



Will Trucking Lead The Way in Connected Vehicles

Dave Schaller
Wharton: June 2017

An effort of the Carbon War Room and the North American Council for Freight Efficiency



Today's Topics



Who is NACFE

What We Do

Gathering VOC

Adoption Curves

Fleet Fuel Study

Disruptive Technologies

Questions



Trucking Efficiency



Dedicated to doubling the efficiency of North American goods movement

We pursue this goal in two ways:

1. By improving the quality of information flow and
2. By highlighting successful adoption of technologies



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www.TruckingEfficiency.org

www.RunOnLess.com



US Trucking Fuel Costs



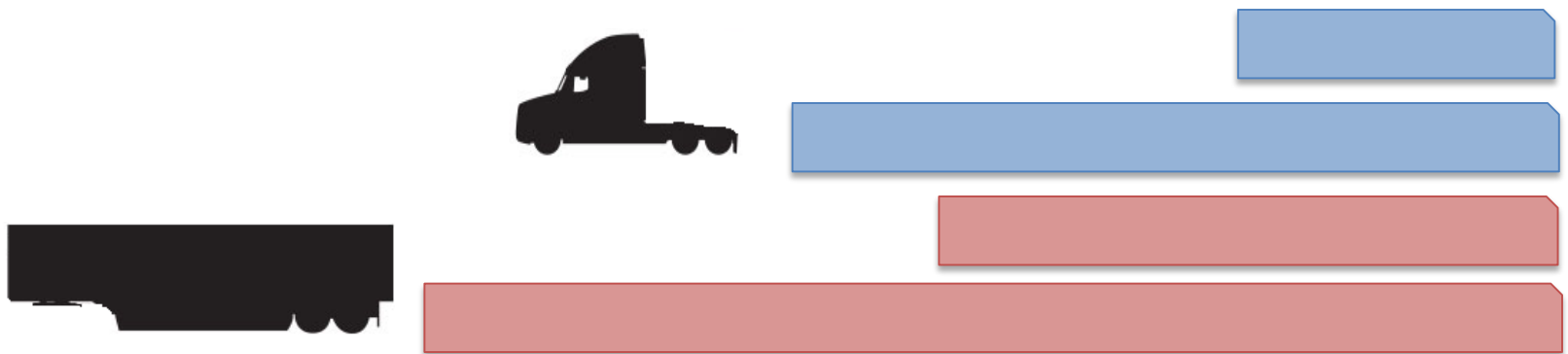
Weekly U.S. No 2 Diesel Retail Prices

DOWNLOAD

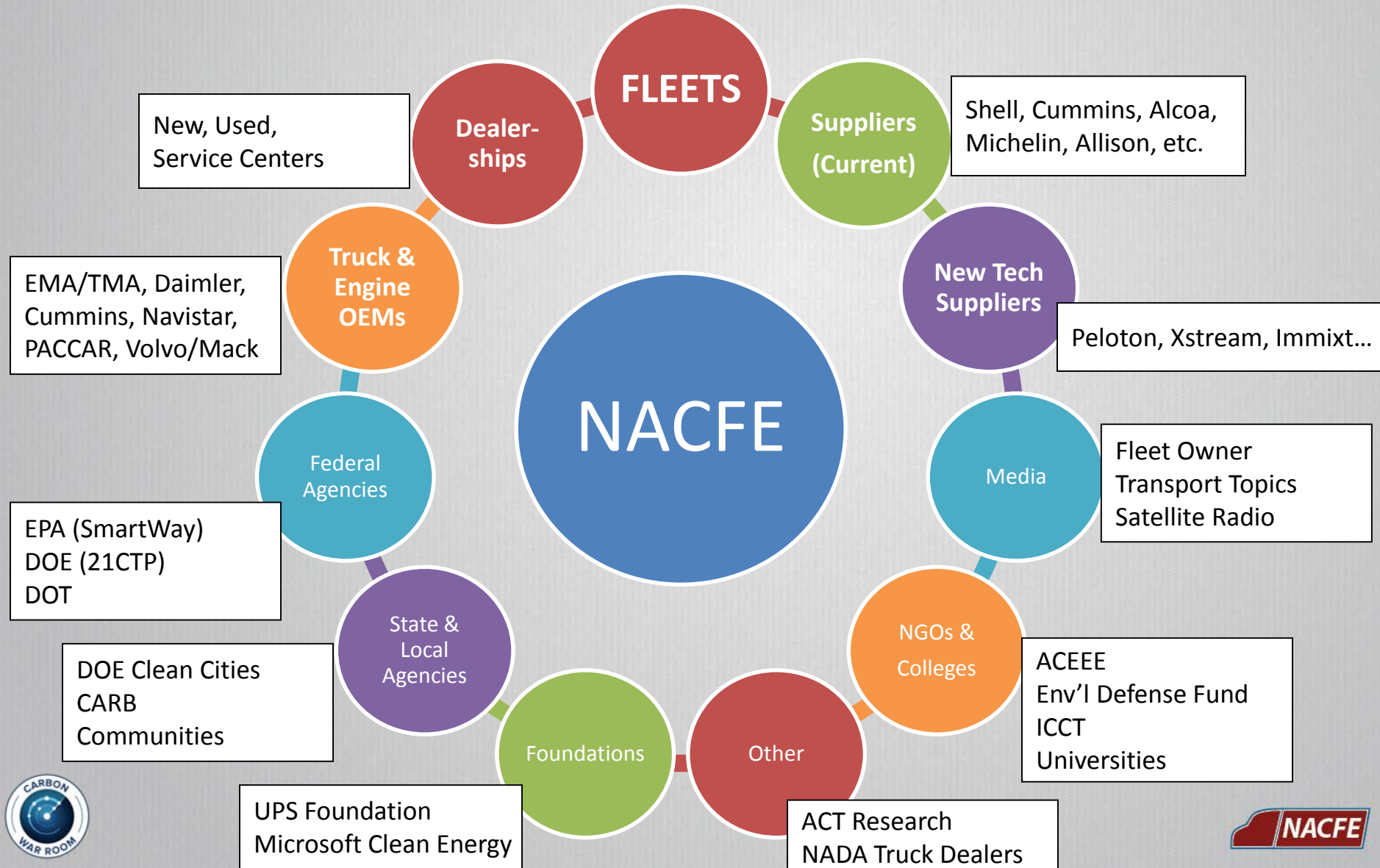
Dollars per Gallon



Source: U.S. Energy Information Administration



Many Voices (& Ears, Eyes)



Confidence Reports



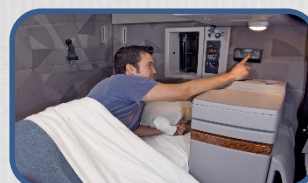
Complete, unbiased review of available technologies for fleet confidence to adopt.



