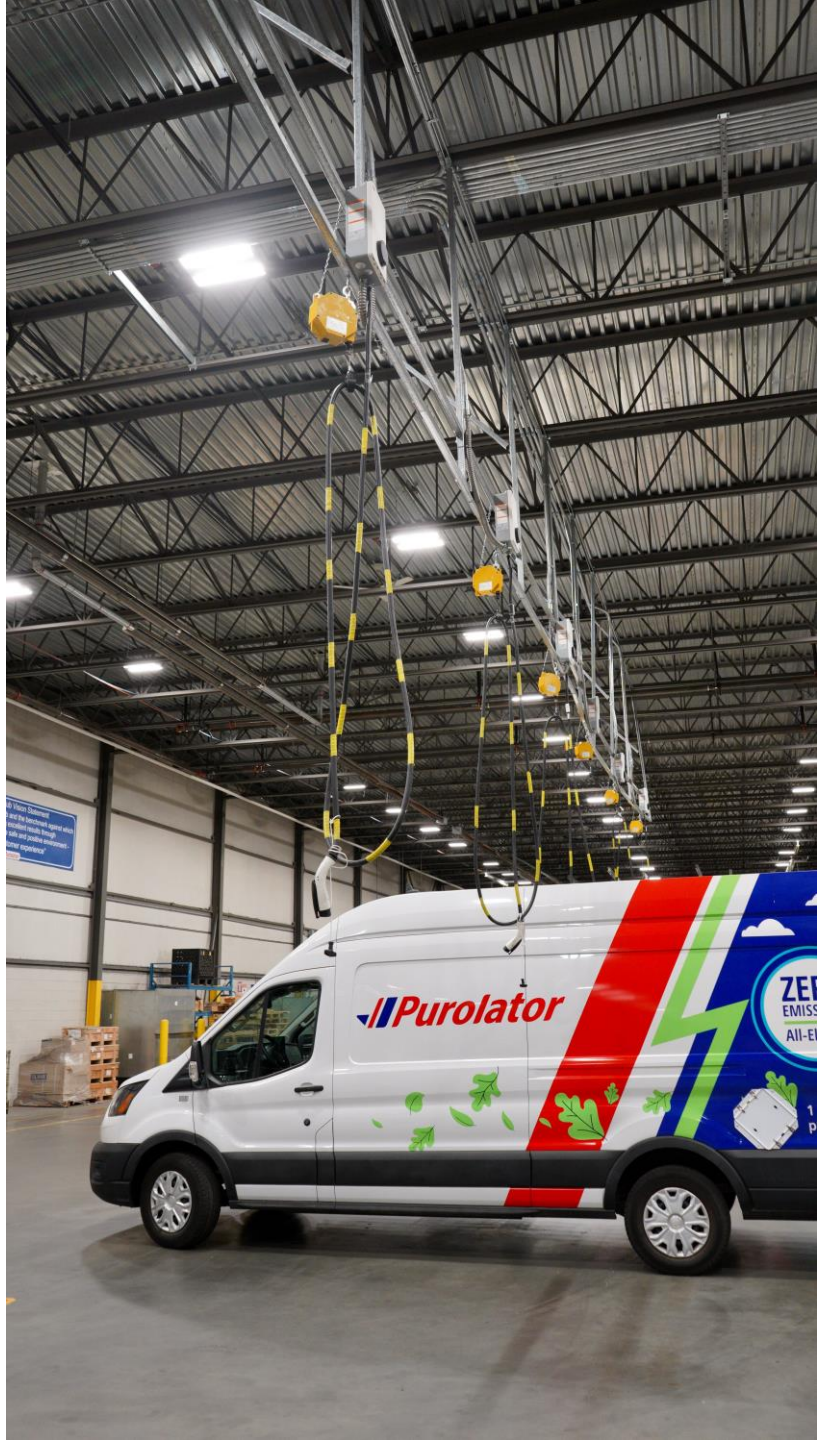
Commercial Truck Electrification & More

September 2024

Dave Schaller: Industry Engagement Director

RUN ON LESS ELECTRIC DEPOT

NACFE
NORTH AMERICAN COUNCIL FOR FREIGHT EFFICIENCY



Run on Less - “Best of the Best”

2017

RUN ON LESS BY NACFE

Long Haul
7 Fleets
10.1 MPG

2019

RUN ON LESS REGIONAL

Regional Haul
10 Fleets
8.3 MPG

2021

RUN ON LESS ELECTRIC

All BEVs
13 Fleets
EV Truck Pilots

2023

RUN ON LESS ELECTRIC DEPOT

BEV Depots
10 Depots
Infrastructure

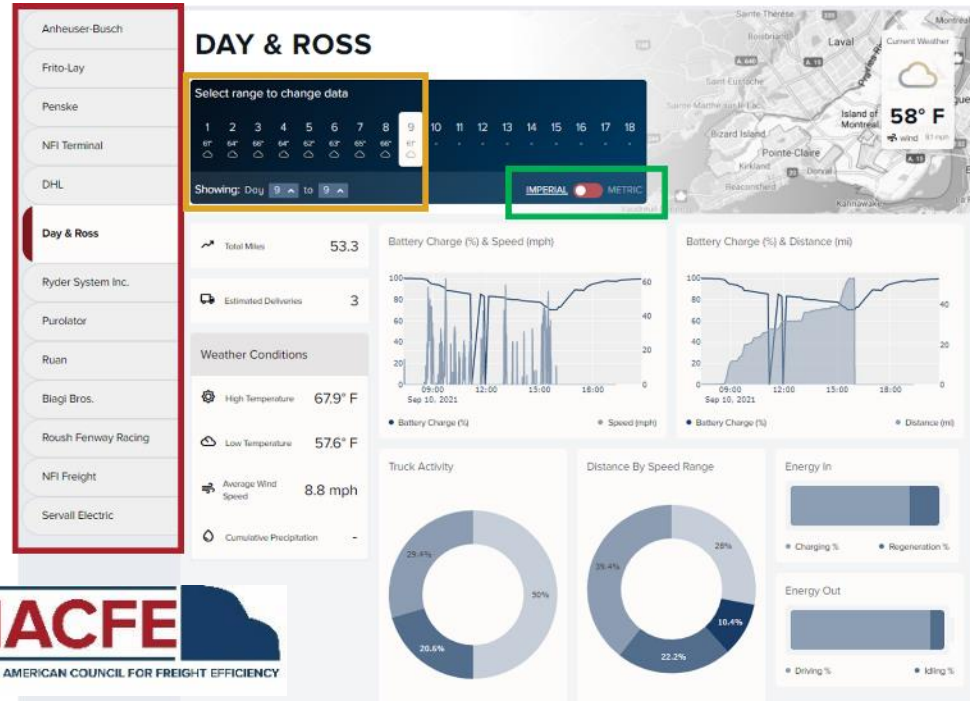
2021

Real-World, Real-Time Case Studies

- For each fleet & OEM
- Fleet Interviews: Drivers & Leaders
- OEM Interviews & more

