

# Electric Trucks Enabling Driver Diversity

North American Council for Freight Efficiency  
NACFE



# Moderator



**Rick Mihelic**

*Director Emerging Technologies*  
**North American Council for Freight Efficiency**

# Diversity

- Long Road



Tuskegee Airman William Diez is featured in this poster asking Americans to buy war bonds. NARA.



Jacqueline Cochran (1906-1990)

Jacqueline Cochran gives up peace. She handles her determination to return to work and fly for her own. She earned her private pilot's license in 1932 and was active in the air race and exhibitions of the "Three Ladies of Aviation." Cochran became known as the "Red Tails" Transcontinental Air Race and made her reputation as a pilot by winning in 1938.

She was named the "American Girl" by Time magazine in 1945. She was also named "Woman of the Year" by Time magazine in 1945. She was the first woman to fly solo across the Atlantic Ocean in 1931. She was the first woman to fly solo across the Pacific Ocean in 1931. She was the first woman to fly solo across the Atlantic Ocean in 1931. She was the first woman to fly solo across the Pacific Ocean in 1931.



1940's



# Electric Trucks Are Here (Nearly)



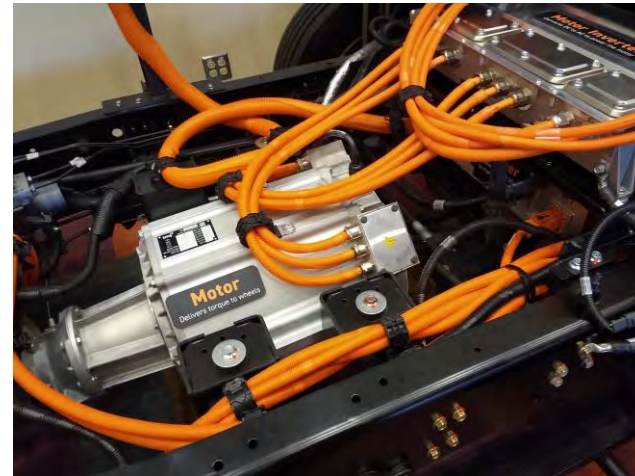
# What Are Electric Trucks?



- Battery Electric Trucks
- Fuel Cell Electric Hybrid Trucks
- Alternative Fuel Hybrid Trucks

## Common Themes

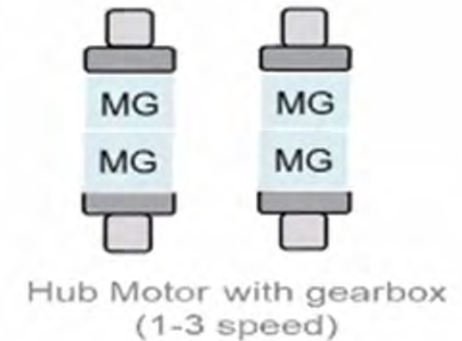
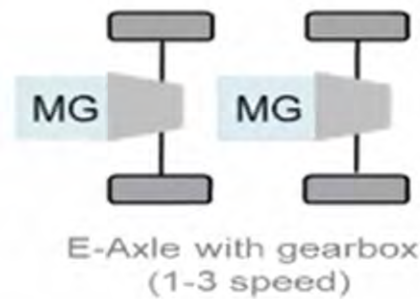
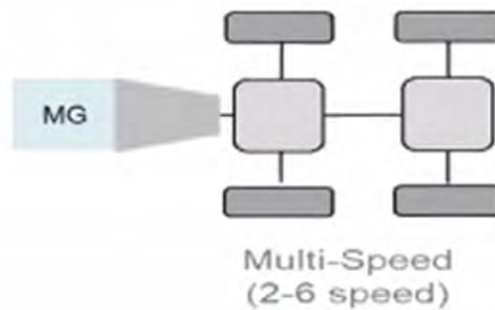
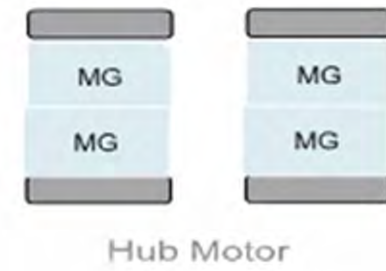
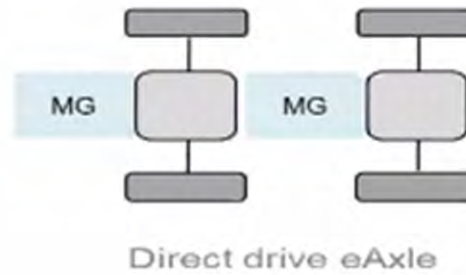
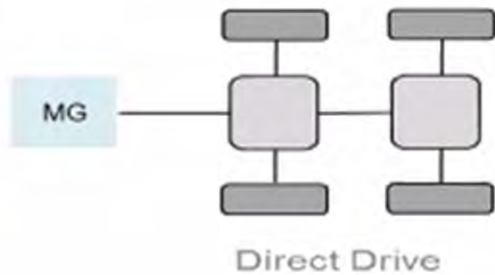
- Electric Motors
- Batteries
- Computer Controllers
- High Voltage Cables
- High Voltage Connectors
- Regenerative Braking
- Smart Systems



# BEV, Hybrid or Fuel Cell



The electrified propulsion system produces mechanical power from single or multiple electric motors to the wheels/axles in order to generate the propulsion



Courtesy of Cummins Inc.