Tire Pressure Systems



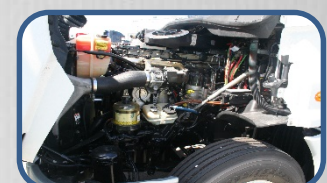
6x2 Axles



Idle Reduction



Transmissions



Engine Parameters



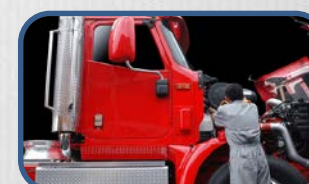
LRR Tires



Lightweighting



Downspeeding



Maintenance for FE



Determining Efficiency



Trailer Aerodynamics



Tractor Aerodynamics



Lubricants



Platooning



Engine Accessories

www.TruckingEfficiency.org



Two Truck Platooning



Conclusions

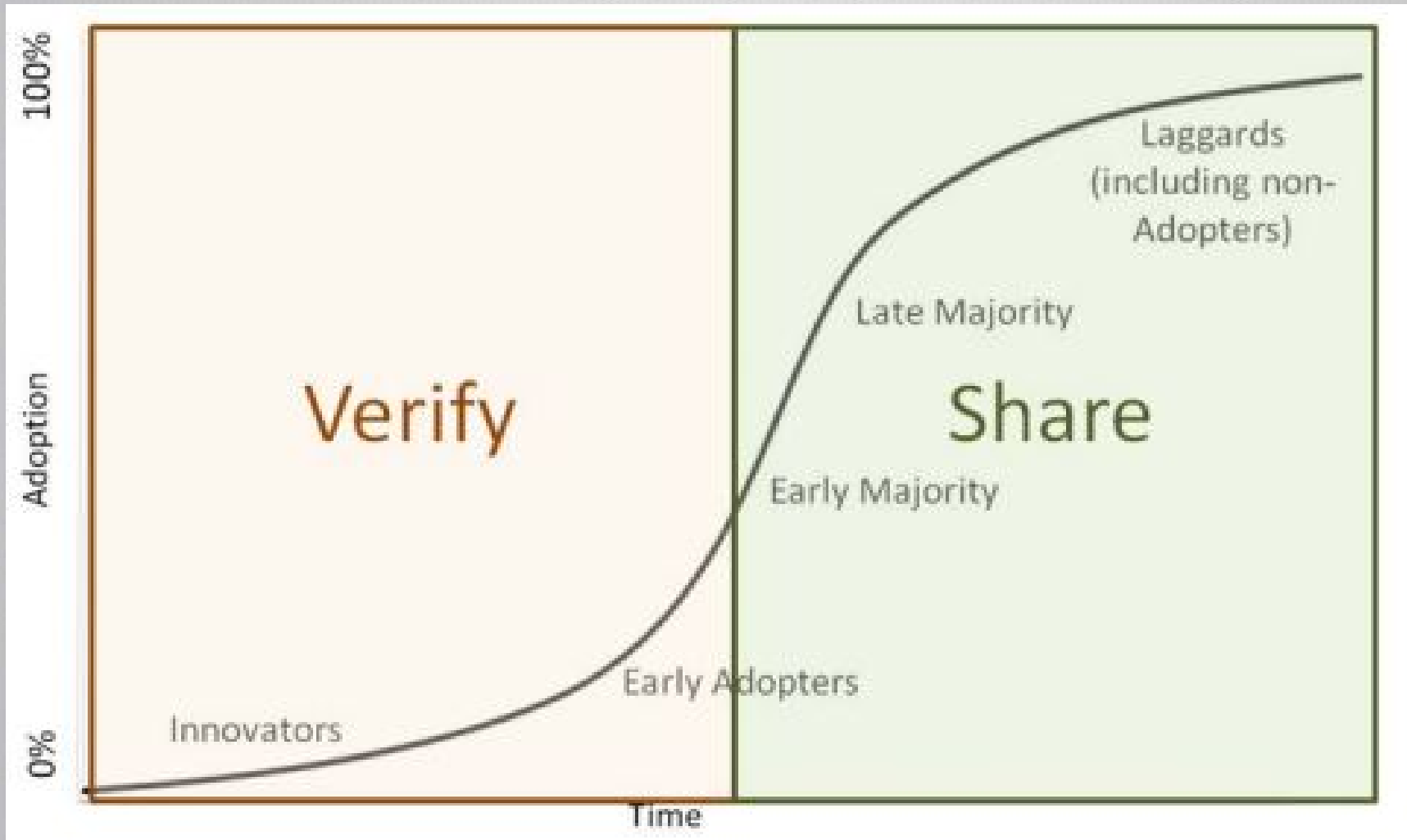
- Valid/proven fuel-saving strategy for fleets
- Bulk of required technology currently available
- Intervals not as close as widely believed
- Minimal stress on drivers
- Begin as inner-fleet option
- Become extra-fleet option quickly
- Will expedite autonomous driving tech