Link

1. Select any of the 13 fleets
2. Select a day or range of days
3. Select Units of Measure
4. Use the data!



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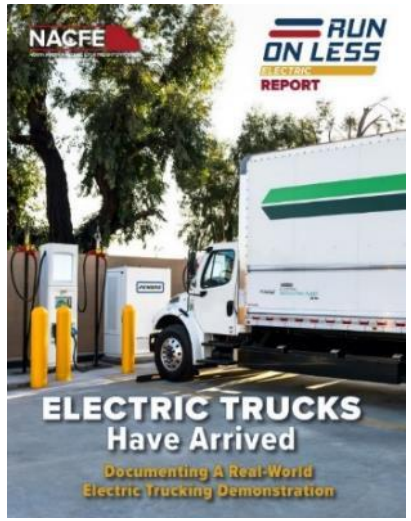
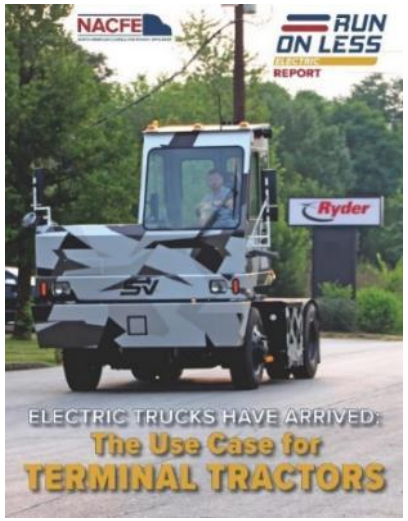
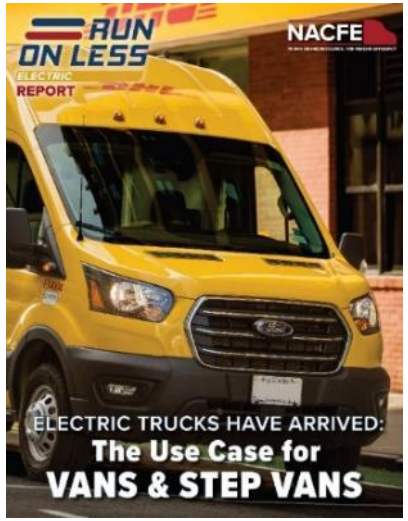
RoL–E Reports



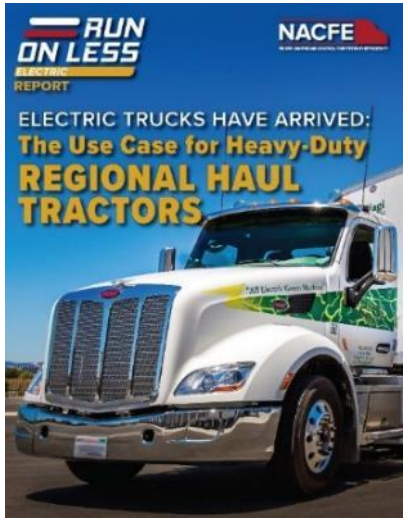
January 12, 2022
Review Of Complete Demonstration:
Electric Trucks Have Arrived



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

June 28, 2022
The Use Case For
MEDIUM DUTY BOX TRUCKS

Other NACFE Whitepapers on Truck EVs:
https://nacfe.org/research/electric-trucks/

RUN ON LESS ELECTRIC

Run on Less - Electric DEPOT 2023

- 10 fleet locations
- Each has at least 15 electric trucks
- Many had more
- Fleet videos
- Telematics data

All information at:
RunOnLess.com

Truck Models in Run on Less 2023

1. Vans & Step Vans
2. MD Trucks
3. Terminal Tractors
4. Tractor-Trailers

FORD

FREIGHTLINER

FORD

FREIGHTLINER CUSTOM CHASSIS CORPORATION

ORANGE EV

GM

MOTIV

NIKOLA

FREIGHTLINER

INTERNATIONAL

FREIGHTLINER

FREIGHTLINER

TESLA

VOLVO

FREIGHTLINER

RUN ON LESS ELECTRIC DEPOT

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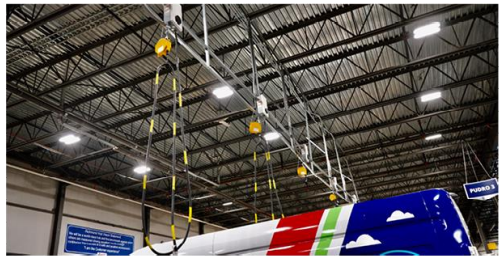
Chargers (EVSE)



- ABB
- BTC Power
- Charge America
- DC Siemens
- Ford Pro
- InCharge Energy
- Heliox
- Power Electronics
- Shell Recharge
- Tesla
- Tritium

RUN ON LESS ELECTRIC DEPOT

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RUN ON LESS – ELECTRIC DEPOT

WHAT IS IT?

BOOTCAMP

DEPOT VISITS

PROFILES

DASHBOARD DATA

INDUSTRY EVENTS

A real-world focus on early electric truck deployments in urban and regional haul operations.

STORIES FROM THE RUN

FINDINGS

DETAILED REPORTS IN 2024

Purolator: Richmond BC

Testing Several Different OEMs

- Motiv EPIC Class 6 step van
- Ford E-Transit Class 2 van
- Other models on order
- 15 Overhead Level 2 Chargers
- Diminishing load package delivery
- BC Hydro

Pepsi: Sacramento CA

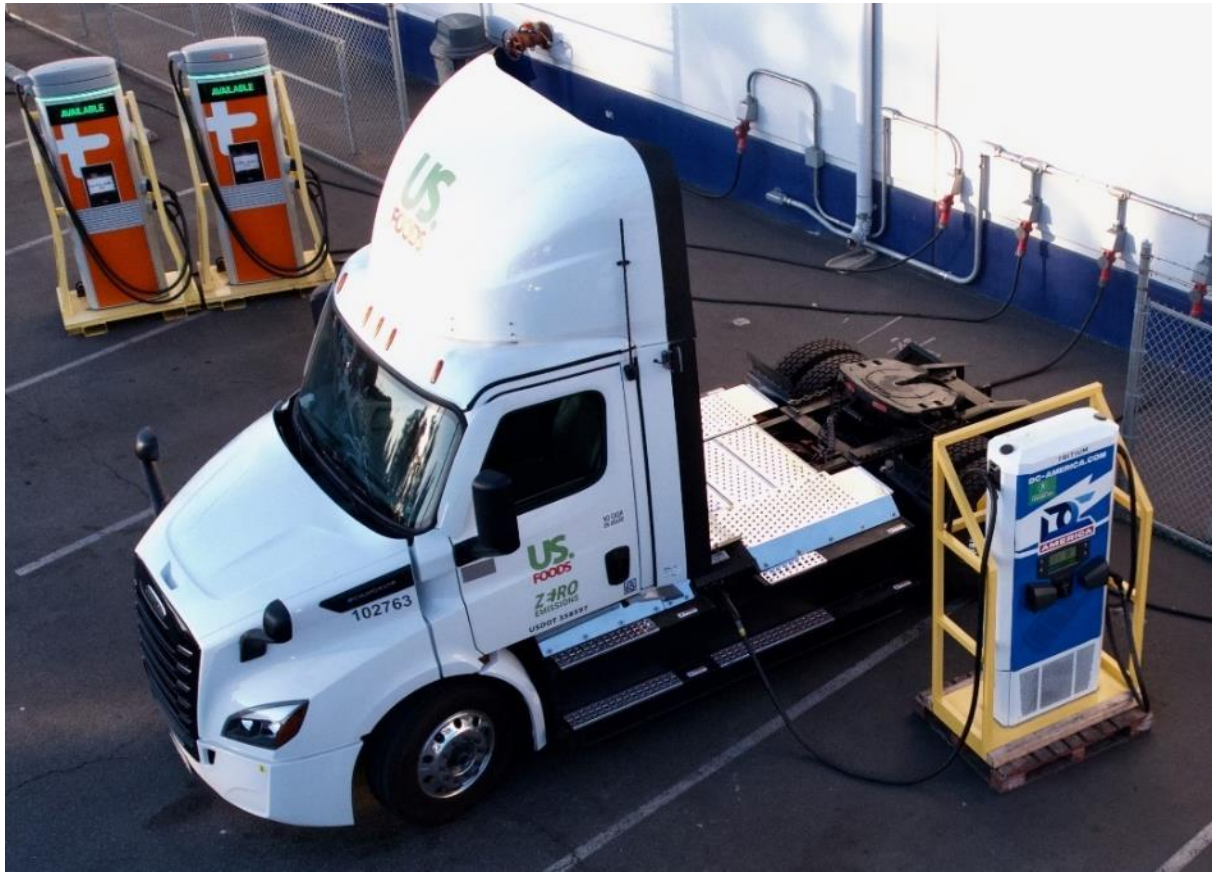
Long Haul & City Delivery with Tesla Semis

