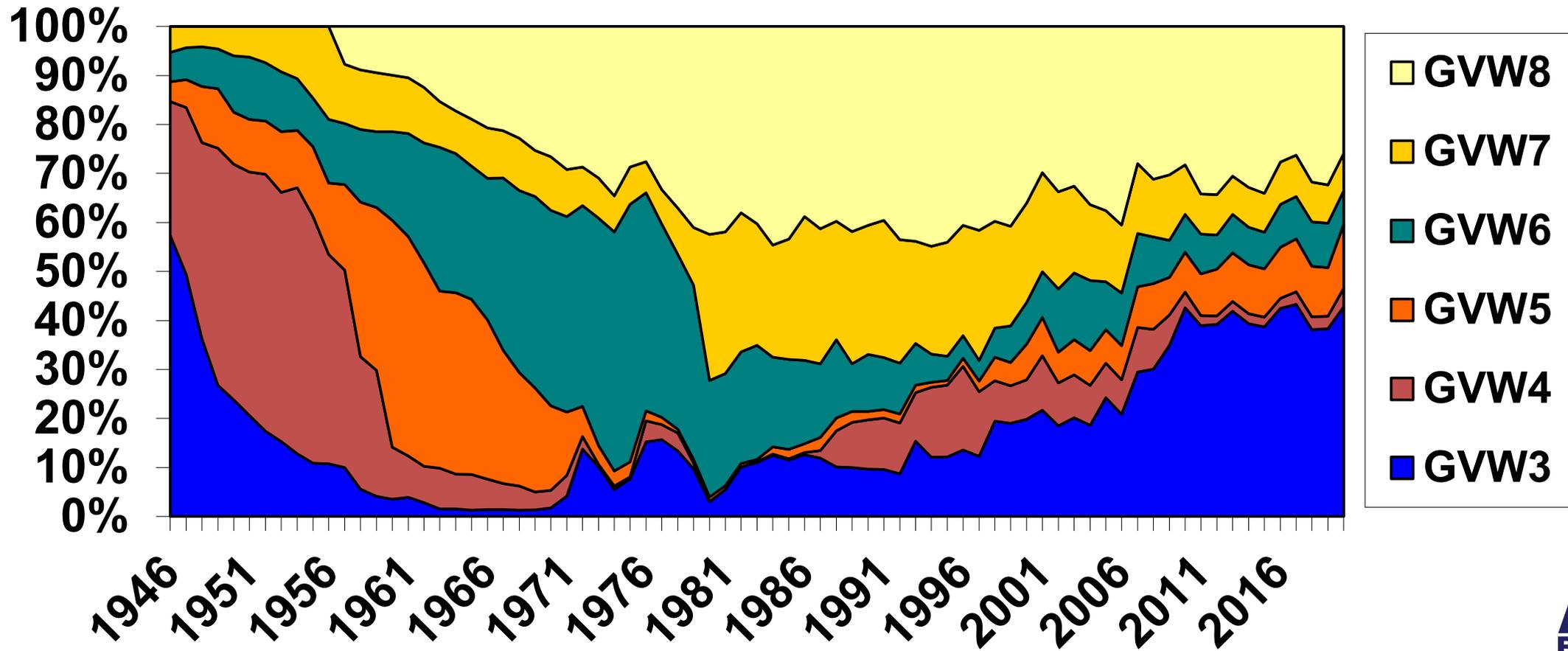


[www.NACFE.org](http://www.NACFE.org)

- Unbiased, non-profit
- Mission to double freight efficiency
- All stakeholders
- Scale available technologies, guide future change and Run on Less demonstrations.



# Historic Shifts In Truck Classes



Percent Mix 1946 – 2020 YTD

- Class 3 growing with growth in E-commerce



Source: ACT Research

# 10 Trends of Regional Haul Growth

# Regional Haul

## More Regional Haul: An Opportunity for Trucking?

- Drop in Length of Haul
- Warehousing
- Technology Trends
- An Opportunity
  - Drivers
  - Alternative Fuels
  - Others?

Report published April 2019.

<https://nacfe.org/regional-haul/>



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# Run on Less Regional



Results Fleets Technologies Videos News & Events About

## Day 18 of 18

Congratulations to Our Drivers!

OCTOBER 7 – 25 2019

Run on Less Regional Sets Impressive Efficiency Benchmark



### RESULTS

See the results

8.3

Average MPG

\$8,249

Dollars saved

\$9,003,550,961

Annualized Potential Savings

Potential savings represents the savings that are possible across the industry if all regional-haul trucks operated at this level.

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Results Fleets Technologies Videos News & Events About

All Results

RESULTS BY FLEET

C&S Wholesale Grocers

Hirschbach

Hogan Transportation

J.B. Hunt

Meijer

PepsiCo

Ploger Transportation

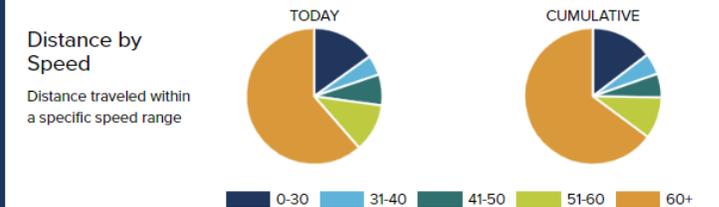
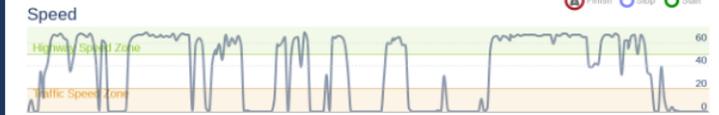
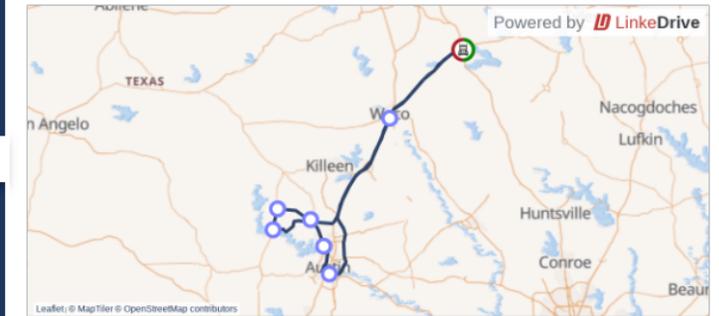
Schneider