<http://truckingefficiency.org/operational-practices/two-truck-platooning>



Trucking Transitions



2016 Annual Fleet Fuel Study



Technologies

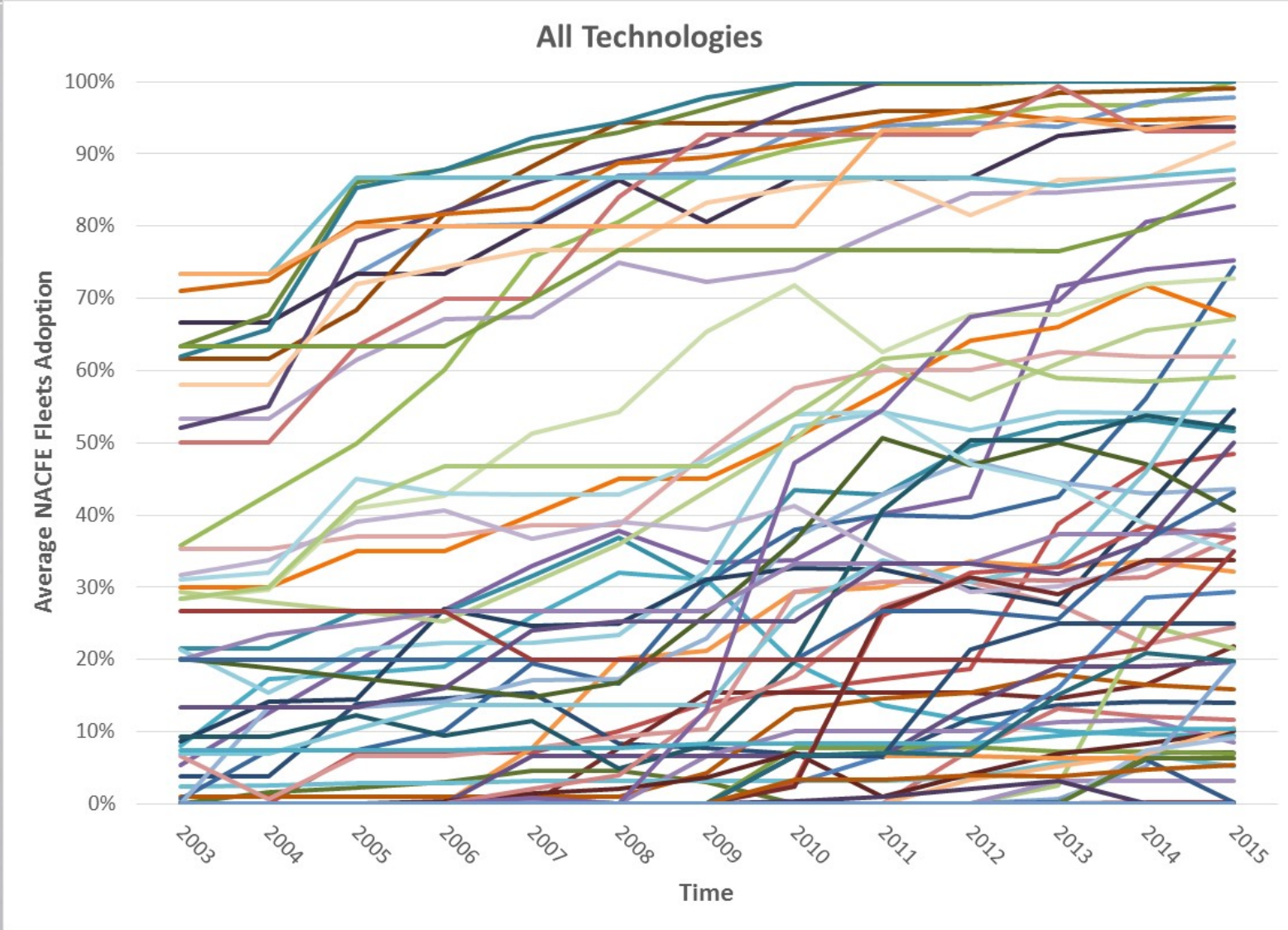
- Which ones are most popular on new tractors and trailers?
- Did fleets keep buying them?
- Are they delivering fuel savings?



- 5th Annual Report
- 62,000 tractors and 217,000 trailers
- Lower fuel prices
- GHG Phase 2






