Efficient Scaling of Electric Trucking

Mike Roeth, Executive Director, mike.roeth@nacfe.org

May 12, 2022
• Polls
• Questions
North American Council for Freight Efficiency

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

www.NACFE.org
www.RunOnLess.com

May 2022
No Membership Fees: Thanks to Sponsors

2022 FISCAL SUPPORT

Platinum

Gold

Silver

Bronze

Philanthropy

NACFE
NORTH AMERICAN COUNCIL FOR FREIGHT EFFICIENCY

May 2022
1. What is your role?
   a. Fleet
   b. Utility
   c. Infrastructure
   d. OEM
   e. Industry Organization
   f. Government
   g. Other

https://io.cvent.com/polling/v1/api/polls/sp5qho2c
• Welcome and Logistics
• NACFE and Run on Less
• RoL-E key findings
• Participating Fleet Panel
• Data for scaling
• Group discussions
# Guidance on Electric Trucks

<table>
<thead>
<tr>
<th>#</th>
<th>Title</th>
<th>Publication Date</th>
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<tbody>
<tr>
<td>#1</td>
<td>Electric Trucks: Where They Make Sense</td>
<td>May 2018</td>
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<tr>
<td>#2</td>
<td>MD Electric Trucks: Cost Of Ownership</td>
<td>October 2018</td>
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<tr>
<td>#3</td>
<td>Electric Trucks: Charging Infrastructure</td>
<td>March 2019</td>
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<tr>
<td>#4</td>
<td>Viable Class 7 &amp; 8 Electric, Hybrid &amp; Alt Fuels Tractors</td>
<td>December 2019</td>
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<tr>
<td>#5</td>
<td>High Potential Regions</td>
<td>November 2020</td>
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<tr>
<td>#6</td>
<td>Heavy-Duty Hydrogen Fuel Cell Tractors</td>
<td>December 2020</td>
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</table>

Now Free Online at [https://nacfe.org/emerging-technology/electric-trucks-2/](https://nacfe.org/emerging-technology/electric-trucks-2/)
Poll #2

Why are you here?

a. To learn – already doing a deployment project
b. Our project is waiting for a truck and/or infrastructure
c. Deciding how to deploy electric trucks
d. Not sure electric trucks are for us
e. Skeptical – here to convince our management not to do it

Run on Less by NACFE

2017
Long Haul
7 Fleets
10.1 MPG

2019
Regional Haul
10 Fleets
8.3 MPG

2021
All BEVs
13 Fleets
New metrics!

May 2022
Run on Less – Electric Participants

- Purolator: Operating a Motiv-Powered Step Van in Vancouver, BC
- Frito Lay: Operating a Cummins Box Truck in Modesto, CA
- RUAN: Operating an Orange EV Terminal Tractor in Orlando, FL
- Servall: Operating a Workhorse C1000 in Cincinnati, OH
- Biagi Bros.: Operating a Peterbilt 579EV in Sonoro, CA
- ANHEUSER-BUSCH: Operating a BYD Tractor in Los Angeles
- NFI: Operating a Kalmar Ottawa Electric Terminal Tractor in Chino, CA
- NFI: Operating a Volvo VNR Electric in Chino, CA
- FRIIGHTLiner: Operating a Freightliner Cascadia in Los Angeles
- Roush Fenway Racing: Operating a ROUSH CleanTech Truck in Concord, NC
- DHL: Operating a Lightning eMotors Van in New York City
- DAY & ROSS: Operating a LIIONG Truck in Montreal, QC

Run On Less – Electric Fleet Locations
Run on Less – Electric Videos

Real World, Real Time Case Studies

• Video for each fleet & OEM
• Fleet Interviews: Drivers & Leaders
• OEM Interviews & more
Run on Less – Electric Videos

“Stories from the Road”

• New video every day
• All commercial truck EV related
• Pulled from several dozen interviews