# Electric Vehicle Attributes



- Smart Systems
- Less Maintenance - probably
- Quieter – still have tire and road noise
- No fumes – no diesel, no DEF, no exhaust, no oils
- Fewer liquids – cooling systems still there
- Regenerative braking – one pedal driving in some cases
- Very automated powertrain – probably no manual shifting
- High voltage batteries, cables, connectors
- Software controllers
- Sensors
- Still have air compressors, air brakes, suspensions, tires

Drivers report  
less stress and  
fatigue  
at end of day

# Diversity & Inclusivity



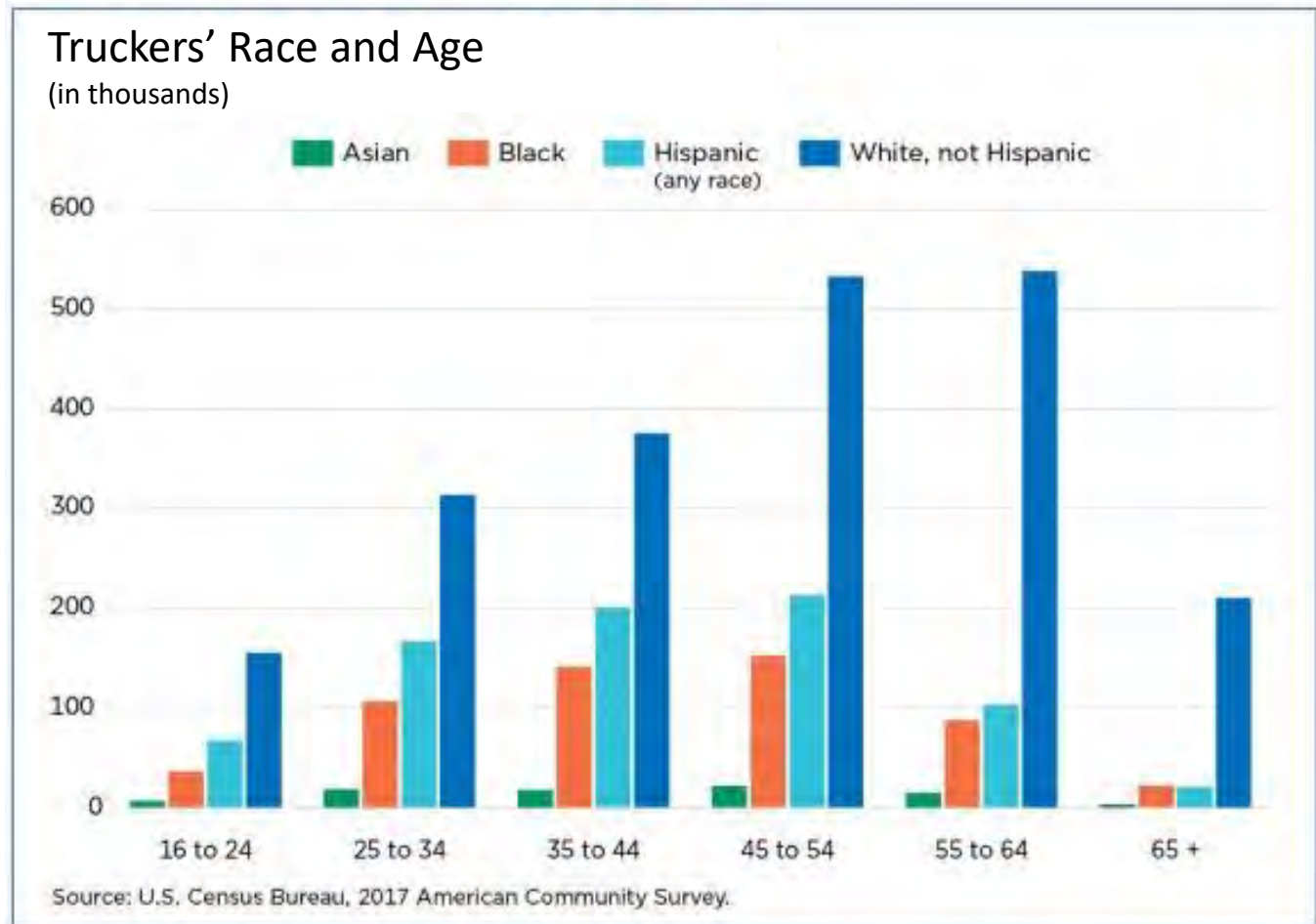
- Gender
- Ethnicity
- Age
- Education
- Ergonomics