Adoption Curves: Business Cases





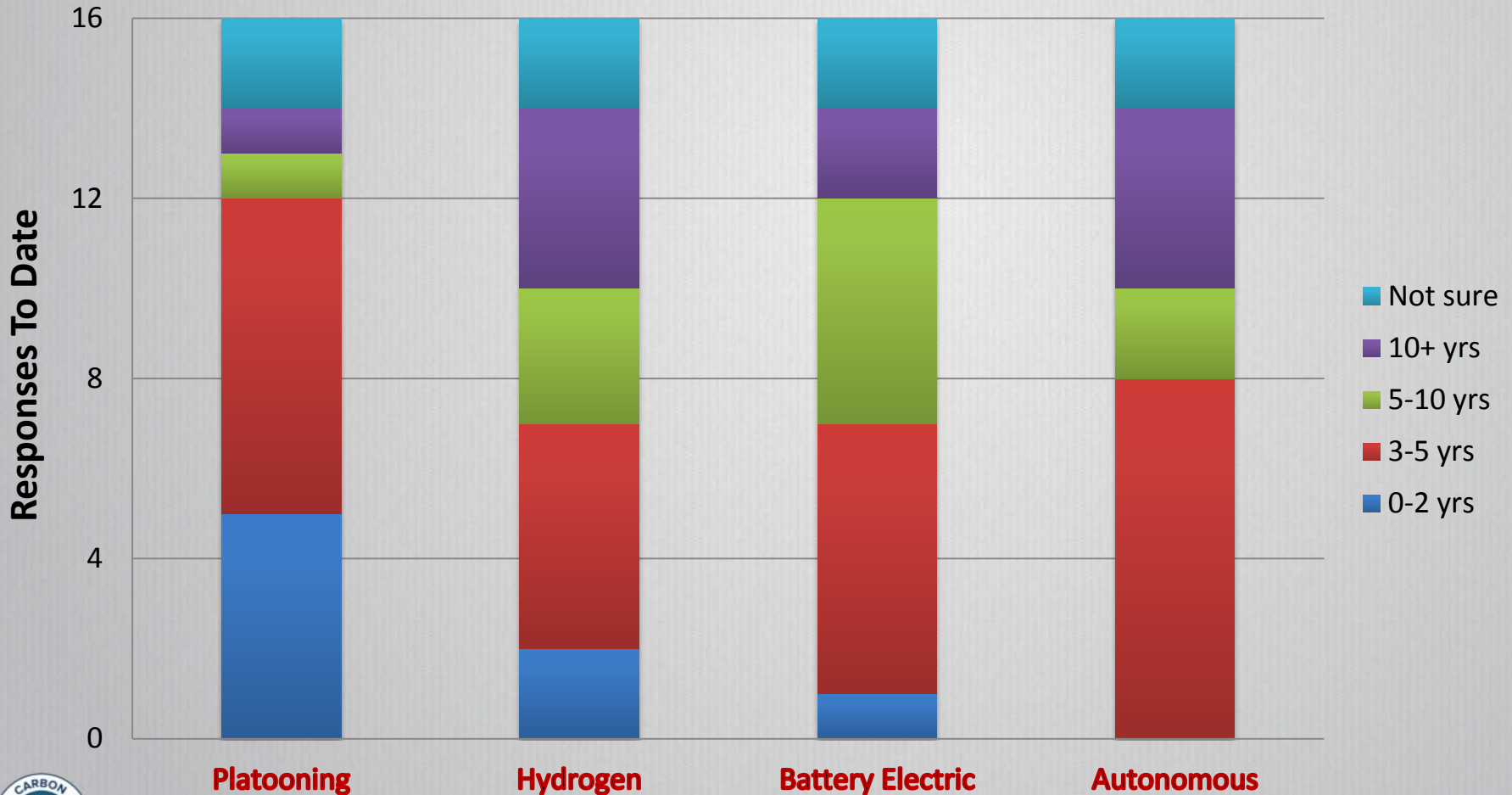
3 Waves of Technology

	Available Technology	Emerging Technology	Bold Disruptor
Definition	Truck technologies that are already valid and adopted in the market.	Truck technologies that have great potential to change the status quo.	New truck technologies that completely change the common trucks on the road.
Features	<ul style="list-style-type: none"> • Verified fuel economy benefits. • Fleets are following up to adopt these techs. • Continuing to improve, but the space is limited. • Flat investment with higher willingness to accept. 	<ul style="list-style-type: none"> • Have lots of benefits on safety and fuel saving. • Not fully developed and requires more testing. • Start to be adopted by innovators on the market. • Further funding and policy support are critical. 	<ul style="list-style-type: none"> • Much better fuel economy. • Bigger uncertainty to the public and customers. • Higher capital investment at the beginning. • Hard to find first one to try.
Examples	<p>Tire Pressure Adjustment, Light Weighting, Fairing, etc.</p> 	<p>Platooning, Engine Accessories</p> 	<p>Autonomous, Hydrogen, Battery Electric</p> 