Southeastern Freight Lines

United Parcel Service

OCTOBER 16, 2019: DAY 10 OF 18

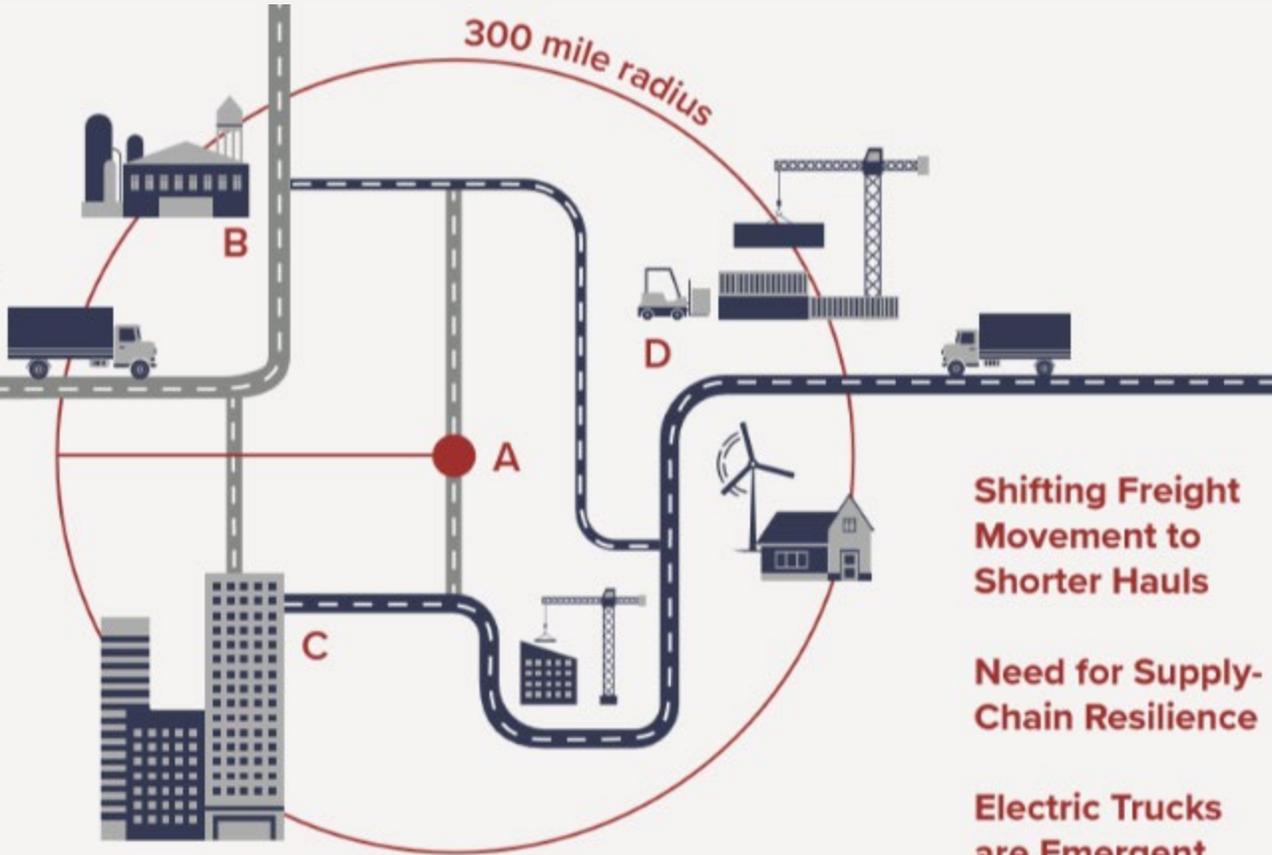
Day 10



# Run on Less Regional Report

## Regional Haul Trucks:

- Return to base often
- Diversity in duties
- Predictable operations
- Great efficiency opportunity
- Proximity to base for support



## Regional Haul Routes

**A-B-A**  
(shuttles, dedicated and dedicated fast turn)

**Hub-and-Spoke**  
Different destination each day

**A-B-C-D-A**  
(city, diminishing load, and milk runs)

**Shifting Freight Movement to Shorter Hauls**

**Need for Supply-Chain Resilience**

**Electric Trucks are Emergent**

Download the report at:  
<https://nacfe.org/run-on-less-regional-report/>

## Efficiency Opportunity

Run On Less Regional confirmed that the 800k trucks in North America could use much less fuel.