- 21 Teslas (3 LH & 18 City)
- LH Beverages: 250-450 miles/day
- City Beverages: < 75 miles/day
- 4 Tesla 750 kW chargers
- Sacramento Municipal Utility District

US Foods: LaMirada CA

Portable/Temporary Infrastructure Can Be First

- 30 Freightliner eCascadias = ~$9M
- Permitting delayed permanent charging, stranding assets
- Portable chargers now: Tritium 75kW & ChargePoint 62.5kW
- Food & beverage local delivery to hotels, restaurants, etc.
- Southern Cal Edison



Drivers Love Electric Trucks

Regardless of their initial feelings, drivers LOVE them once they have driven one.

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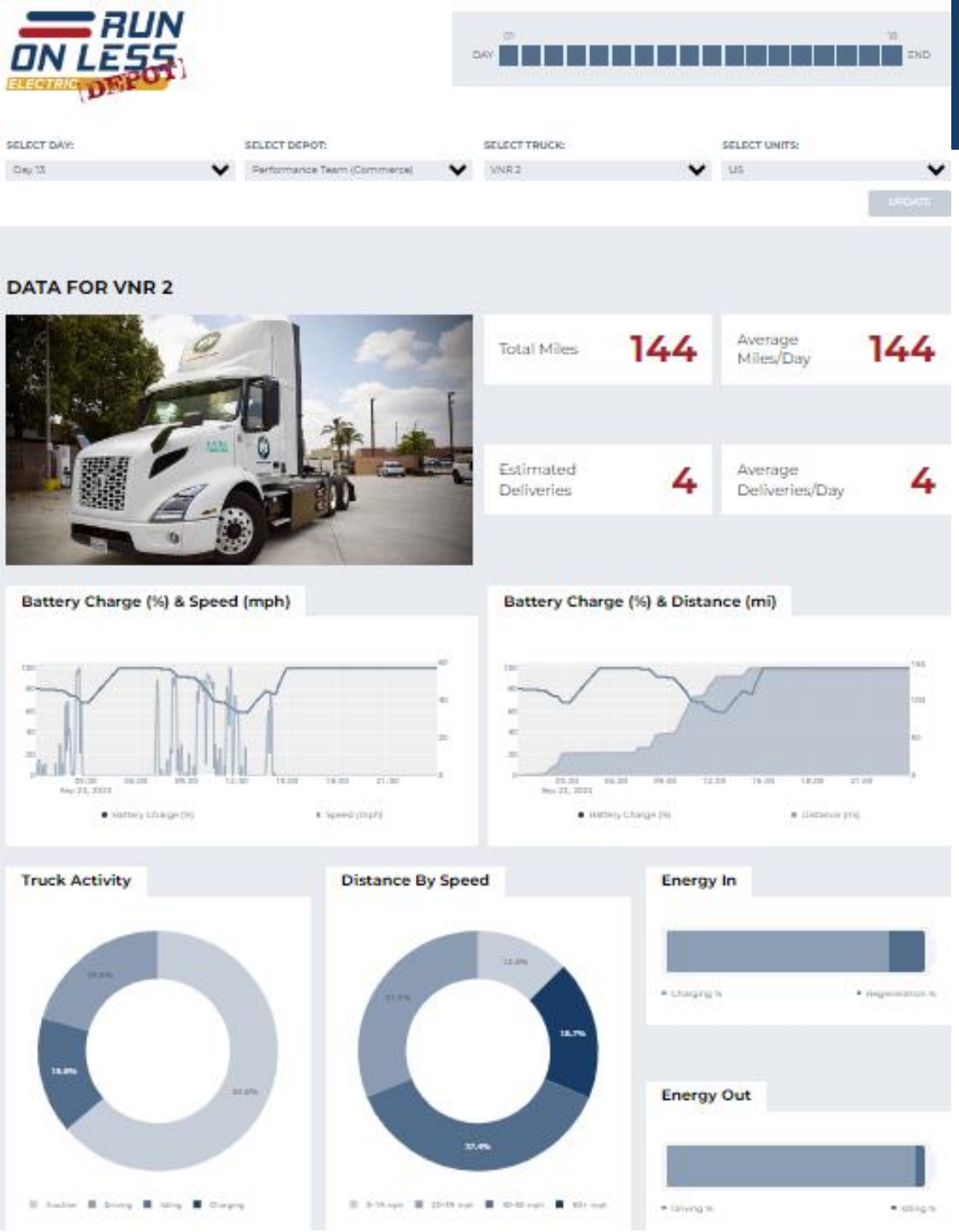
Metrics



DATA at RunOnLess.com!

Select:

1) Fleet
2) Truck
3) Day
4) Units of Measure

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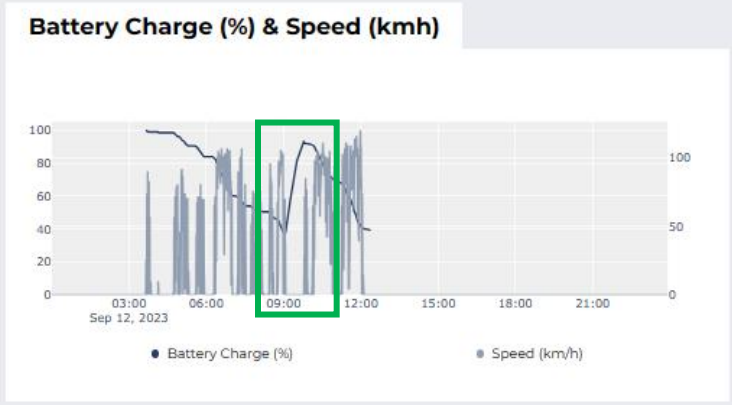
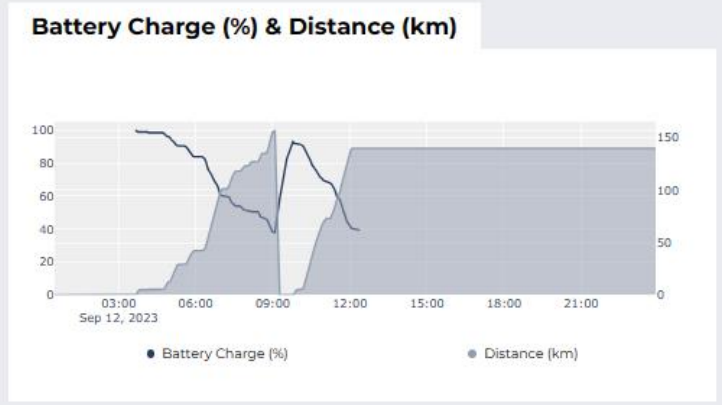
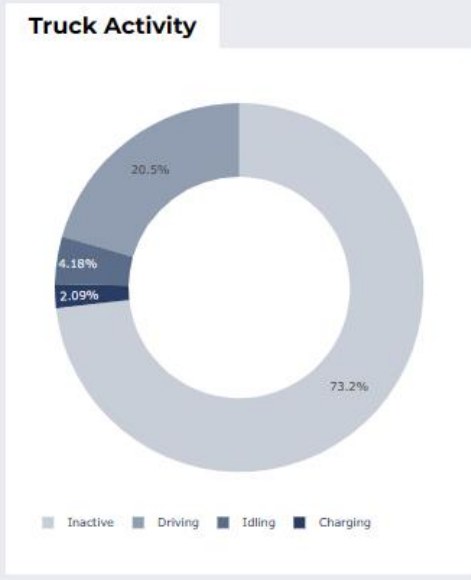
RoL-E DEPOT

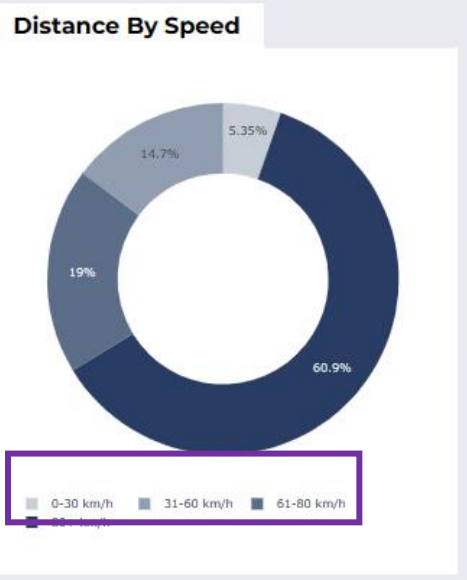
- Penske Day 2 eTransit
- **297 km in a single shift**
- 54 deliveries
- Fully charged with another charge middle of the day
- A lot of regenerative braking
- 41% of miles under 80 kph

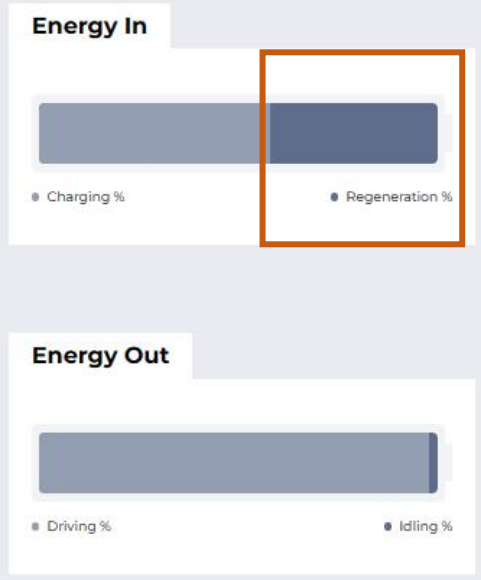
Total Kilometers	297	Average Kilometers/Day	297
Estimated Deliveries	54	Average Deliveries/Day	54







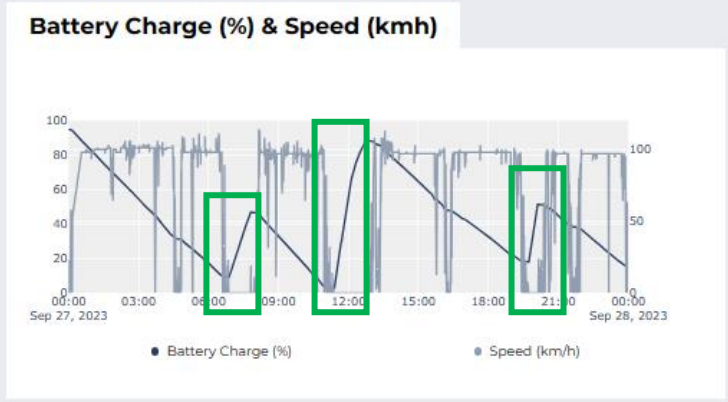


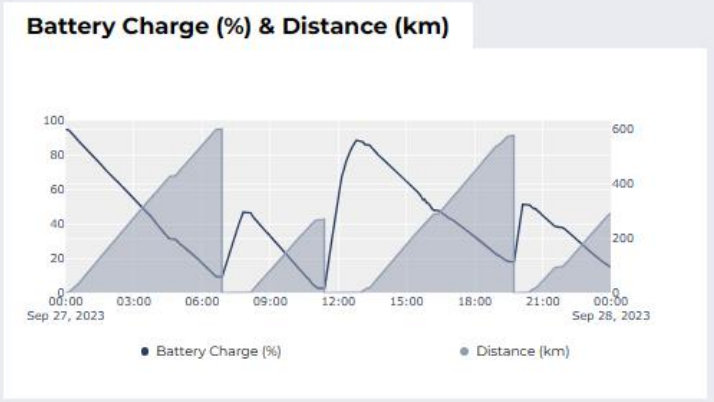


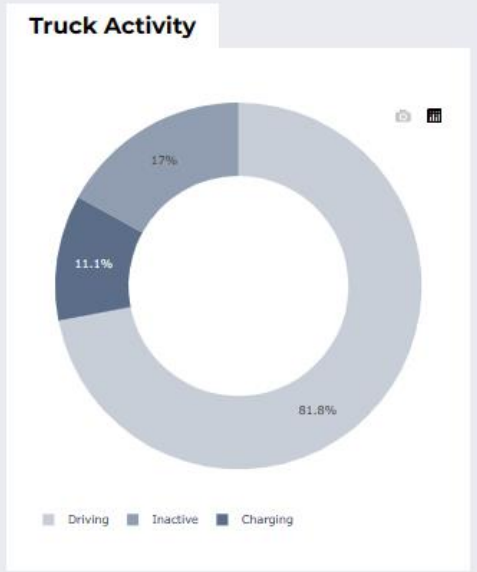
New RH Metrics

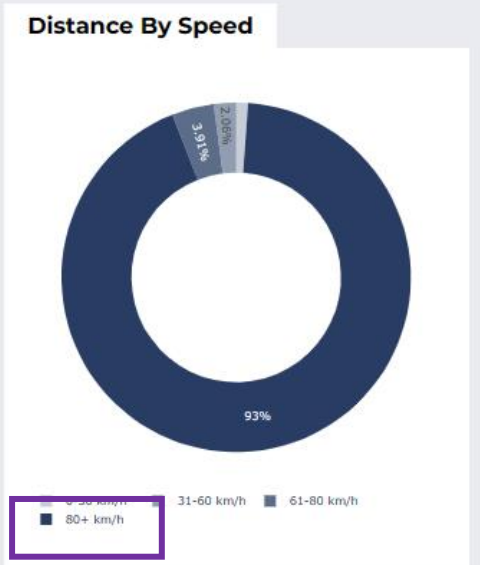
- Tesla Semi at Pepsi
- Sacramento CA depot
- 1076 miles (1,732 kilometers) in 24 hours
- 5 deliveries
- Three charging sessions
- Some regenerative braking
- Most of the day above 50 MPH = 80.5 KPH (55 MPH/88.5 KPH speed limit in California)