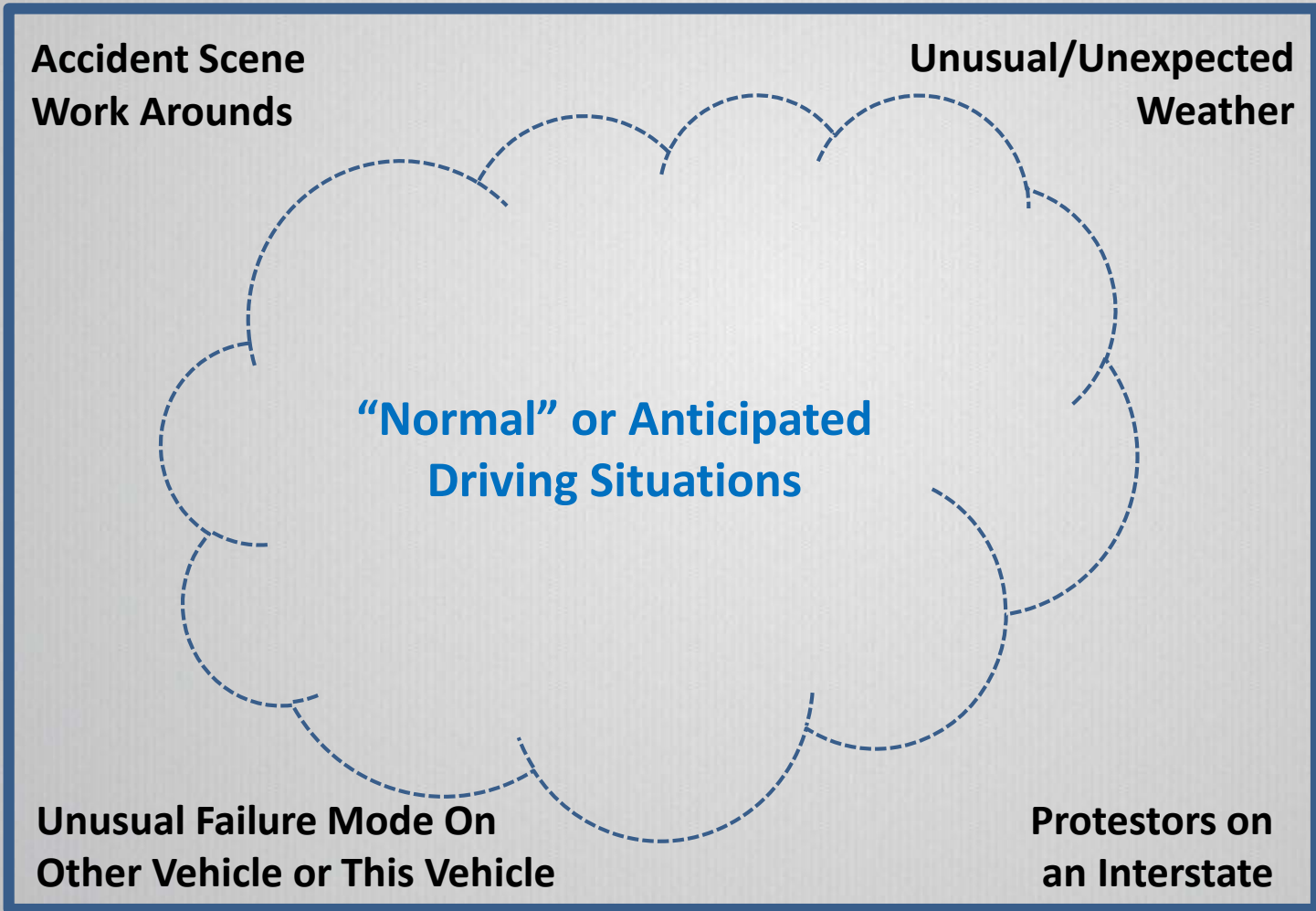
Embracing Industry Disrupters



NACFE Research on Time Required for Technologies to be Adopted as Common Place on the Road



“Corner Cases” Are Typically The Development & Validation Challenge



Corners for Confidence in Autonomy



In Their Neighborhood

NOT In Their Neighborhood

Supports Consumers



Doesn't Support Consumers

Other Applications: Drayage, Private Tour Grounds, Airport Rental Car Shuttles...



Other Operational Features: Platooning, Parking, Docking...





Summary

1. Manufacturers & Suppliers need to interface closely with fleets, mechanics and drivers in autonomy development & validation.
2. Progress can be made in fringe applications before legislation & society confidence catch up to technology development.
3. Commercial trucks, as tools for business, have a large potential economic benefit for autonomy.



Thank you – Questions?



WIND TUNNEL
Driver Coaching

Driver Coaching

Engine Automated Parameters Xmins

IDLE REDUCTION

NORTH AMERICAN COUNCIL FOR FREIGHT EFFICIENCY

lightweighting FLEET SURVEYS

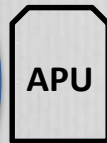
Sir Richard Branson

Amory Lovins

MPGS PLATOONING: PLATOONING SUSTAINABILITY

AERO

Low Viscosity Lubricants



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Dave Schaller

260.602.5713

David.Schaller@NACFE.org

www.TruckingEfficiency.org

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