\*measured in billion gallons of diesel

Annual Consumption



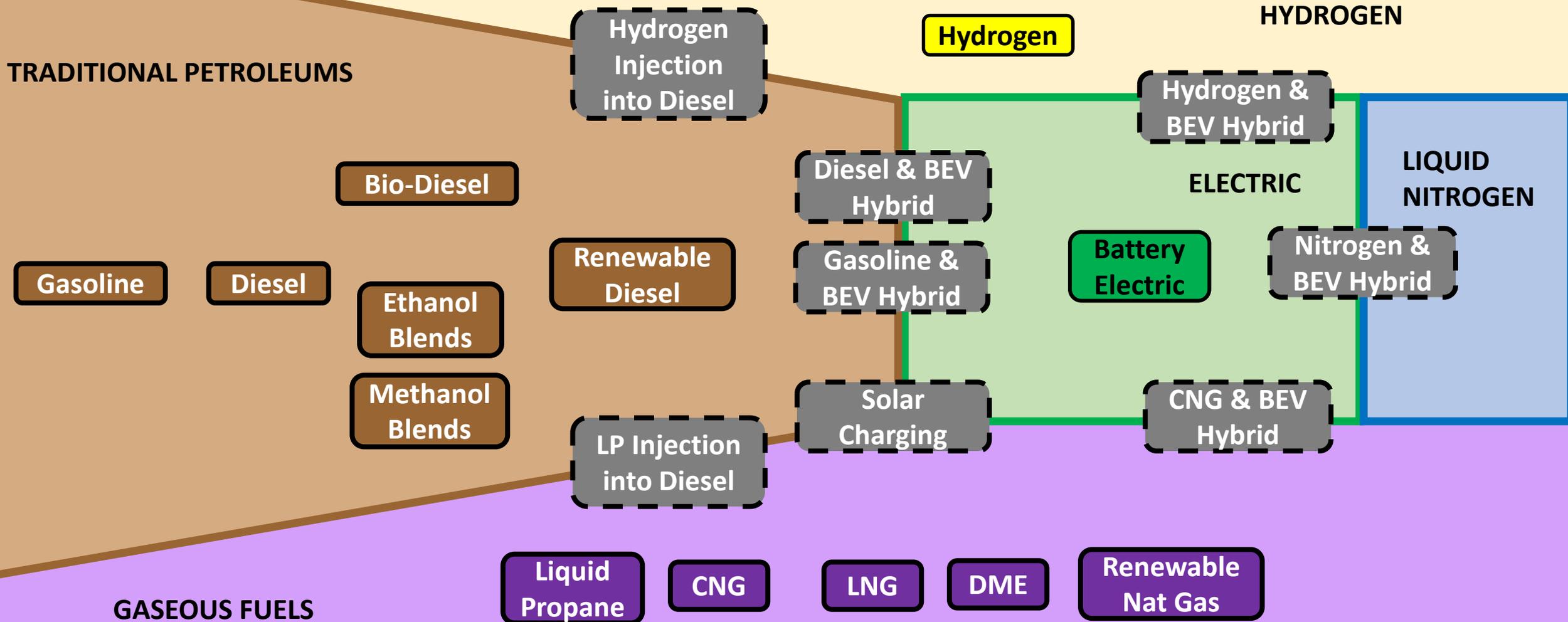
ROL Regional Possible



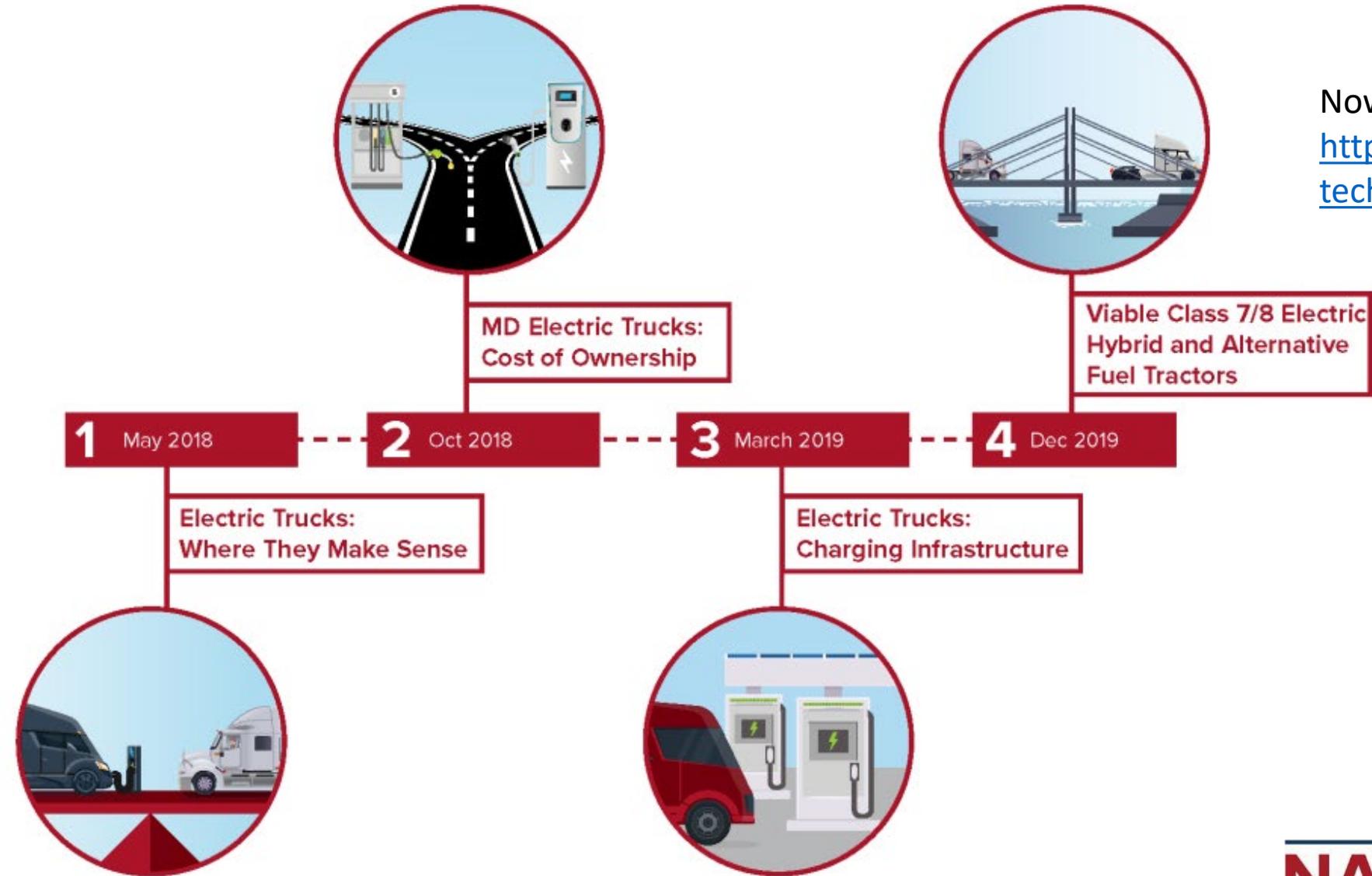
Future Potential



# Alternative Fuels



# Guidance On Electric Trucks



Now Free Online at  
<https://nacfe.org/emerging-technology/electric-trucks-2/>

# 10 ARGUMENTS FOR AND AGAINST ELECTRIC TRUCKS

Argument FOR Electric Trucks	VS.	Argument AGAINST Electric Trucks
1 Commercial battery electric vehicle (CBEV) weight is not an issue	<b>WEIGHT</b>	1 Vehicle tare weight is too high to support my freight needs
2 CBEV technology is proven and here now	<b>TECHNOLOGY</b>	2 Technology is not ready
3 Maintenance will be less costly		3 Maintenance may not be less costly
4 CBEVs will last beyond 10 years		4 Vehicle life is too short
5 CBEVs will be competitively priced	<b>COST</b>	5 Vehicle purchase price is too high for a positive ROI
6 CBEVs will be less expensive to operate		6 Vehicle operating costs are too great for positive ROI
7 CBEVs will command a premium at resale		7 Vehicle residual value is questionable
8 Trust the market to provide CBEV charging solutions	<b>CHARGING</b>	8 Charging infrastructure is not ready
9 Trust the market to provide CBEV charging solutions		9 Charging Infrastructure is not fast enough
10 The grid and market will evolve with CBEVs		10 The electric grid cannot support growth in electric vehicles