# What Is Diversity in Trucking?

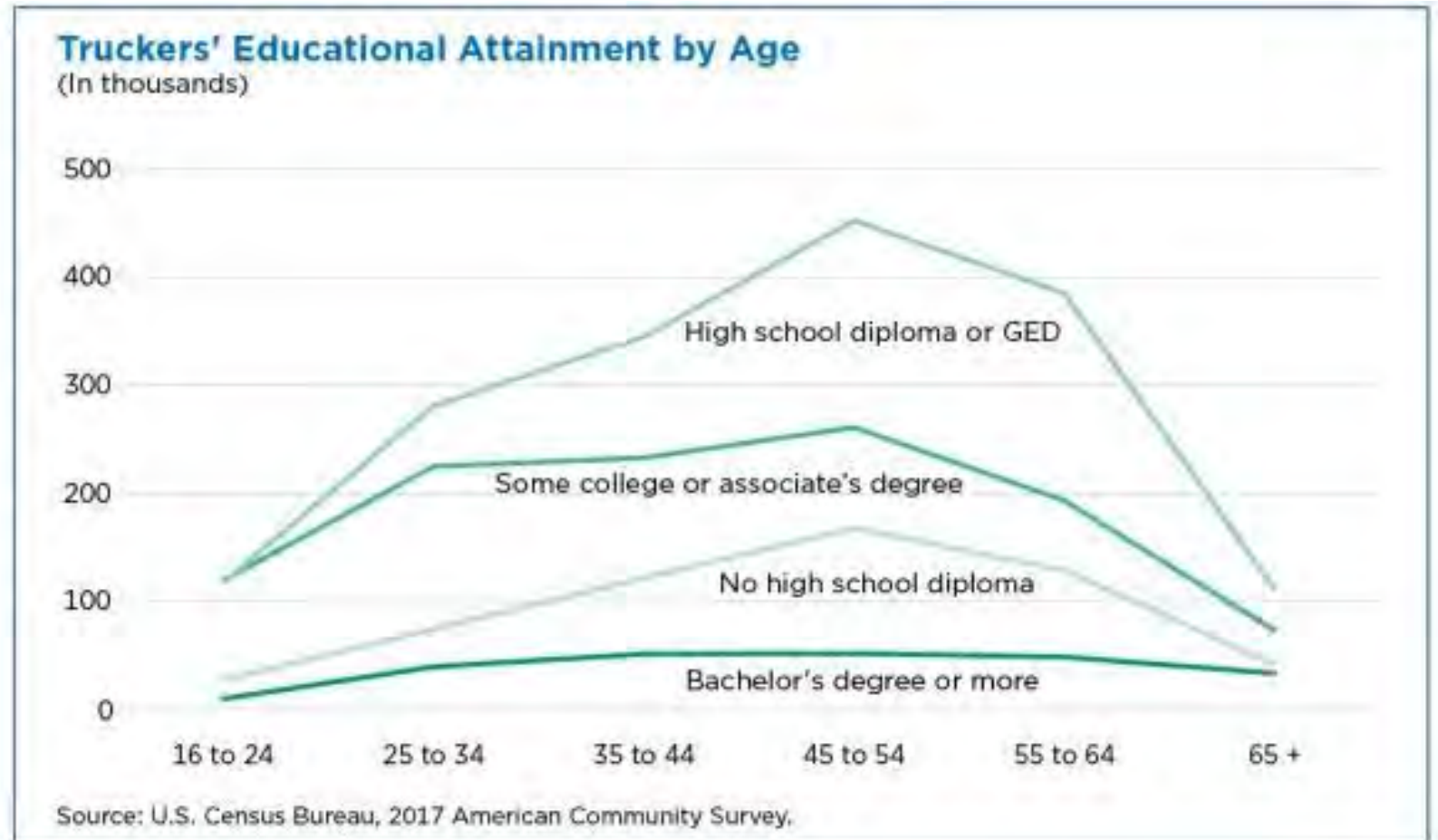
- Gender - Women
  - 10% of drivers
  - 21.1% transportation managers
- Ethnicity
  - See graph
- Age
  - See graph



# What Is Diversity in Trucking?



- Education



# Jobs & Dollars



Data series	Employment, 2019
<a href="#">Bus and truck mechanics and diesel engine specialists</a>	55,690
<a href="#">First-line supervisors/managers of transportation and material-moving machine and vehicle operators</a>	41,570
<a href="#">Laborers and freight, stock, and material movers, hand</a>	122,880
<a href="#">Truck drivers, heavy and tractor-trailer</a>	895,670
<a href="#">Truck drivers, light or delivery services</a>	51,410

Data series	Wages, 2019			
	Hourly		Annual	
	Median	Mean	Median	Mean
<a href="#">Bus and truck mechanics and diesel engine specialists</a>	21.62	22.13	44,970	46,030
<a href="#">First-line supervisors/managers of transportation and material-moving machine and vehicle operators</a>	28.64	29.48	59,570	61,320
<a href="#">Laborers and freight, stock, and material movers, hand</a>	15.89	16.84	33,060	35,020
<a href="#">Truck drivers, heavy and tractor-trailer</a>	22.29	22.79	46,370	47,400
<a href="#">Truck drivers, light or delivery services</a>	20.17	20.75	41,960	43,150