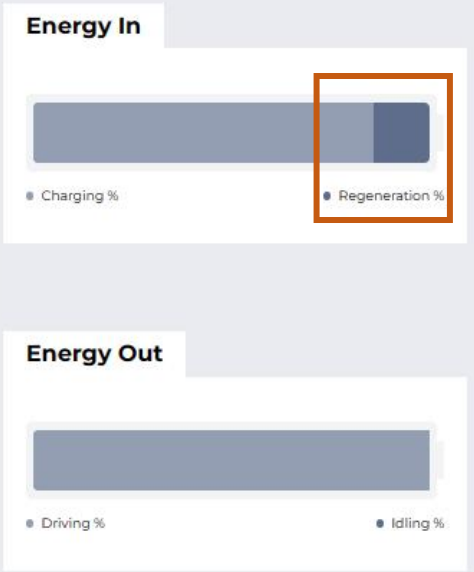
Total Kilometers	1732
Average Kilometers/Day	1732
Estimated Deliveries	1
Average Deliveries/Day	1

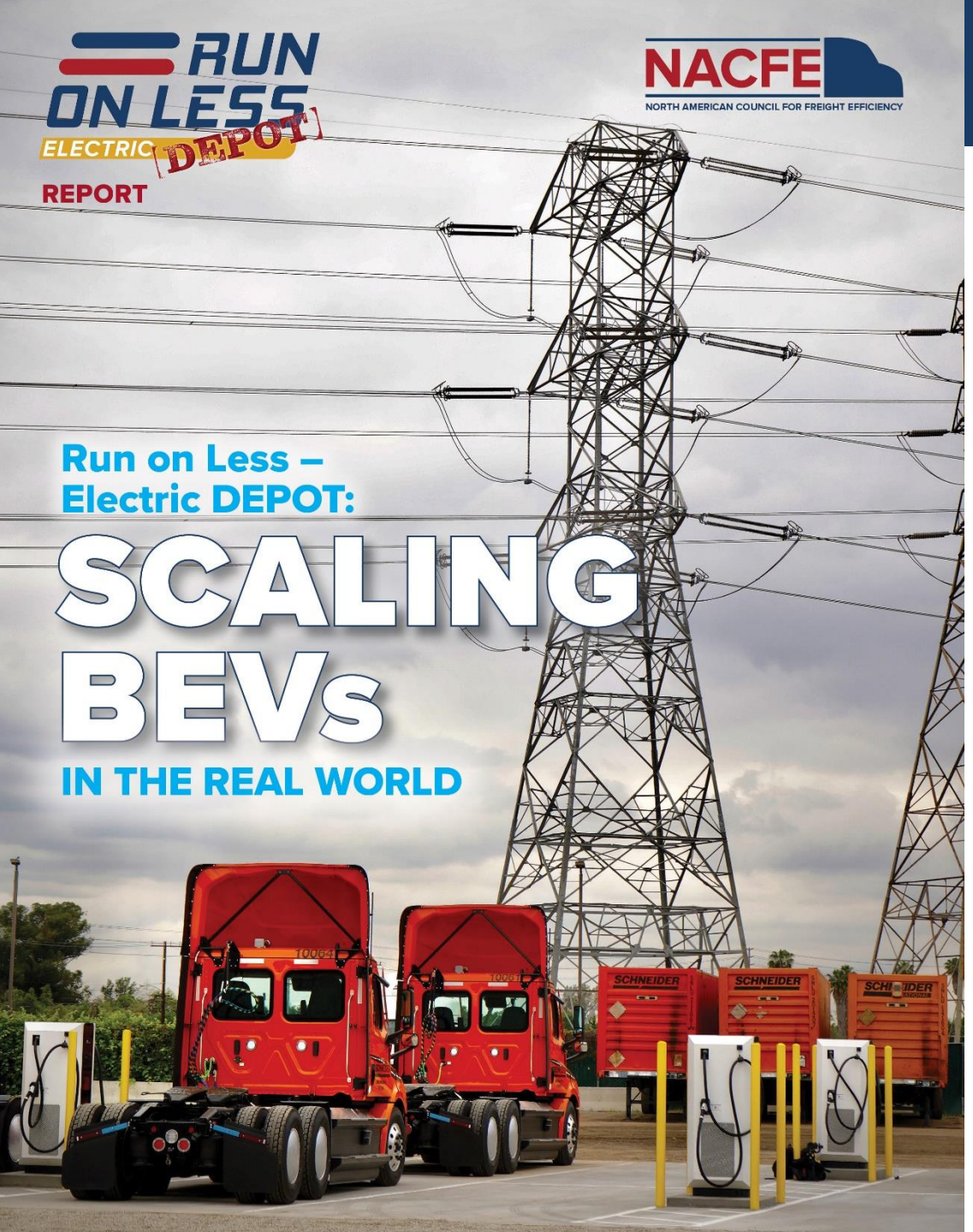












DEPOT Report

- New video: https://runonless.com/run-on-less-electric-depot-reports/
- Final findings in executive summary, or full report format.
- Detailed analysis of 22 EV trucks at 10 fleets over three weeks.
- Initial and Final Findings.
- Contains new research including summaries of 30 current electric truck depots.

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COMMERCIAL EV MARKET

5.2M electrifiable trucks saving 100M MT CO2E* still valid

(Excluding long haul)

*2021 Run on Less - Electric infographic

121 candidates representing **5200** EVs

10 Depots

operating 850 trucks in total

- **291** EVs
- **139** chargers
- **1044** MWh of power used
- **446,831** miles traveled
- **39** speakers in Bootcamp
- **122** interviews at depots

ROL-E DEPOT REPRESENTS THIS MARKET.

8 Charger Companies

5 Utilities

11 OEMs

Total power needed if all trucks at all 10 depots were electric

214 MWh per day

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ENERGIZING THE SITES TAKES TOO LONG

AARGH!

Due diligence is needed to ensure reliability of power and to avoid brownouts.

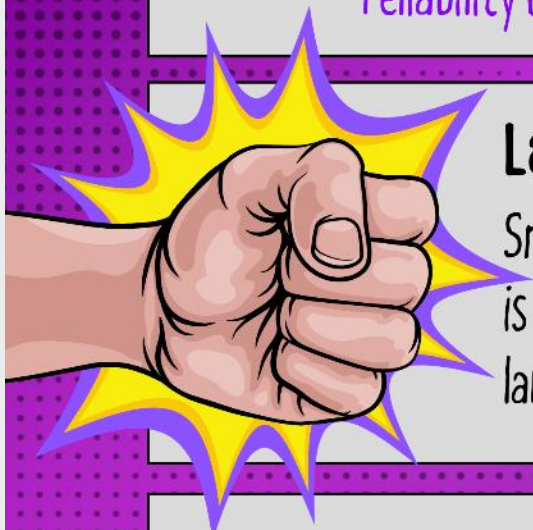
For the 10 depots in the Run it took...