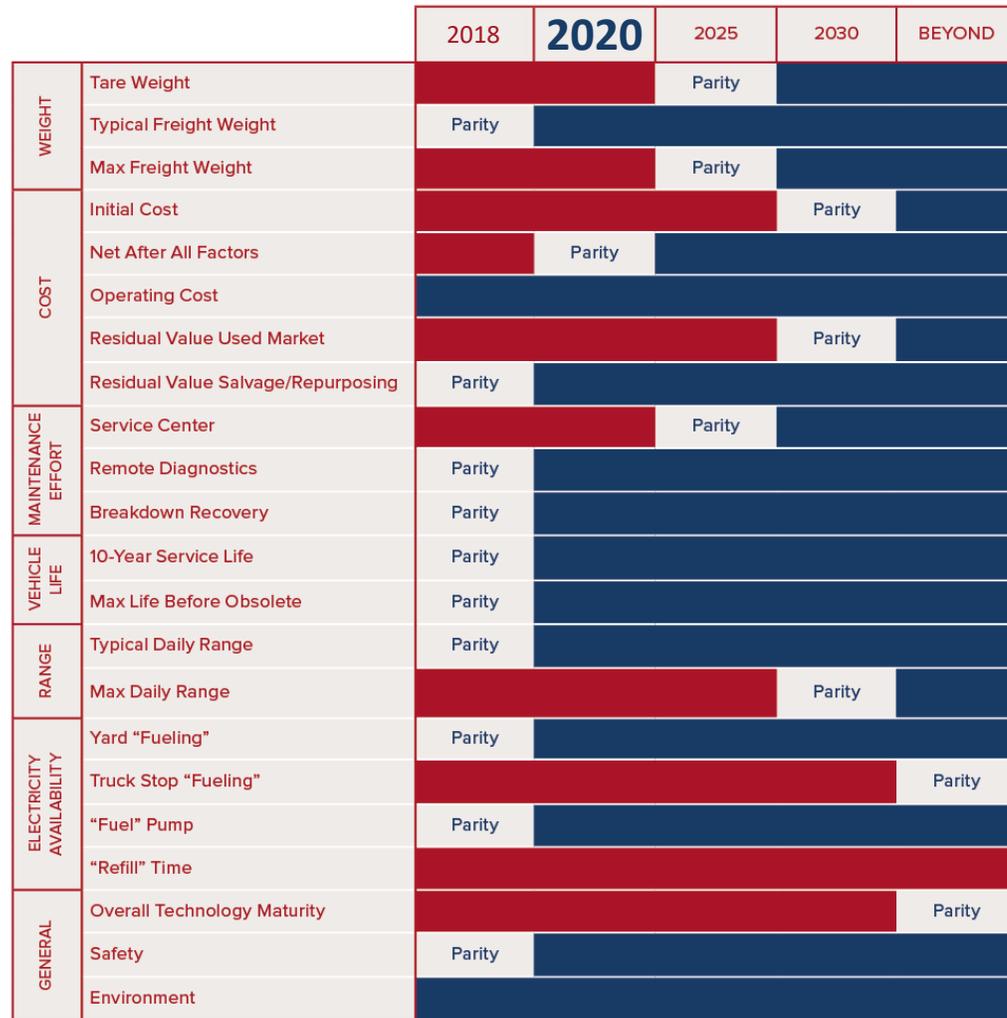
NACFE's findings on these 10 arguments are discussed in detail in its Electric Truck Guidance Report

# Where they make sense?

- Arguments for and against
- Weight
- Maintenance
- Cost
- Market for infrastructure