May 2022
March 2022
Specs: Anheuser-Busch

**Truck**

- Truck Class: Class 8
- Type: Heavy-Duty Tractor
- OEM: BYD
- Model: BTT Tandem Axle
- Production Level: In Series Production
- Battery Capacity: 435 kWh
- Estimated Range: 150 - 200 Miles
- Components: Cabover

**Driver**

- Name: Rene Soils
- Years Driving: 30 Years
- Home Base: Pomona, CA

**Charger & Utility Company**

- Charging Station
- Mex Charge Rate: 40 kW (GB/T)
- Parking Configuration: Pull in with Trailer
- Utility: Southern California Edison

**Route**

- Route Type: Diminishing Load (7-10 stops per day)
- Goods: Beer and Seltzer
- Payload Range: Usually heavy, up to 82,000 lbs

**Duty Cycle**

March 2022 - May 2022
1. Select any of the 13 fleets
2. Select a day or range of days
3. Select Units of Measure
4. Enjoy the data!
2022 Reports

January 12, 2022
Review Of Complete Demonstration:
Electric Trucks Have Arrived

Market Segment Fact Sheets

March 6, 2022
The Use Case For
TERMINAL TRACTORS

April 11, 2022
The Use Case For
VANS & STEP VANS

May 5, 2022
The Use Case For
REGIONAL HAUL TRACTORS

In Development:

The Use Case For
MEDIUM DUTY BOX TRUCKS

May 2022
### Lessons Learned

**What NACFE learned while conducting Run on Less – Electric**

<table>
<thead>
<tr>
<th>Early adopters of CBEVs may choose duty cycles that reduce risks from range anxiety, keeping battery use above 50% SOC each shift.</th>
<th>Determine what sampling rate you can afford and if it is sufficiently accurate.</th>
<th>Vehicle telemetry data does not describe why a vehicle performed a maneuver.</th>
<th>Terminology like idling used for diesels may not directly apply to CBEVs.</th>
<th>The trucking industry could benefit from standardizing CBEV data buses and interfaces.</th>
<th>CBEVs must be specified for four-season operations and road grades and account for extremes in sizing battery packs.</th>
<th>For more detailed information on these lessons learned, click <a href="#">here</a>.</th>
</tr>
</thead>
</table>

- **State of Charge readings should be standardized across the industry.**
- **Regenerative braking can reduce demands for grid energy or conversely help in range extension.**
- **There are many opportunities in the fleet-utility relationship to negotiate net electricity pricing models.**
- **Choose battery capacity and charging based on those duty cycles with some safety factor to account for battery aging.**
- **A vehicle designed for a maximum power of 150 kW cannot charge at 350 kW without risking damage.**

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**Charger efficiency is important in estimating total energy demand.**

**Measuring maintenance and downtime requires a long-term project to capture seasonal effects as well as sufficient mileage.**

**Have a system perspective on electrifying a facility.**

**Weather conditions at the vehicle at all times requires higher resolution sensors and equipment not installed on today’s vehicles.**

**Use managed charging to minimize electricity demand and cost.**

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**Validate what is actual measured and where in the vehicle it is measured.**

**Given the ease of operation, drivers of CBEVs want the technology to succeed.**

**Opportunity charging can help extend the range of vehicles during a work shift.**

**Consumption and efficiency can be confusing metrics.**

**Fleets may not always have a receptive contact at utilities with respect to electrifying their fleets.**

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**Explicitly know your duty cycles, range requirements, dwell time, etc.**
Run on Less: Terminal Tractors

Findings
1. Great first step in electrification
2. Drivers rave about these vehicles
3. Maintenance costs lower
4. Positive environmental impact
5. Payback time without incentives is long
6. Plan tight data tracking to prove ROI

Terminal Tractor Video
Findings

1. E-commerce is leading the doubling of the huge van and step van market.
2. Electrifying smaller commercial vehicles is easier &
3. TCO is approaching parity with IC engines.
4. EVs improve driver attraction and retention.
5. Transition will be challenging, but planning can mitigate risks.
Poll #3