Perennial shortages in all these roles



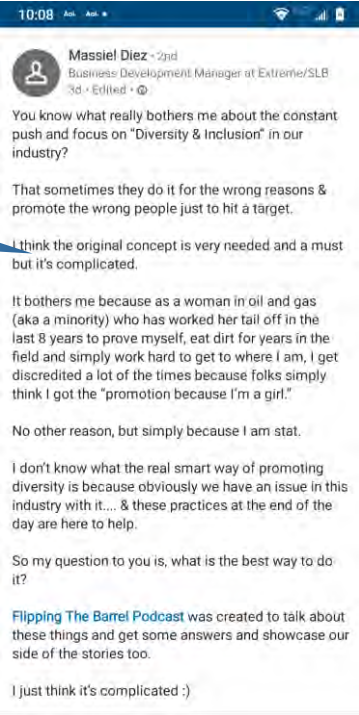
# Diversity is Complicated

## Diversity and Inclusion

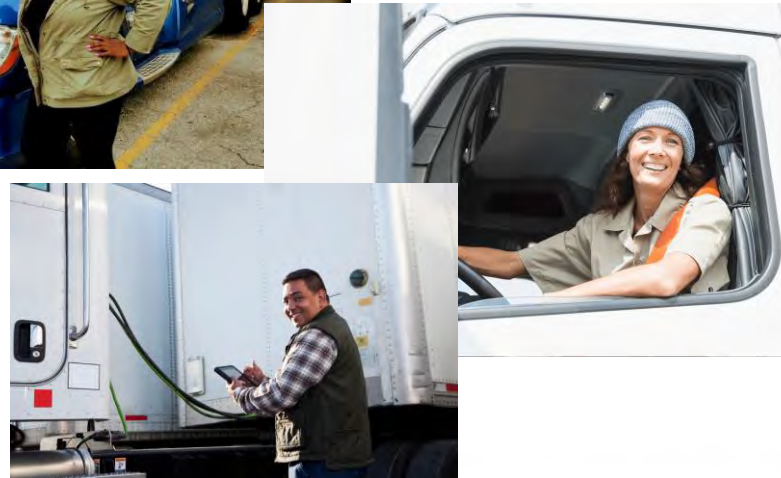
*"I think the original concept is very needed and a must but it is complicated"*  
Massiel Diez

### Common Ground

- Everyone can add value
- Everyone wants to be valued
- Everyone wants to be of value



# Progress Being Made



Cummins Inc.  
493,495 followers  
4h • 🌐

Today [Cummins Inc.](#) announced the promotion of six individuals to vice presidents. These employees are John Gaidoo, Judy Brunson, Bonnie... see more

## Cummins Appoints Six New Officers



**John Gaidoo**  
Vice President  
Deputy General Counsel,  
Employment and Labor Relations



**Cathy Van Way**  
Vice President  
Government Relations



**John Brockhaus**  
Vice President  
Human Resources,  
Technology and Strategy



**Judy Brunson**  
Vice President  
Quality



**Bonnie Fetch**  
Vice President  
ORU Supply Chain Services



**Angel Franklin**  
Vice President  
Compensation and Benefits

**PETERBILT RECOGNIZED AS A TOP  
PLACE TO WORK FOR WOMEN 2018**

# Today's Panelists



**Denise Rondini**  
*Freelance Writer*  
Rondini Communications



**Jessie Lund**  
*Senior Associate*  
Rocky Mountain Institute (RMI)



**Emily Conway**  
*Fleet Sustainability Manager*  
PepsiCo



# Denise Rondini



**Denise Rondini**

*Freelance Writer*

**Rondini Communications**



# Trucks Back In The Day



Typical trucks from 1982



# My trucking industry journey



2020 Accelerate! Virtual Conference & Expo • Women In Trucking Association

# What Is Diversity?



Not just:

- Gender
- Ethnicity
- Skin color



Also Includes:

- Age
- Culture
- Sexual Orientation
- Education
- Background
- Experience
- Physical Abilities

# What Diversity Looks Like



# Why It Matters



Higher Innovation & Increased Creativity



Better/Faster Decision Making



Higher Employee Engagement

# Why It Matters



Reduced Employee Turnover



Better Company Reputation



Increased Profits

# How We Make It Happen



Start in Elementary School  
& Stay Involved



Girl Scouts



Build Relationships



Find A Mentor/Be A  
Mentor

# Where We Are Today



We've come a long way and  
have made progress...

But we've still got ground to  
cover.

*WTA*

*WTA*



# Trucks Today & Tomorrow



Today's Fuel- Efficient Trucks

The Tesla Semi

The Nikola Tre



# Jessie Lund



**Jessie Lund**

*Senior Associate*

**Rocky Mountain Institute (RMI)**



2020 Accelerate! Virtual Conference & Expo • Women In Trucking Association

# Driver Shortage



- Perennial challenge for trucking industry
- Shortage of ~60,000 drivers
- Causes:
  - Age
  - Gender
  - Lifestyle
  - Competition (construction, food delivery, etc.)
  - Industry growth
- 1.1M new hires expected over the next decade
  - Replacing retiring truck drivers will account for ~54%
  - Industry growth will account for ~25%
- Turnover also a challenge
  - 89% for large for-hire truckload carriers & 73% for small for-hire truckload fleets
- Because of COVID-19, the number of people obtaining CDLs is expected to drop by >40% this year



# ZEVs & Driver Recruitment & Retention



Zero-Emission Vehicles (ZEVs) can help attract drivers & expand diversity of applicant pool.

- Less Noise
- Higher Torque/Performance
- Cleaner Operations (literally)
- Driver Comfort
- “Cool Factor”



# Millennials & Gen Z



- 80% of Millennials and Gen Zs think government and business need to make greater efforts to protect the environment
- Climate change/protecting the environment is among the top 3 concerns for Millennials and Gen Zs (along with health care and unemployment)
- 76% of Millennials consider a company's social and environmental commitments when deciding where to work
- 64% won't take a job if a potential employer doesn't have strong corporate social responsibility (CSR) practices
- 83% would be more loyal to a company that helps them contribute to social and environmental issues