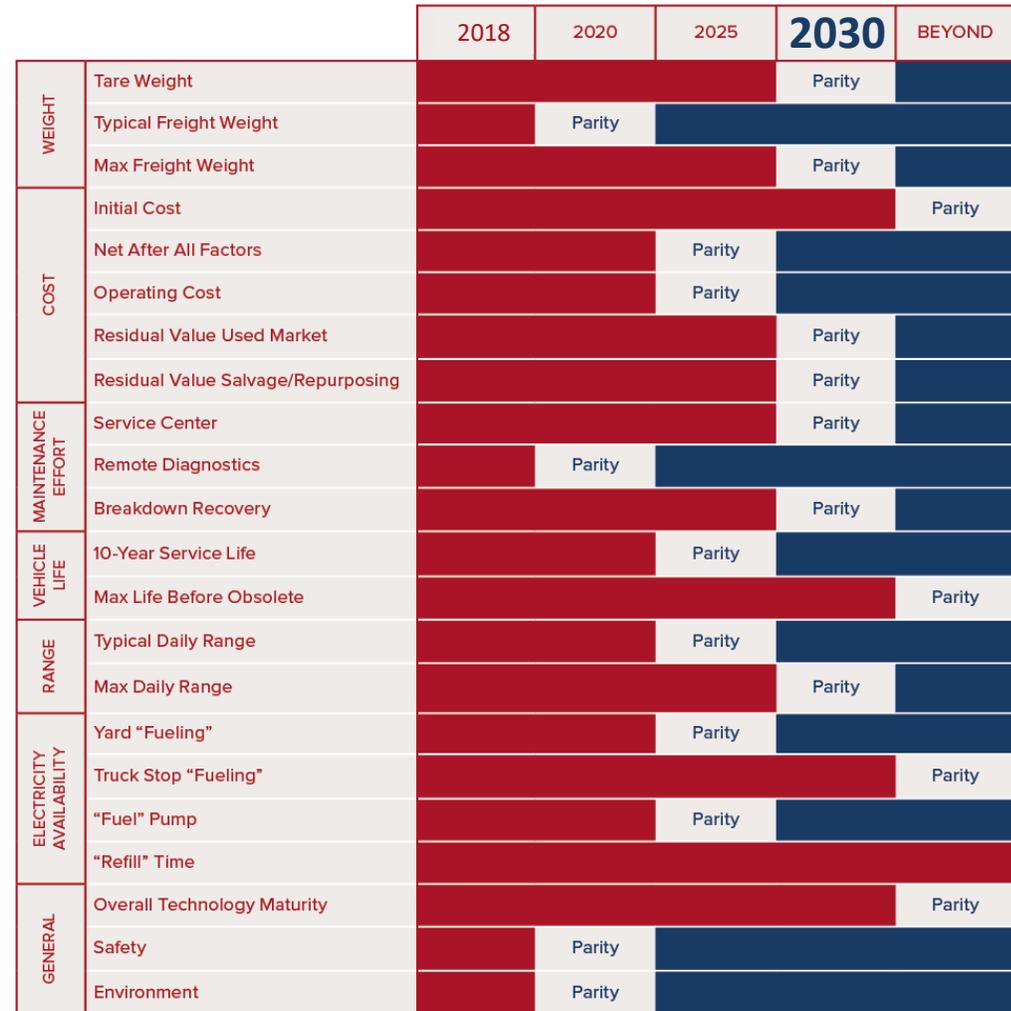
# Findings: Parity To Diesel

CLASS 3 THROUGH 6 CBEV PARITY VS. DIESEL SYSTEM (NACFE)



Key: Comparison to 'Equivalent' Diesel Baseline: ■ Worse ■ Parity ■ Better

CLASS 7 AND 8 CBEV PARITY VS. DIESEL SYSTEM (NACFE)



Key: Comparison to 'Equivalent' Diesel Baseline: ■ Worse ■ Parity ■ Better

**Class 3 - 6**  
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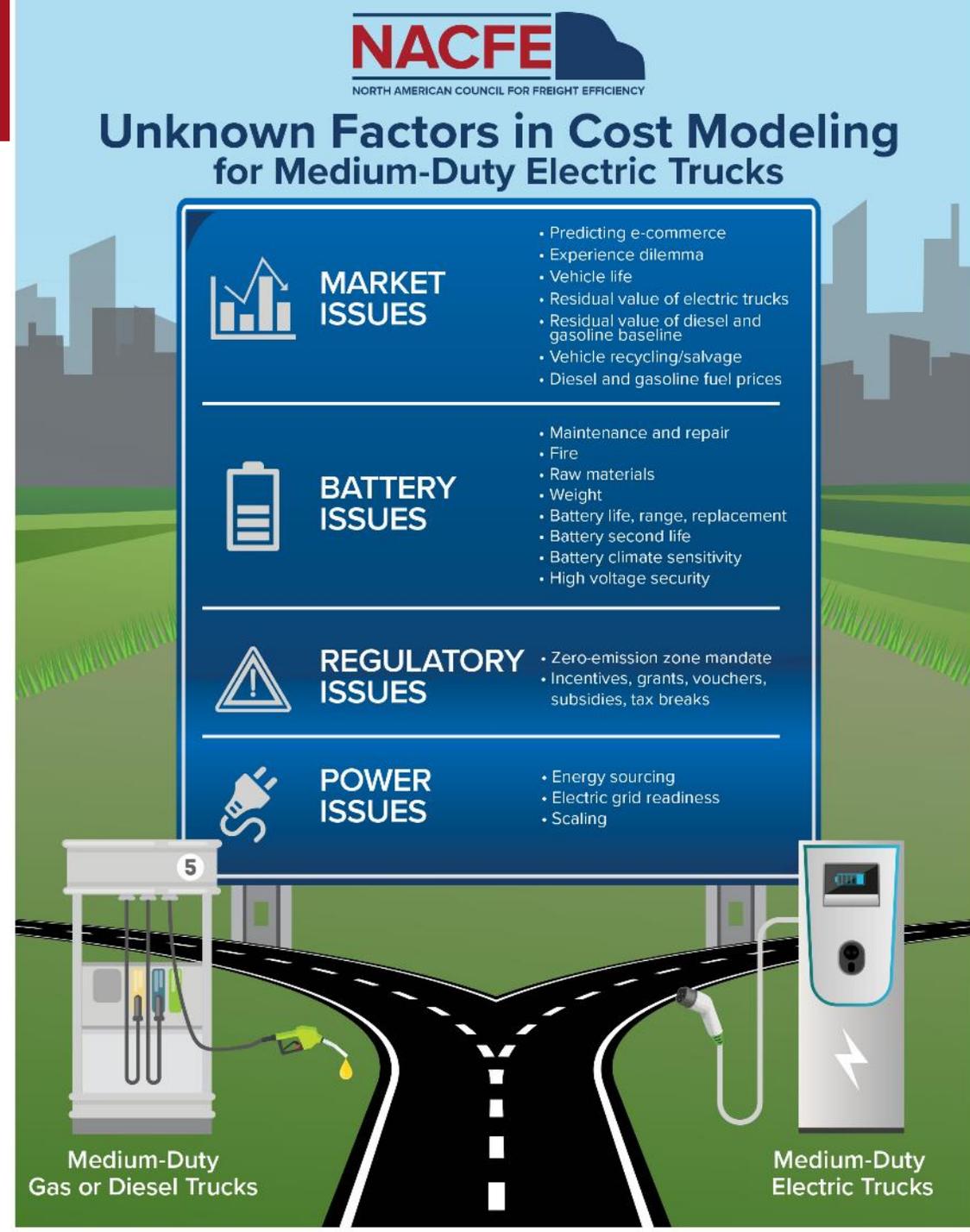
**Dark Blue = EV is Better**