9 to 36 months

to energize the infrastructure

TEMPORARY/ PORTABLE CHARGERS CAN HELP

Trucks are arriving before charging is in place, sometimes months earlier.



Large Power Demand

Small depots require less, but power is a significant issue for medium or large energy depots.

Roadblocks to Energizing

Site planning, utility approvals, site permitting, etc. all contributing to too much time to energize the depots.

UTILITIES MUST SHORTEN ENERGIZING TIMELINES

TACTICS TO MITIGATE INCLUDE:

- Use a consultant with experience
- Add an early phase to get started
- But, get to 100% complete electrification quickly and possibly in a single effort

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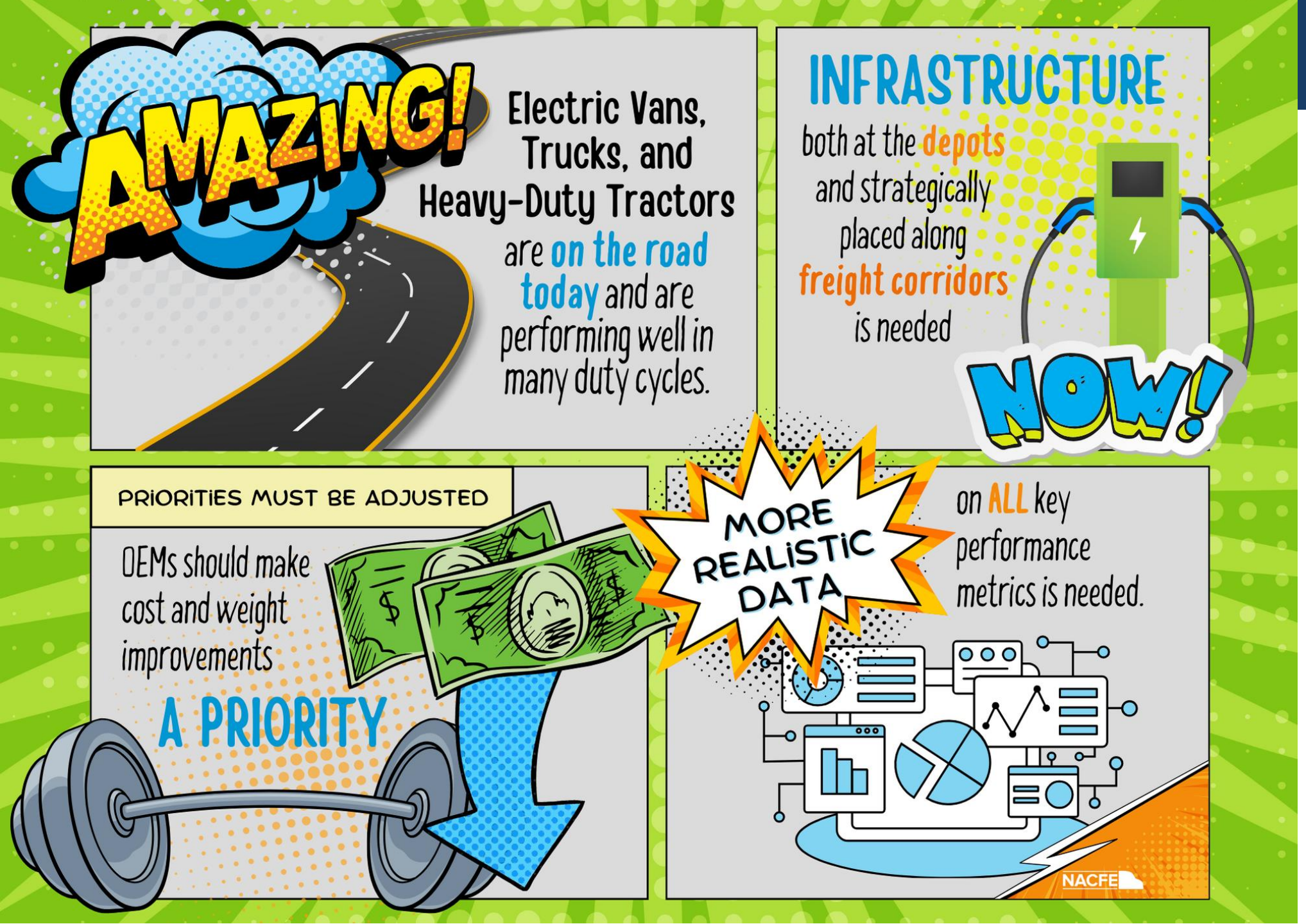
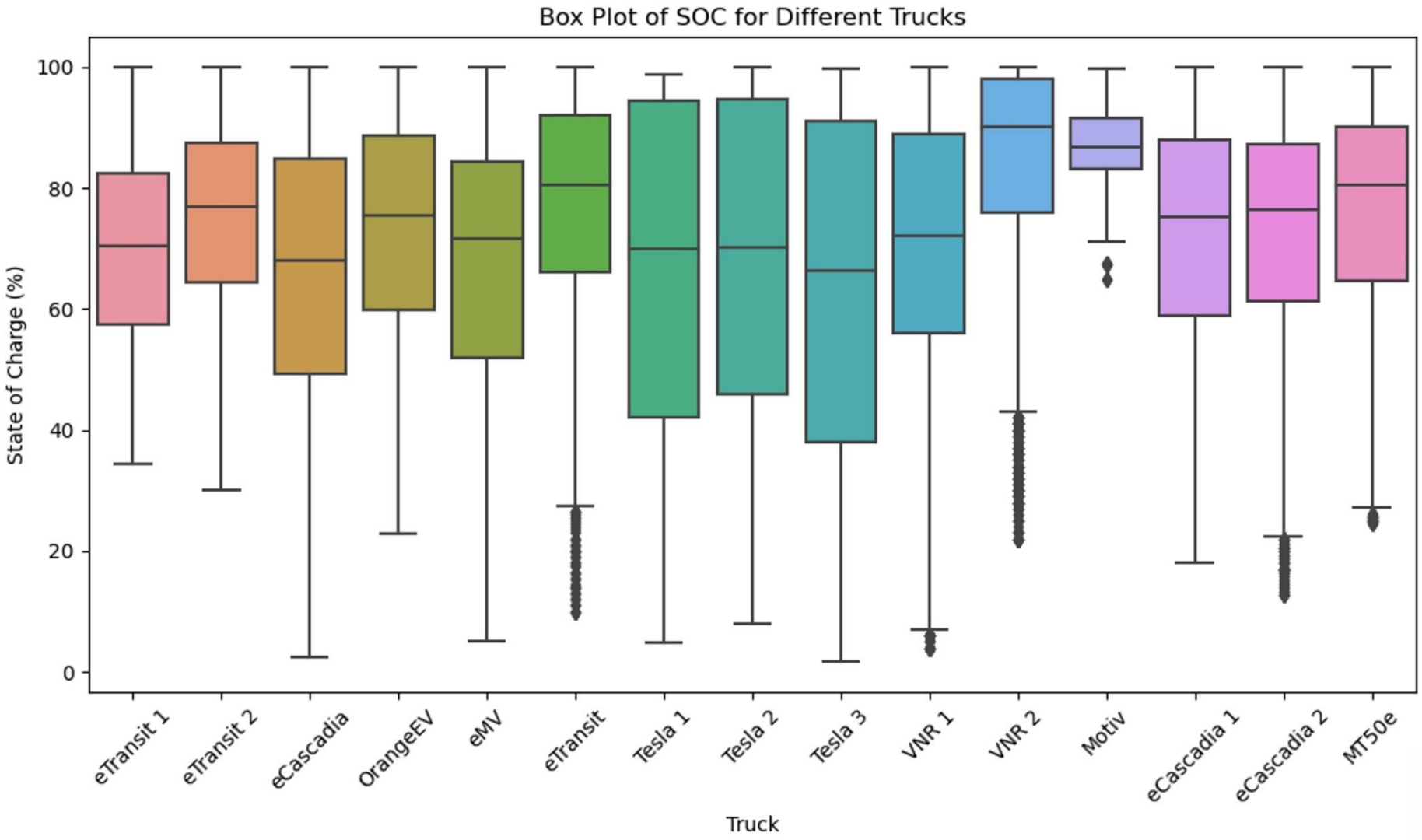