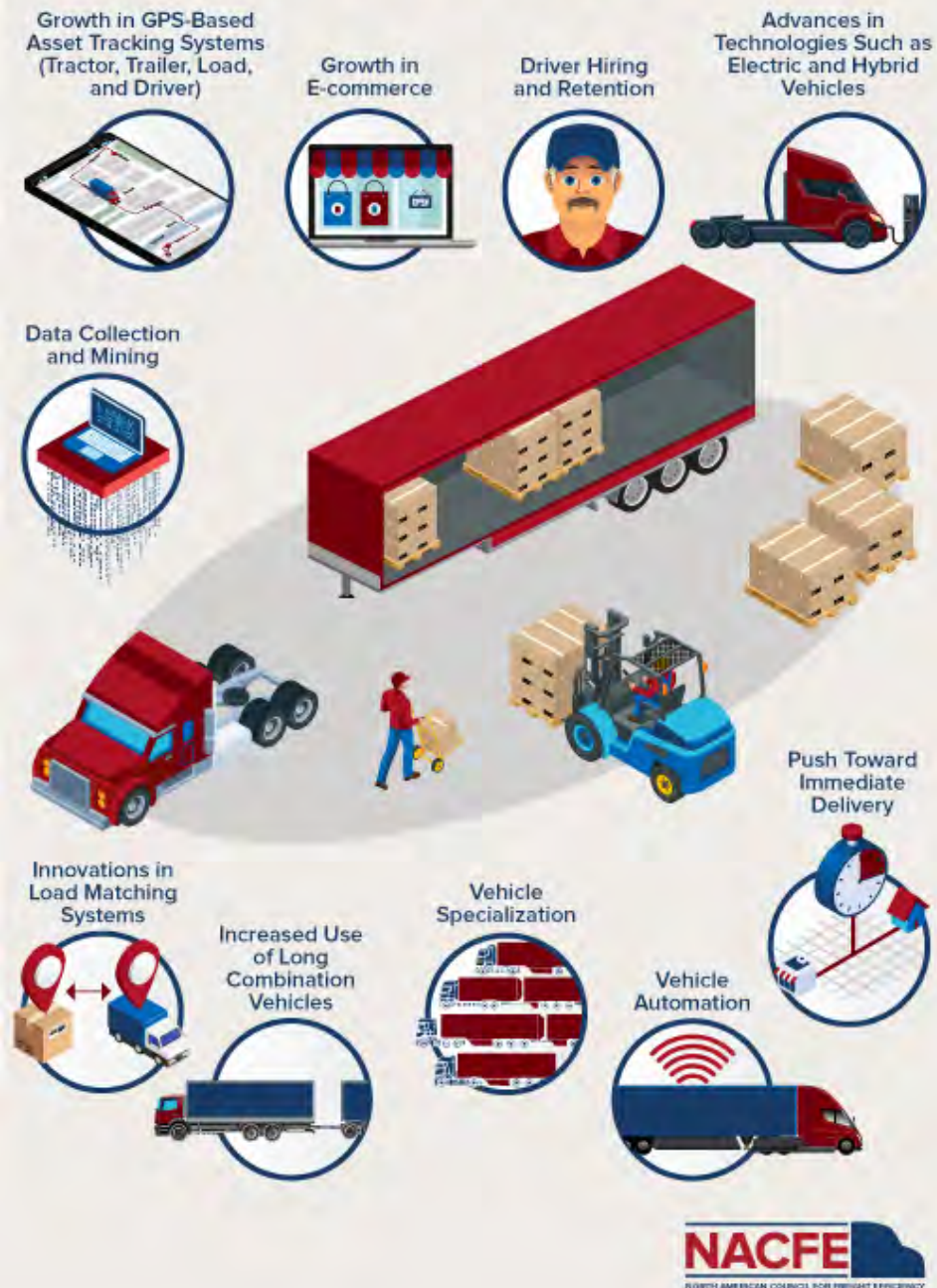
# STEM Fans



- High-profile entrepreneurs like Elon Musk & Trevor Milton
  - Influential social media users with a combined Twitter following of ~40M