**Class 7 & 8**

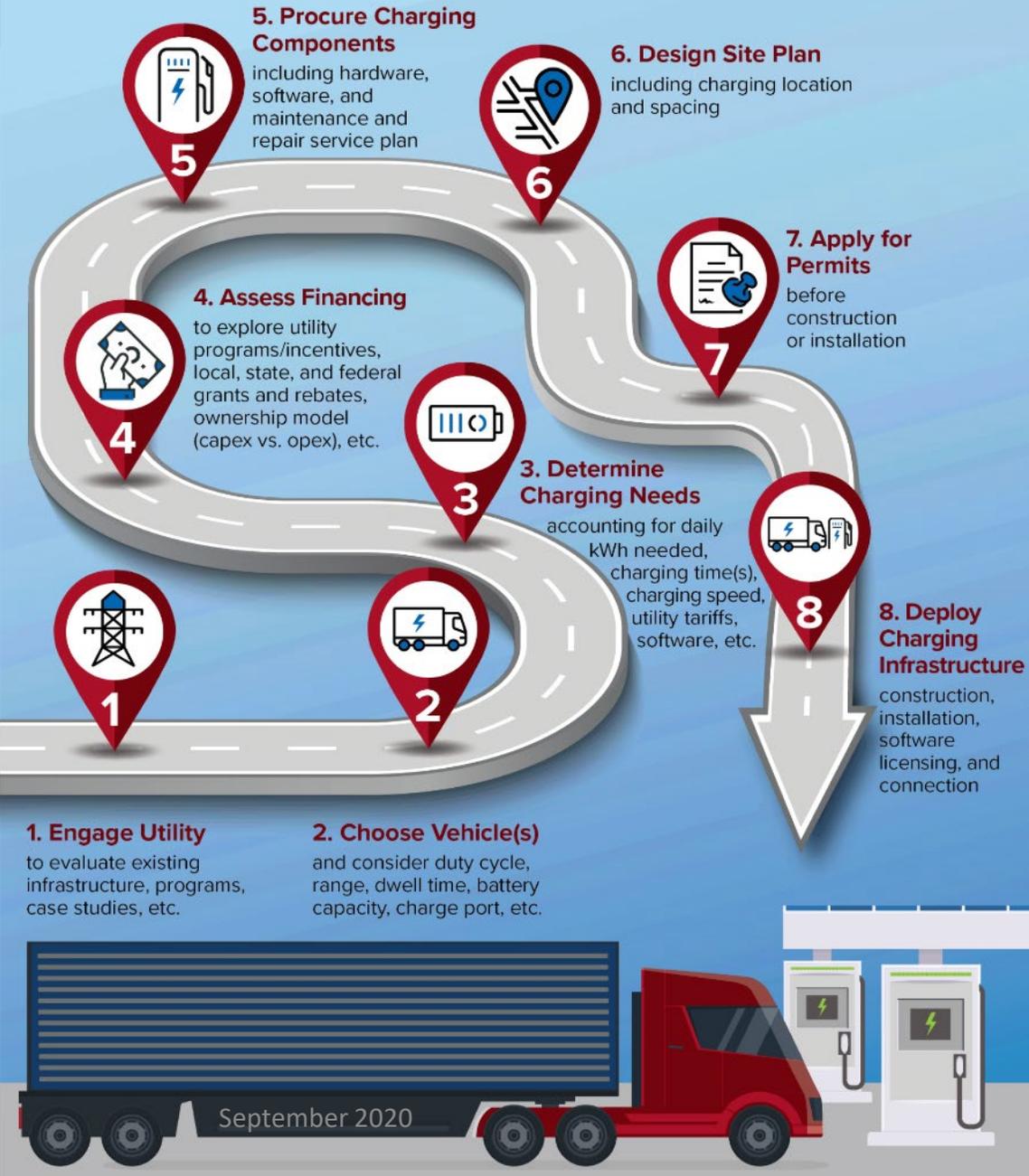
# Medium Duty Trucks

- Close to base
- Limited range
- Consistent, dedicated routes
- Total cost calculator
- “Unknown...difficult to monetize benefits”
  - Zero emissions in warehouses
  - Noise
  - Design flexibility
  - And on

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## Charging Procurement Roadmap



# Infrastructure

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

## Electric Truck Charging Infrastructure Components

### HARDWARE

The physical charging stations, ports, panels, transformers, etc., including wiring/conduit, transformer upgrades, and installation

Does not vary dramatically from company to company. Main differentiators are connector types, speed, and price

Utility programs may cover some hardware costs

### SOFTWARE/NETWORKING

Can be built-in to chargers or purchased from third-party vendors to complement chargers' built-in software

Enables cost-effective charging management, along with integration of distributed energy resources (DERs) and grid services

Provides data and analytics to fleet managers to inform charging decisions

Main differentiator between electric vehicle supply equipment (EVSE) provider companies

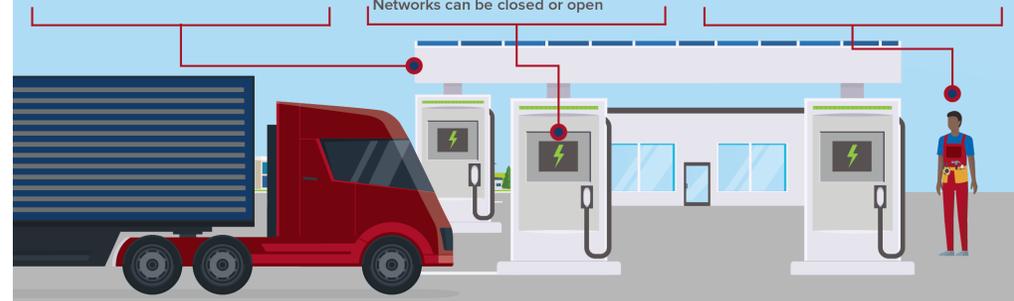
Networks can be closed or open

### MAINTENANCE

Timely repair of charging equipment is essential for ensuring vehicle uptime

Service packages available to monitor and repair equipment

Necessary for proactively identifying and addressing issues



# HD Tractors Viable Alternatives

## 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  
Hybrids

Battery Electric  
Hydrogen Fuel Cells  
Renewable Natural Gas & Diesel

CBEV from  
Clean Energy

# NACFE's Focus on Regional Haul Electric Trucks

## PAST ACCOMPLISHMENTS



Run on Less Regional



Regional Haul thought leadership



Electric truck guidance reports

## NEW WORKSTREAMS



Identify high-potential regional trucking routes



Support implementation on first- and next-mover deployments



Scale best practices in infrastructure deployment



Increase confidence in the value of electrification



# Electrifying RoLReg Routes

A-B-A Operation



Hub and Spoke Operation



A-B-C-D-A Operation



## Battery Electric Trucks

NACFE Pre-Publication Draft Copy – EVS33 publication postponed to Fall 2020 due to COVID-19

33<sup>rd</sup> Electric Vehicle Symposium (EVS33)  
Portland, Oregon, June 14 - 17, 2020

### **Battery Electric Powertrains for Class 8 Regional Haul Freight Based on NACFE Run-On-Less**

Rick Mihelic<sup>1</sup>, Andrew Kotz<sup>2</sup>

<sup>1</sup>NACFE, 938 Royal Oaks Drive, Lewisville, TX 75067, mihelic2@verizon.net