[Free Report Download]

RUN ON LESS ELECTRIC DEPOT

State of Charge Ranges: Depots



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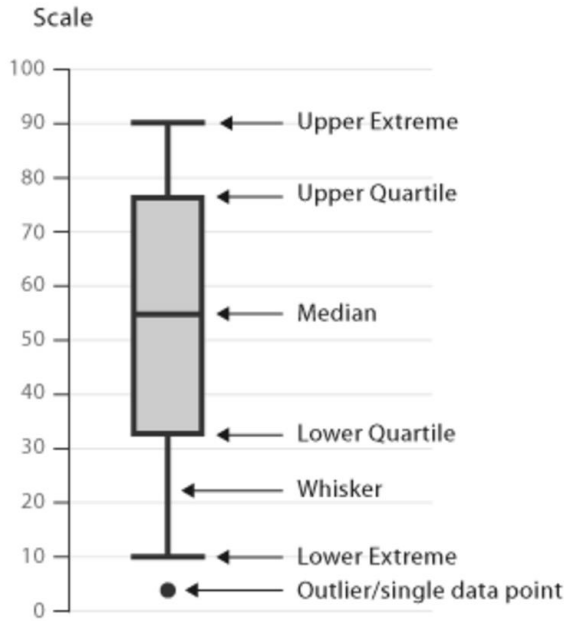


RUN ON LESS ELECTRIC DEPOT

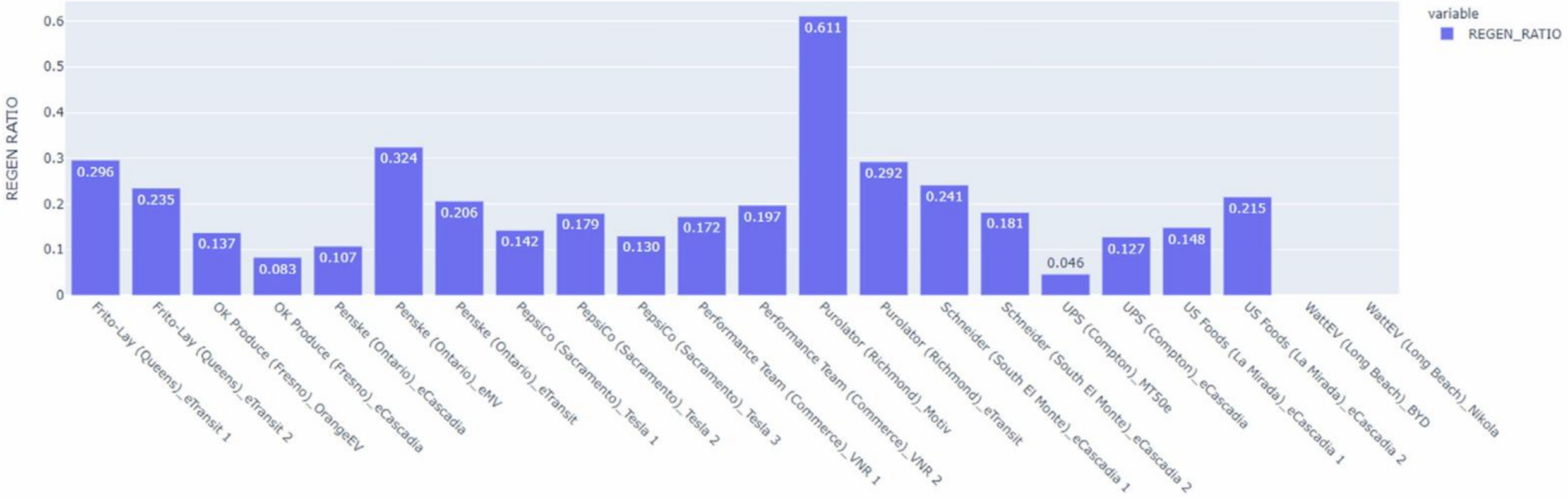
Electrical Consumption

Segment	Consumption at Meter (kWh/mi)
Class 2b/3	0.4 - 0.5
Class 6	1.3 - 1.5
Class 8 Terminal Tractor	2.5 - 4.0
Class 8 Day Cab	1.6 - 2.4

Assumptions:

1. truck in standard environmental conditions of 68°F at sea level with nominal wind conditions.
2. there will be energy losses at the charger and between the charger and the vehicle, and losses inside the vehicle.
3. at the meter numbers assume a level of regenerative braking energy recovery while driving as that definitely contributes to range.

Regenerative Braking in DEPOTs



16 % Average across 20 EV trucks: amount of regen energy recovered in braking versus the total energy used in driving

Numerous variables impact the regen braking energy recovery including but not limited to: load weight, driver, route, traffic, terrain, wind and temperatures.