# 10 Trends of Regional Haul Growth



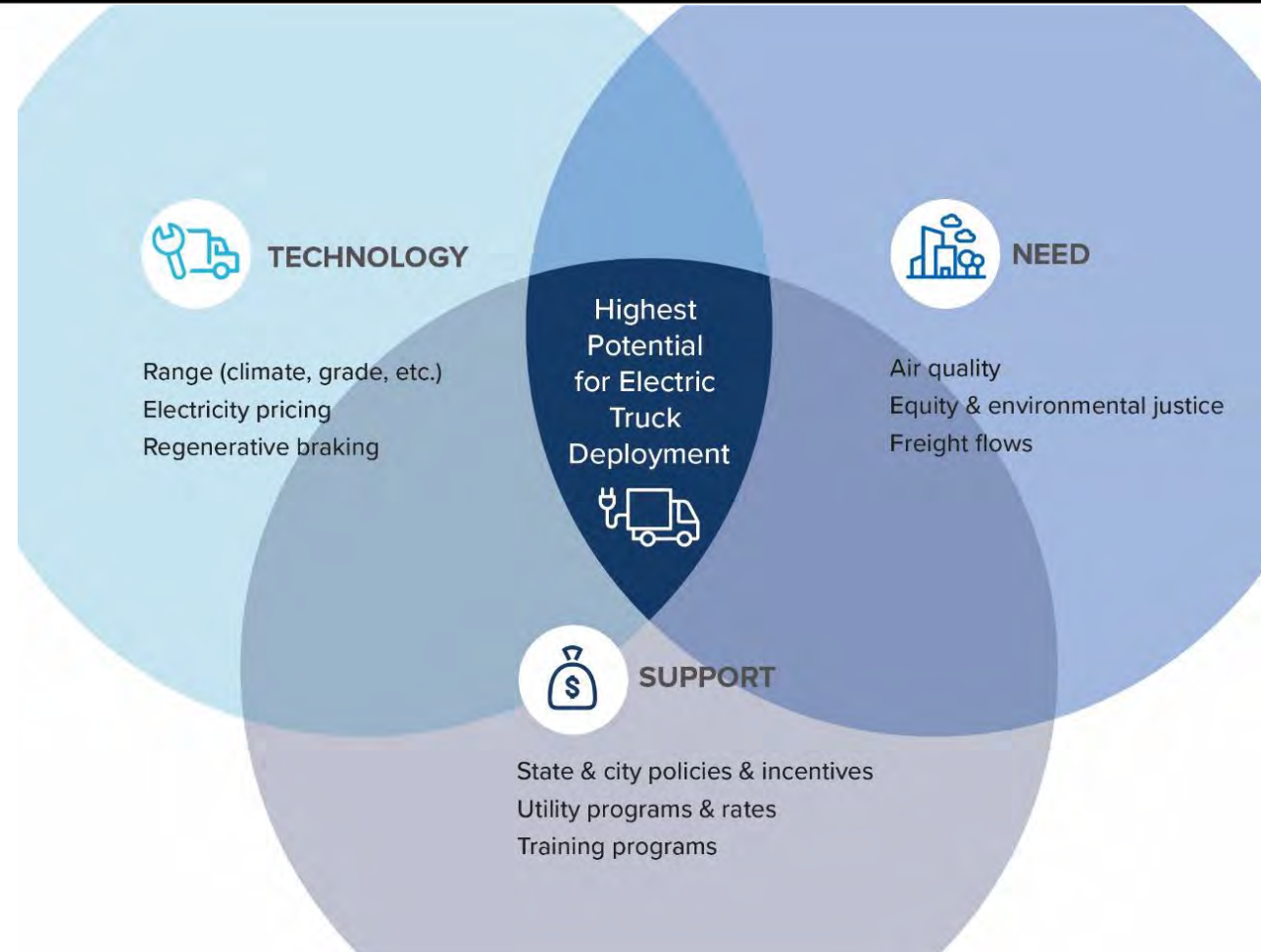
## Regional Haul



### More regional haul operations are conducive to ZEVs and a more diverse driver pool

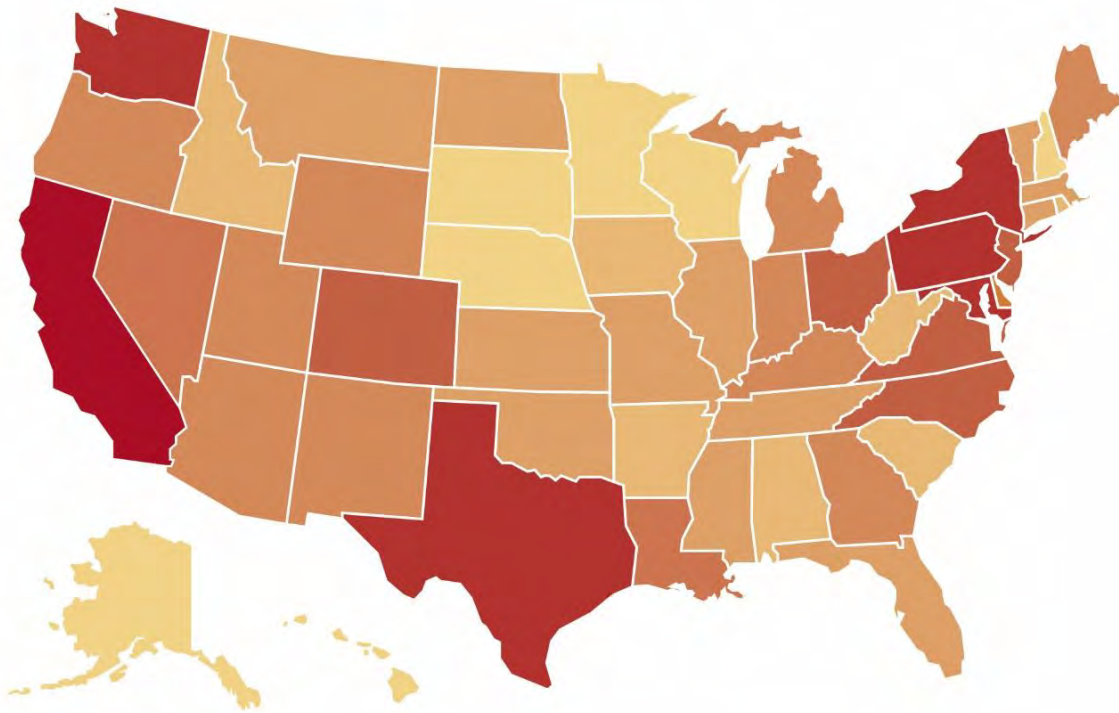
- Observed growth in regional haul operations, documented in 2019 NACFE report, *More Regional Haul: An Opportunity for Trucking*
- Driven by a combination of several factors
- Regional haul is also fertile ground for ZEVs, given its short-haul nature and return-to-base operations
  - Relatively straightforward to build out charging/fueling infrastructure
- Regional operations also mean drivers are more likely to get home on a regular basis
  - Attractive career for more people of all backgrounds and identities