<sup>2</sup>NREL, 15013 Denver West Parkway, Golden, CO 80401, andrew.kotz@nrel.gov

#### **Summary**

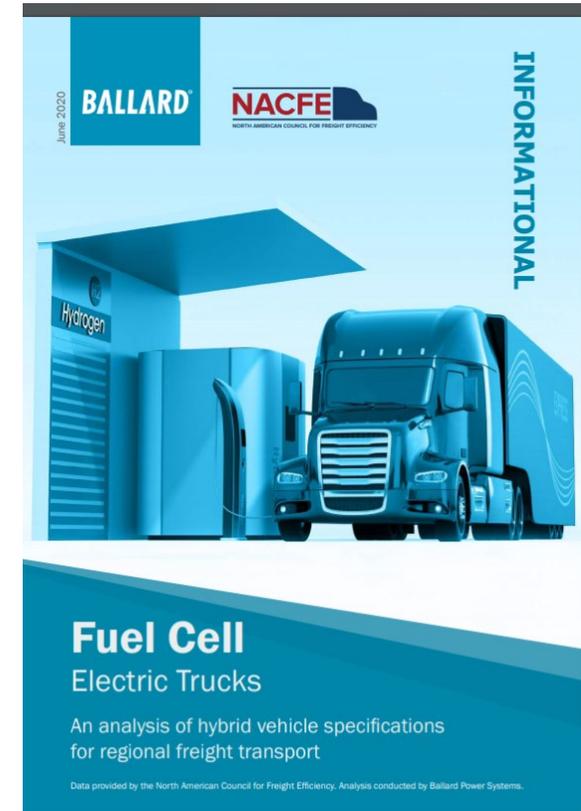
This report evaluates potential Class 8 regional haul commercial battery electric semi-truck performance requirements based on real world diesel and natural gas vehicle duty cycle data. Data was recorded over a 17-day period accumulating 58,633 miles with 10 trucks in a variety of locations as part of the North American Council for Freight Efficiency's (NACFE) Run on Less Regional (ROLR) demonstration of the effectiveness of current production diesel and natural gas tractor technologies in the hands of well-trained drivers. Data was collected with on-board data loggers in concert with the U.S. National Renewable Energy Laboratory (NREL) and Oakridge National Laboratory (ORNL), and independently through use of GEOTAB and LinkeDrive fleet tracking and management systems.

*Keywords: Electric Truck, CBEV, Commercial Battery Electric Vehicle, NACFE, Regional Haul, Run On Less, NREL, ORNL, GEOTAB, LinkeDrive*

Download the reports at:

<https://nacfe.org/run-on-less-regional-report/>

## Hydrogen Fuel Cell Electric Trucks



# Electric/Hybrid Trucks Catalog

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## ZERO-EMISSION TECHNOLOGY INVENTORY

GLOBAL COMMERCIAL VEHICLE DRIVE TO ZERO A PROGRAM OF CALSTART

SELECT A VEHICLE PLATFORM TO EXPLORE

Transit Bus School Bus Shuttle Bus Cargo Van Yard Tractor MD Truck MD Step Van HD Truck Other

SELECT A REGION

SELECT A VEHICLE MANUFACTURER

ALSTOM \* AFFIVAL BLUE BIRD BYD Caplano Bus BEW 宁德时代新能源 chanye

EASY MILE EFORCE EICHER E/NRIDE ELDERADO EMOSS EDG Ford FOTON

ONECITYLINK FUSO GILLIG GreenPower HYUNDAI Irizar JBM

KALMAR OTTAWA LION LM MAEK MAN MAY Mercedes

Motiv NAVSTAR NEW FLYER NIKOLA NOVABUS Optare OPTIMUS

SAIC SAIC MOTOR SCANIA SEA Electric

SOLARIS TATA TESLA TEVVA Thomas YINLONG YANHOOL VOLVO

VINFAST VOLVO XOS YINLONG YUTONG

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REPORTED VEHICLE AVAILABILITY THROUGH 2023

Available 2020 2021 2022 2023

RESET FILTERS

- “ZETI”
- Calstart on-line tool
- Part of *Drive to Zero* program at Calstart
- Launched March 2020
- Current & future production models
- Links to OEM web pages

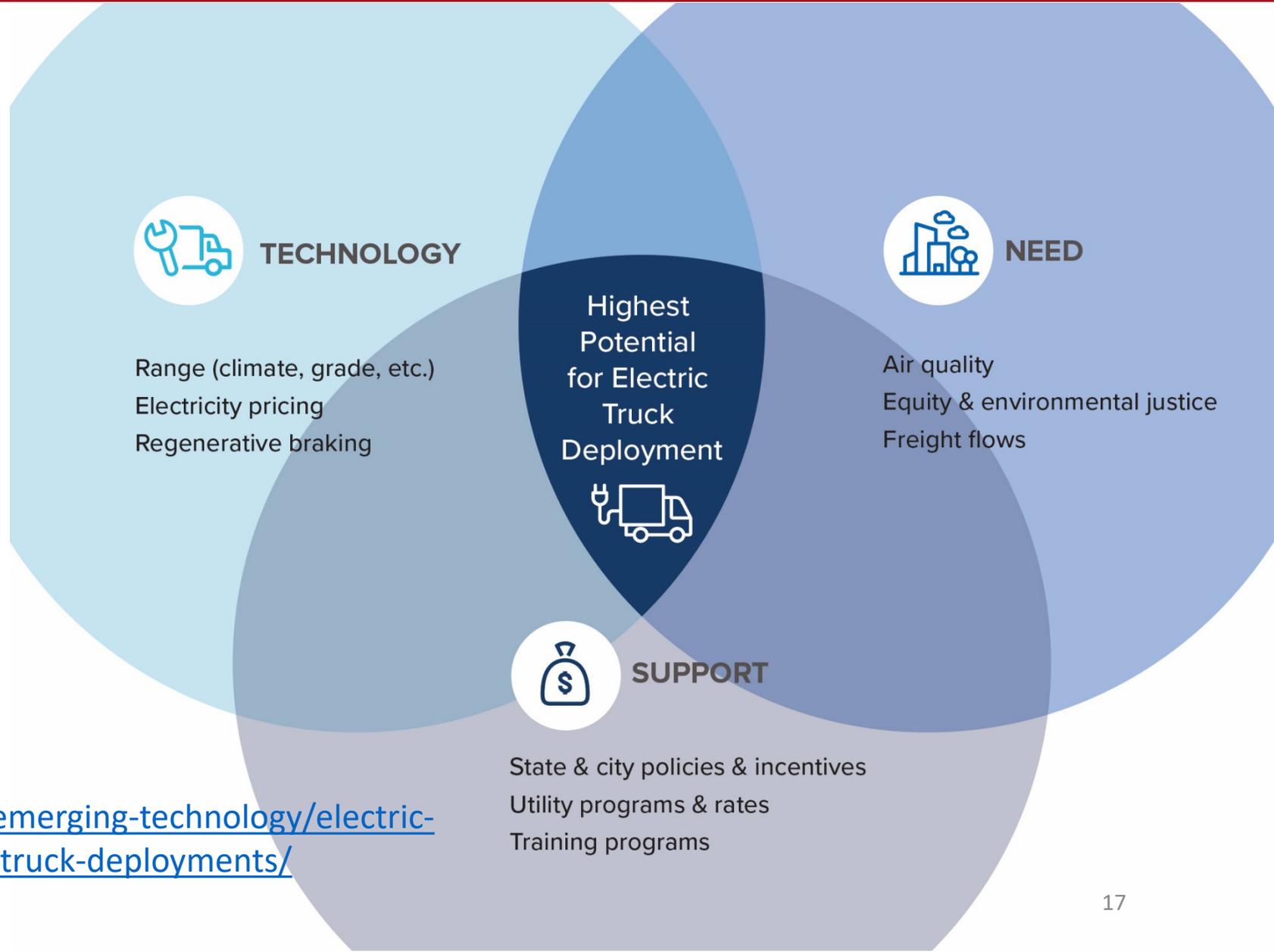
<https://globaldrivetozero.org/resources/zero-emission-technology-inventory/>

