John Rich
Vice President
and CTO
Commercial Vehicle Impact

~70% Of US Freight Moved By Truck*

~2/3 Of GDP Worth Of Freight Moved Per Year*

~12 Million Trucks In The US*

US Highway Energy Used**

Passenger 71%

Class 7-8 23%

Class 3-6 6%

*2019 DOT Freight Facts And Figures

**2020 ORNL Transportation Data Book
Alternative Powertrain In Freight Network

- <100 Miles: BEV
- 100-400 Miles: BEV -> Fuel Cell
- 400-3000 Miles: Diesel Mild Hybrid (eFuel/Bio/PtL)
Electric Trucks Are Designed & Built Here
• Part of $50M CARB ZANZEFF Grant
• 15 Class 8 Tractors: Peterbilt Model 579EV
• Range 175 Miles
• Collaboration With TransPower
• Drayage in Port of Oakland and Port of LA
Early Experience:
• Trucks Drive Smoothly And Have Good Acceleration
• Range Is Limiting Compared To Diesel, Used For Specific Routes
• Maintenance Costs Are Lower Than Diesel
• Infrastructure Delays Caused Deployment Delays
FCEV Deployment @ Port of LA

- $41M CARB Grant
- 10 Class 8 Tractors: Kenworth Model T680 FCEV
- Powered by Toyota Hydrogen Fuel Cells
- Range 350 Miles
- Drayage in Port of Los Angeles & Regional-Haul in Inland Empire

Featured Partners: Toyota Motor North America, Shell Oil Products U.S., Toyota Logistics Services, UPS, Total Transportation Services Inc., Southern Counties Express, South Coast Air Quality Management District, Port of Hueneme, Cap and Trade, California Air Resources Board (CARB), California Climate Investments (CCI)
Early Experience:
• Trucks Are Easy To Fill And Operate
• Quicker & Quieter Than Diesel
• Much Higher Range Than BEVs
• Extensive Technician Training Needed
• Infrastructure & Hydrogen Are Expensive
• Consider Trucks And Infrastructure In Combination
• Infrastructure Timelines Often Longer Than Truck
• Mostly Depot Charging But On-Route Needed For Emergencies
• Planning And Tools Minimize Cost And Productivity Impact
OBSERVATIONS
• Autonomy is Coming – When?, not If?
• Increases Fuel and Freight Efficiency
• Works With Drivers
• New Distribution Models will Emerge

OPPORTUNITIES
• WA State Leadership
• Remove Barriers to Testing
• Develop Technical Workforce
• Promote Efficiency and Safety Benefits
Autonomous Truck Stack

Autonomous Driver

Digitally Controlled Truck Platform

SENSE

PLAN

ACT

LIDAR and Camera

Compute

RADAR

LIDAR

RADAR

Camera
Autonomous Truck Partnership

Strong Collaboration Based On

• Safety Culture
• Technical Leadership
• Complimentary Expertise