Who has the bigger challenge ahead of them?

a. Fleets  
b. Utilities  
c. Manufacturers

https://io.cvent.com/polling/v1/api/polls/sp-t5bgwc
NACFE and Regional Haul

2019 RH Good for Trucking

2020 Run on Less – Regional

2022 Use Case given Run on Less - Electric
Run on Less
What is Regional Haul?

Region Haul Market Segments by Daily Range

- Short: 50 mi
- Medium: 100 mi
- Long: 100-300 mi
Class 8 Regional Haul BEVs

California Trucks But Running In Other States Now Too

<table>
<thead>
<tr>
<th>Truck Class</th>
<th>Class 8</th>
</tr>
</thead>
<tbody>
<tr>
<td>Type</td>
<td>Heavy-Duty Tractor</td>
</tr>
<tr>
<td>OEM</td>
<td>Peterbilt</td>
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<tr>
<td>Model</td>
<td>572EV</td>
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<tr>
<td>Production Level</td>
<td>In Series Production</td>
</tr>
<tr>
<td>Battery Capacity</td>
<td>396 kWh</td>
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<tr>
<td>Estimated Range</td>
<td>150 miles</td>
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<tr>
<td>OEM</td>
<td>Volvo</td>
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<tr>
<td>Model</td>
<td>VNR Electric</td>
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<tr>
<td>Production Level</td>
<td>Pre-Production</td>
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<tr>
<td>Battery Capacity</td>
<td>316 kWh</td>
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<tr>
<td>Estimated Range</td>
<td>175 miles</td>
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<tr>
<td>OEM</td>
<td>Freightliner</td>
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<td>Model</td>
<td>eCascadia</td>
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<td>Production Level</td>
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<tr>
<td>Battery Capacity</td>
<td>440 kWh</td>
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<td>Estimated Range</td>
<td>175 miles</td>
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</table>

May 2022
Balancing Freight Weight and Range
Balancing Freight Weight and Range

Freight Weight

Range
Balancing Freight Weight and Range
Freight Weight Example

200 miles

Freight Max | Allowed GVWR
---|---
\(\sim 49,500 \text{ lbs.}\) | 80,000 lbs.
\(\sim 45,500 \text{ lbs.} \quad \Delta \sim 4,000 \text{ lbs.}\) | 82,000 lbs.

Tare \(\sim 13,500 \text{ lbs.} + 17,000 \text{ lbs.}\)
Tare \(\sim 13,500 \text{ lbs.} + 22,500 \text{ lbs.}\)

75% of loads are below 75,000 GVW
1. Short and medium regional heavy-duty tractors at 200 miles.
2. Return to base daily giving fleets confidence in charging infrastructure.
3. Fleets implementing operational changes to improve the TCO.
4. The drivability make these trucks ones that drivers prefer.
5. Manufacturers are bringing next generations to satisfy medium and longer regional haul duty cycles.
Participating Fleets Q&A

• **Bill Bliem**, Senior Vice President of Fleet Services, NFI Industries

• **Adam Buttgenbach**, Director of Fleet Engineering & Sustainability, PepsiCo

• **Tim Rivera**, Director, Fleet Management, Americas Network Operations, DHL
Lunch – be back promptly at 12:30 pm
Poll #4

What is the biggest need for scaling?

a. Incentives for trucks or charging
b. Regulatory mandates
c. National charging network
d. Supply side incentives

https://io.cvent.com/polling/v1/api/polls/sp2fgvrx
Fleet Electrification Waves

Electrification waves

1. Forklifts
2. *Terminal Tractors*
3. *MD Urban Delivery*
4. *Beverage & Drayage*
5. *Regional Haul Tractors*
6. Long Haul Tractors

May 2022
Let’s Stay Connected… … And charged up!

NACFE (Spanish: NACFE LATAM)

NACFE

@NACFE_Freight & @RunOnLess

Mike Roeth
Mike.roeth@NACFE.org
260-750-0106

May 2022