# NEW High Potential Regions Report

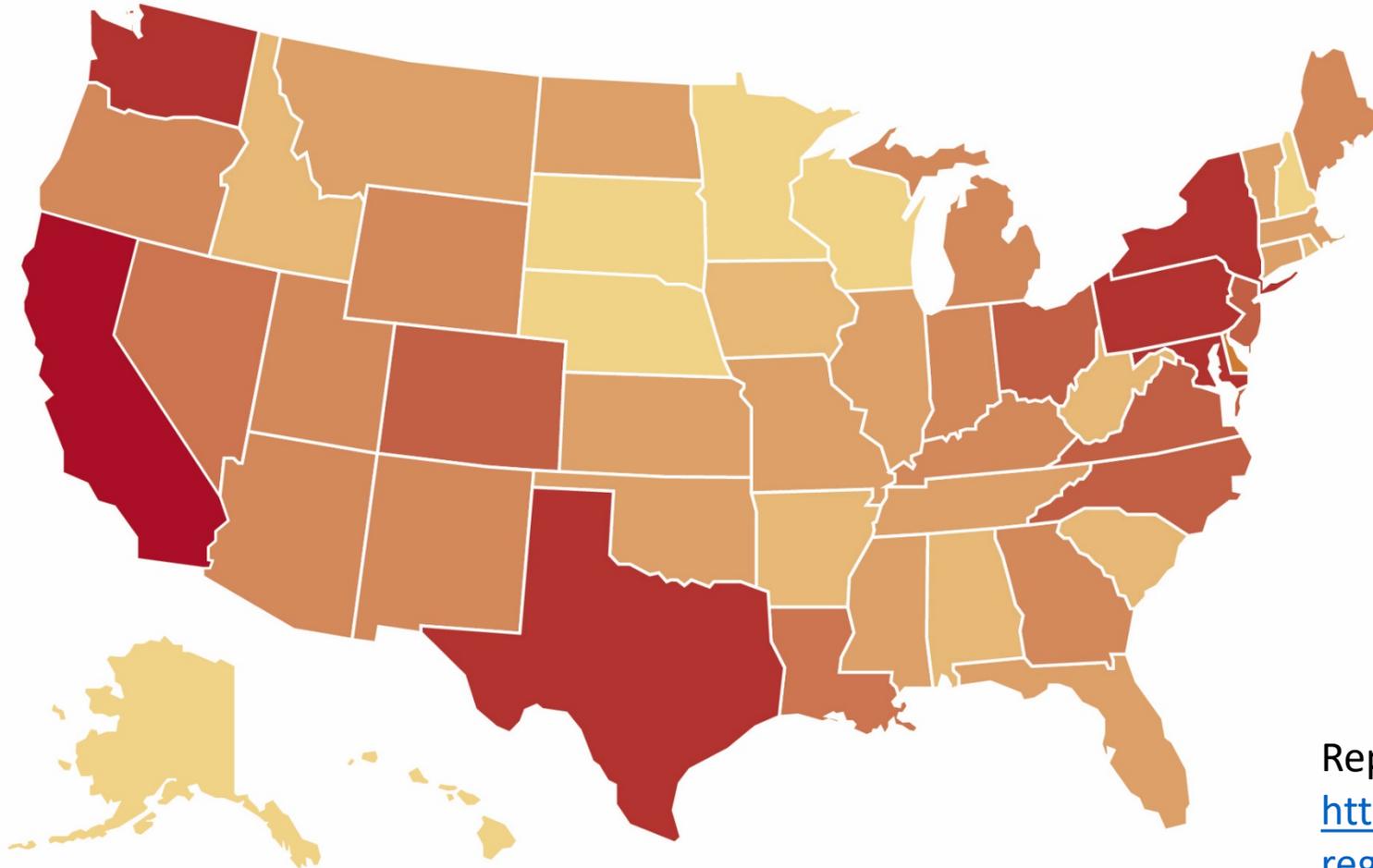


Published August 24<sup>th</sup>, <https://nacfe.org/emerging-technology/electric-trucks/high-potential-regions-for-electric-truck-deployments/>

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# NEW High Potential Regions Report



Megaregions with particularly high potential

- Northern California
- Southern California
- Texas Triangle
- Cascadia (WA & OR)
- Front Range (CO & NM)
- Northeast

Report Link:

<https://nacfe.org/downloads/high-potential-regions-for-electric-truck-deployments-technical-appendix/>

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Consider

High Priority

# Thank You

Mike Roeth, NACFE, [Mike.roeth@nacfe.org](mailto:Mike.roeth@nacfe.org)

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