# eTrucks Sit at the Intersection of Many Industries and Skillsets





# Diversity of Regions



## High-Potential Regions

- California
- Cascadia (OR & WA)
- Texas
- Front Range (CO)
- Northeast (NY, PA, MA)



# Diversity & Inclusion Index



## WIT launching **Diversity & Inclusion (D&I) Index**

- D&I Index designed to:
  - document the programs that fleets currently use
  - share best practices that have proven successful across the industry
  - recognize creative solutions in different areas
- 1<sup>st</sup> edition will open for applications in March 2021
- Results unveiled in Fall 2021
- More info to come in “Taking Transportation Forward: The WIT Diversity & Inclusion Index” *Accelerate!* Session



# Emily Conway



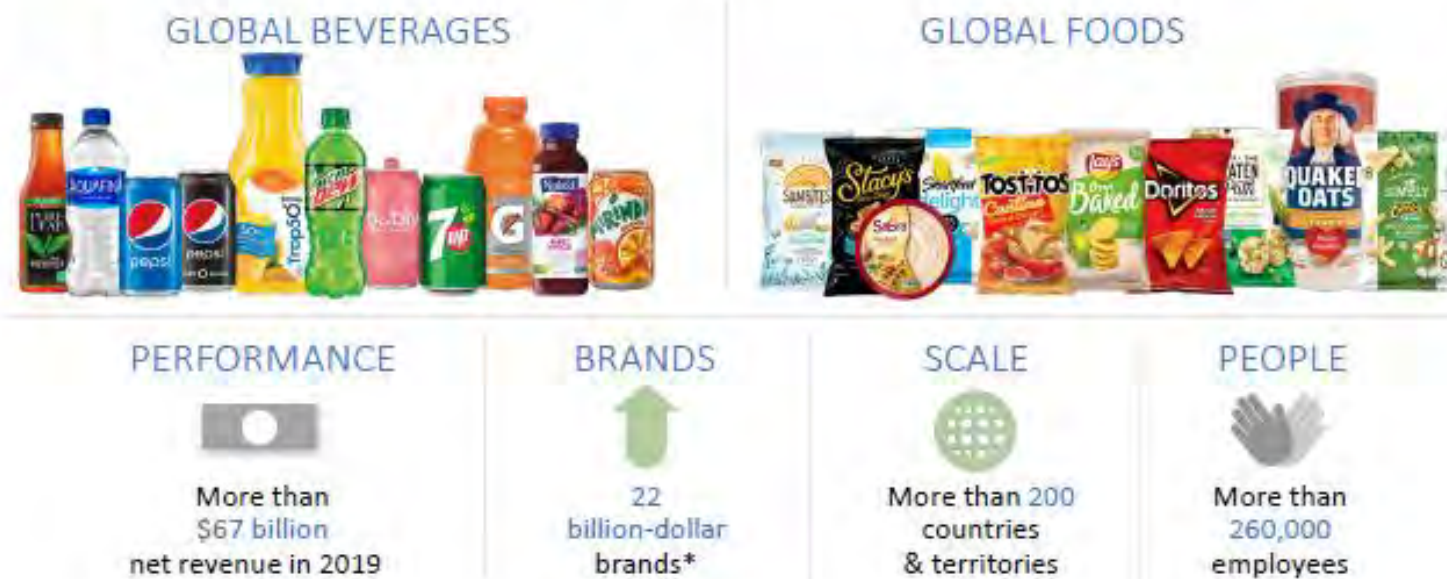
**Emily Conway**  
*Fleet Sustainability Manager*  
PepsiCo



# About PepsiCo



PepsiCo products are enjoyed by consumers more than one billion times a day in more than 200 countries and territories around the world. PepsiCo's product portfolio includes a wide range of enjoyable foods and beverages, including 22 brands that each generates \$1 billion or more in estimated annual retail sales.



\*Based on 2019 estimated annual retail sales



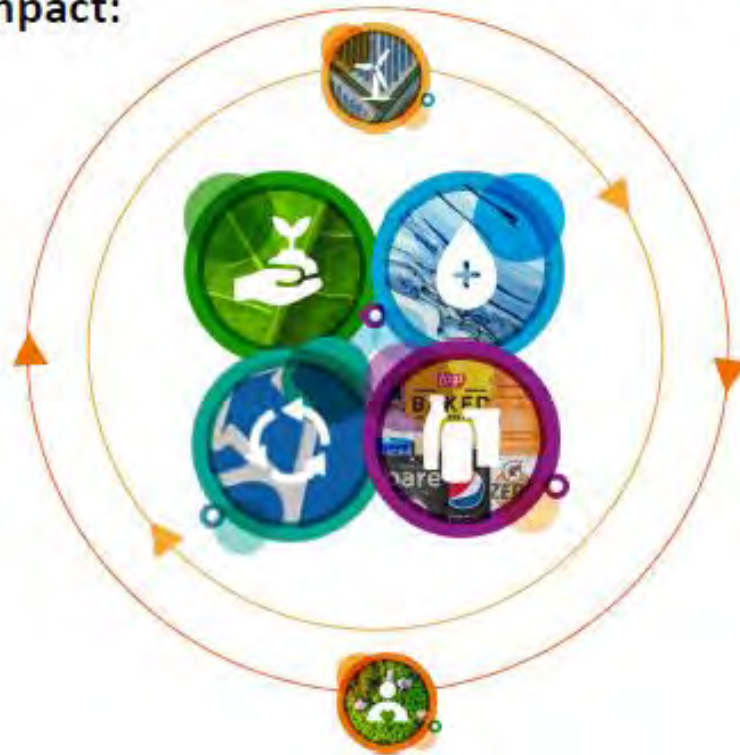
# PepsiCo Winning with Purpose

<b>MISSION</b>	Create more smiles with every sip and every bite		
<b>VISION</b>	Be the global leader in convenient foods and beverages by winning with purpose		
<b>THE PEPSICO WAY</b>	<b>FASTER</b> Winning in the marketplace, being more consumer-centric and accelerating investment for topline growth	<b>STRONGER</b> Transforming our capabilities, cost, and culture by operating as one PepsiCo, leveraging technology, winning locally and globally enabled	<b>BETTER</b> Integrating purpose into our business strategy and our brands, and doing even more for the planet and for our people