RUN ON LESS ELECTRIC DEPOT

OVER Estimation Challenges

1. Overestimating kWh/mi consumption for vehicles based on out-of-date data
2. Ignoring energy recovery from regenerative braking
3. Ignoring reduced out-of-route miles and driver time made possible from depot charging
4. Requiring one charger for every vehicle
5. Assuming the highest charger rating for every charging event
6. Ignoring the benefits derived from managed charging
7. Assuming vehicles require 100% charging at each charging event
8. Assuming vehicles require daily charging
9. Assuming loads are reaching maximum gross vehicle weight (GVW) on every vehicle for every trip
10. Assuming vehicles are driven the maximum miles every trip
11. Assuming only one charge per day is possible
12. Assuming enroute charging is not feasible at delivery points

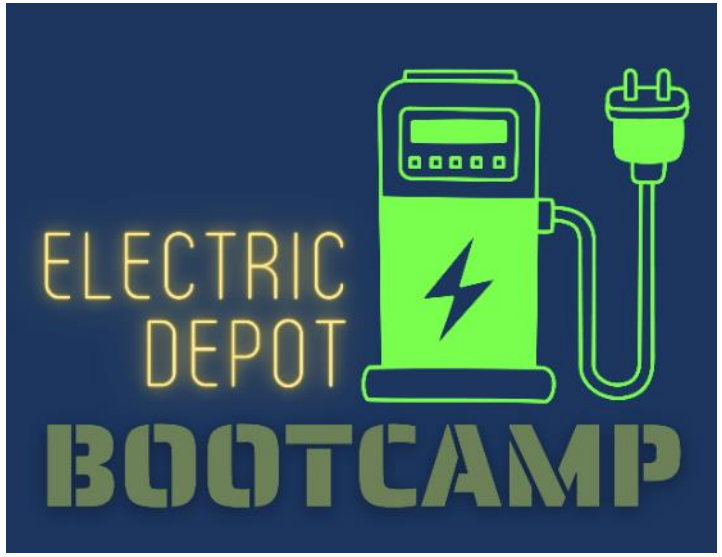
UNDER Estimation Challenges

1. Not considering cold and hot weather effects in battery sizing and charging
2. Not considering the impact of road grades
3. Not considering battery degradation possible over years of ownership
4. Overestimating maintenance cost savings from early generation BEVs
5. Ignoring charger losses (efficiency) in estimating power needs
6. Ignoring increased tire wear from heavier, more agile BEVs
7. Assuming the driver has no impact on performance
8. Assuming tractor and trailer aerodynamics don't matter

RUN ON LESS ELECTRIC DEPOT

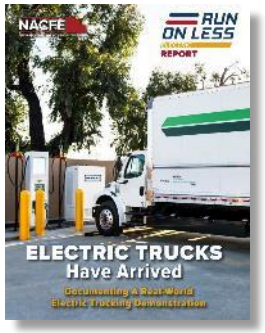
DEPOTS Electric Truck Bootcamp

1. **Best Practices for Utility-Fleet Relationships**
2. **Grants and Incentives for the Trucks and Infrastructure**
3. **Electric Truck Developments**
4. **Faster Charging — Opportunities and Challenges at 350KW and higher**
5. **Opportunities to Extend BEV Range** (via charging technologies)
6. **Electricity Resiliency and Availability** (microgrids, renewable energy…)
7. **Current and Future Regulations for Zero Emission Trucks**
8. **Managed Charging to Improve Availability, Cost and Range**
9. **Scaling Charging Infrastructure Equipment**
10. **Electric Depot Site Planning and Construction**



Available at RunOnLess.com – click on Bootcamp

Key NACFE Reports on ZEV Trucks

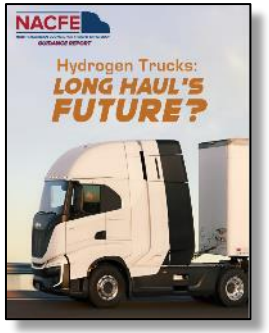


Jan 2022
Review Of Demonstration:
Electric Trucks Have Arrived

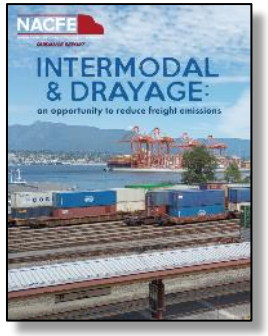
4 Market Segment Fact Sheets

Feb 2023
The Messy Middle:
A Time For Action

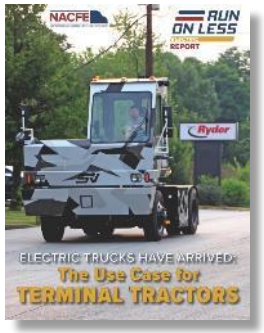
Dec 2020
Making Sense of Heavy Duty
Hydrogen Fuel Cell Tractors



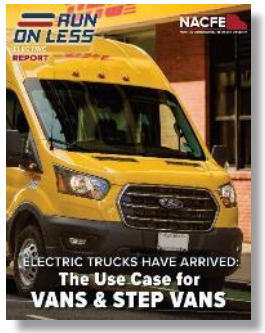
Apr 2023
Hydrogen Trucks:
Long-Hauls Future?



Dec 2023
Intermodal &
Drayage

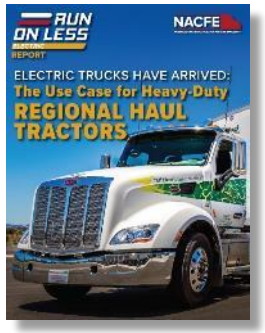


Mar 2022
The Use Case For
Terminal Tractors

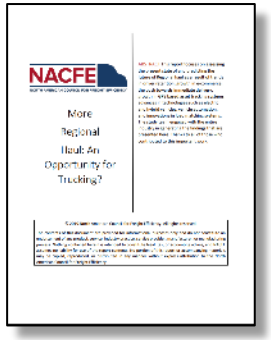


Apr 2022
The Use Case For
Vans & Step Vans

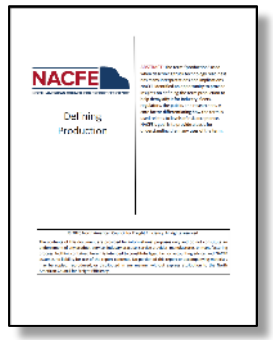
Jun 2022
The Use Case For
Medium Duty
Box Trucks



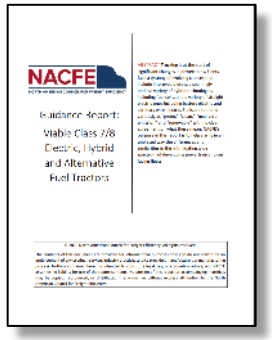
May 2022
The Use Case For
Regional Haul
Tractors



Apr 2019
More Regional Haul:
An Opportunity for
Trucking?



Jan 2020
Defining
Production



Dec 2019
Viable Class 7/8
Electric, Hybrid and
Alternative Fuel
Tractors

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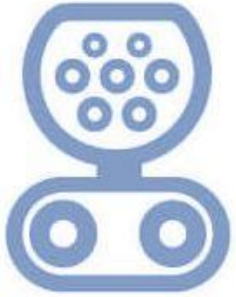
CCS1


CCS2


NACS/Tesla


MCS or CharIN

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NACFE.org

Let's Stay Connected…
…and Charged Up!

RUN ON LESS ELECTRIC

RunOnLess.com

LinkedIn **NACFE** (& Spanish: NACFE LATAM)

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@NACFE_Freight & @RunOnLess

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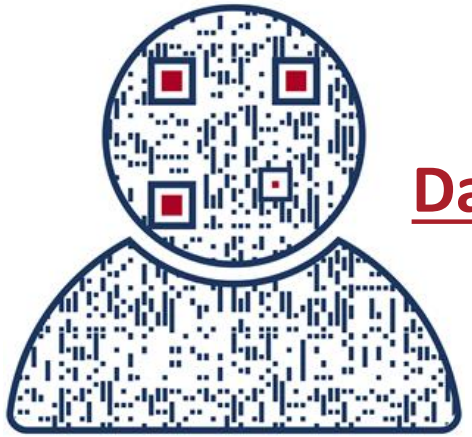

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260-602-5713

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THANK YOU