# Building a More Sustainable Food System



PepsiCo's sustainability agenda focuses on six priority areas where we believe we can have the most impact:



**AGRICULTURE**



**WATER**



**PACKAGING**



**PRODUCTS**



**CLIMATE**



**PEOPLE & PROSPERITY**

# People



**\$38.5M**

invested since 2016 to support workforce readiness and empower women



More than  
**\$60M &  
50M meals**

donated in early 2020 to support communities most impacted by the COVID-19 pandemic

matching donations from employees led to

**\$11M**

in charitable contributions in 2019

Advancing respect for human rights, promoting diverse and inclusive workplaces, and empowering women across our business and throughout our global value chain:

- » [Human Rights](#): In 2020 published our first Human Rights Report, outlining our continued commitment, approach, and progress in advancing respect for human rights
- » [Diverse & Inclusive Workplaces](#): In 2019, women held 41% of our manager positions, progress toward our goal of 50%
- » [Empowering Communities](#): In 2019, we worked with over 260 diverse-owned businesses in the U.S. and Canada and spent \$1.4B with Tier 1 and Tier 2 suppliers



# Supply Chain – Frito-Lay U.S.



BINs	●	(817)
PECs	○	(333)
DCs	●	(152)
Copack/Repack	●	(60)
Plant	●	(31)
Warehouse	●	(19)



# One of North America's Largest Private Fleets





# Deployed Technologies



					
<b>Asset</b>	<b>CNG Tractors</b>	<b>Propane Vans</b>	<b>Electric Vehicles</b>	<b>High MPG Van</b>	<b>Full Aero Trailers</b>
<b>Detail</b>	OTR and Delivery	Class 3/4 Delivery Vans	All Electric Straight Trucks	Route Delivery Vans	Aero devices, LRR tires, tire inflation

300



					
<b>Asset</b>	<b>Parallel Hybrid Tractor</b>	<b>Parallel Hybrid Vans</b>	<b>CNG Tractor</b>	<b>Electric Vans</b>	<b>Hybrid and Electric FSV</b>
<b>Detail</b>	Delivery Tractors and Bay Trucks	Pepsi Equipment Services Vans	Transport Tractors	All Electric Service Van	Vending Service Trucks

# Transforming Modesto Frito-Lay Project



Funded in part by California Climate Investments, and in partnership with the San Joaquin Valley Air Pollution Control District, Frito-Lay is transforming the Modesto plant into a near-zero emission freight facility.

## Project Partners:

San Joaquin Valley Air Pollution Control District, American Natural Gas, Tesla, Peterbilt, Meritor, Volvo, Crown, BYD Motors LLC, ChargePoint, Café Coop, Project Clean Air, CALSTART, University of California, Riverside CE-CERT, Gladstein Neandross & Associates



Transforming Modesto Video: <https://youtu.be/liR-MBt08Bg>



# Transforming Modesto Equipment



Scope includes:

- Electric yard tractors, box trucks, and tractors
- Low NO<sub>x</sub> CNG tractors
- Nearby natural gas fueling station with renewable attributes
- Li-ion powered forklifts
- Heavy-duty Electric Vehicle Support Equipment (EVSE) with battery storage
- Solar carport with battery storage
- Employee light-duty EVSE



# Q & A



**Denise Rondini**  
*Freelance Writer*  
Rondini Communications



**Jessie Lund**  
*Senior Associate*  
Rocky Mountain Institute (RMI)



**Emily Conway**  
*Fleet Sustainability Manager*  
PepsiCo



# Question 1



- What advice would you give women about getting into the trucking industry?



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# Question 2



- What makes electric trucks promising to you for diversity?



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PepsiCo

# Question 3



- How do we expand the applicant pool across genders, age groups and ethnicities?



**Emily Conway**

*Fleet Sustainability*

*Manager*

**PepsiCo**

# Question 4



- Social justice seems a big part of funding for electrification in California.
- How do electric trucks improve quality of life?



**Jessie Lund**  
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# Final Thoughts



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# Resources



- **NACFE** - [www.NACFE.org](http://www.NACFE.org)
  - Electric Trucks - <https://nacfe.org/emerging-technology/electric-trucks-2/>
  - Run on Less demonstrations - <https://nacfe.org/run-on-less/>
  - [Battery Electric Powertrains for Class 8 Regional Haul Freight Based on NACFE Run-On-Less](#)
  - [Fuel Cell Electric Trucks: An analysis of hybrid vehicle specifications for regional freight transport](#)
- **Mathworks Math Modeling Challenge** - <https://m3challenge.siam.org/>
- **PepsiCo** - <https://www.pepsico.com/about/diversity-and-engagement>