"Making Alternative Fuels Relevant, Again"

EASTERN PENNSYLVANIA ALLIANCE FOR CLEAN TRANSPORTATION

EP-ACT

Annual Meeting
November 22nd 2016

Welcome to PECO

PECO®
An Exelon Company

Special Thanks to Our Sustaining Members

EP-ACT is a member supported 501 (c) 3 non-profit organization. We rely on the generosity of our members that fund our mission of petroleum reduction within the transportation sector. We promote clean air; energy independence and economic development by using alternative fuels; vehicles; and technologies in the vehicles we drive.

www.ep-act.org 215-990-8200

For a complete list of all of our stakeholder members go to:
http://ep-act.org/stakeholders

Agenda

10:00- 10:05- *Welcome,*
Liz Murphy– Senior VP Regulatory & External Affairs– PECO

10:05- 10:25- *Introductions-*
Brian Keelen- Chairman -EP-ACT

10:25- 10:35- *State of the Coalition-*
Tony Bandiero- Executive Director -EP-ACT

10:35- 10:45- *Electric Vehicle 's Planning/Workgroup*
Mark Hand– Department of Environmental Protection

10:45- 10:50- *Smart Driver Network*
Tom Bonner– PECO

10:50- 11:05- *Electric*
Brett Gipe– 1st Priority Green Fleets

11:05- 11:20- *Hydrogen*
Nick Mattica- Air Products

11:20- 11: 30- BREAK

11:30- 11:40- *Natural Gas -*
Barry Carr– Landi Renzo

11:40- 11:55- *Propane -*
Derek Whaley– Roush CleanTech

11: 55– 12:10- *Biodiesel*
Dan Falcone– Approved Oil

12:10- 12:20- *2017 Planned Activities*
Nick DeMarie & Caroline McCallum-
Program Manager , Board Member -EP-ACT

12:20- 12:35 *Panel Session* –What Can We Do Together ???

12:35- 1:35 *Networking Luncheon*

Please join us for some early holiday cheer immediately following the event at:
Slánte
Located at: 3000 MARKET STREET PHILADELPHIA, PA 19104 USA

Welcome & Introductions

EASTERN PENNSYLVANIA ALLIANCE FOR CLEAN TRANSPORTATION

EP-ACT

State of the Coalition

Where are Clean Cities?

Compressed Natural Gas

Electricity

Biodiesel

Ethanol

Fuel Economy

Liquefied Natural Gas

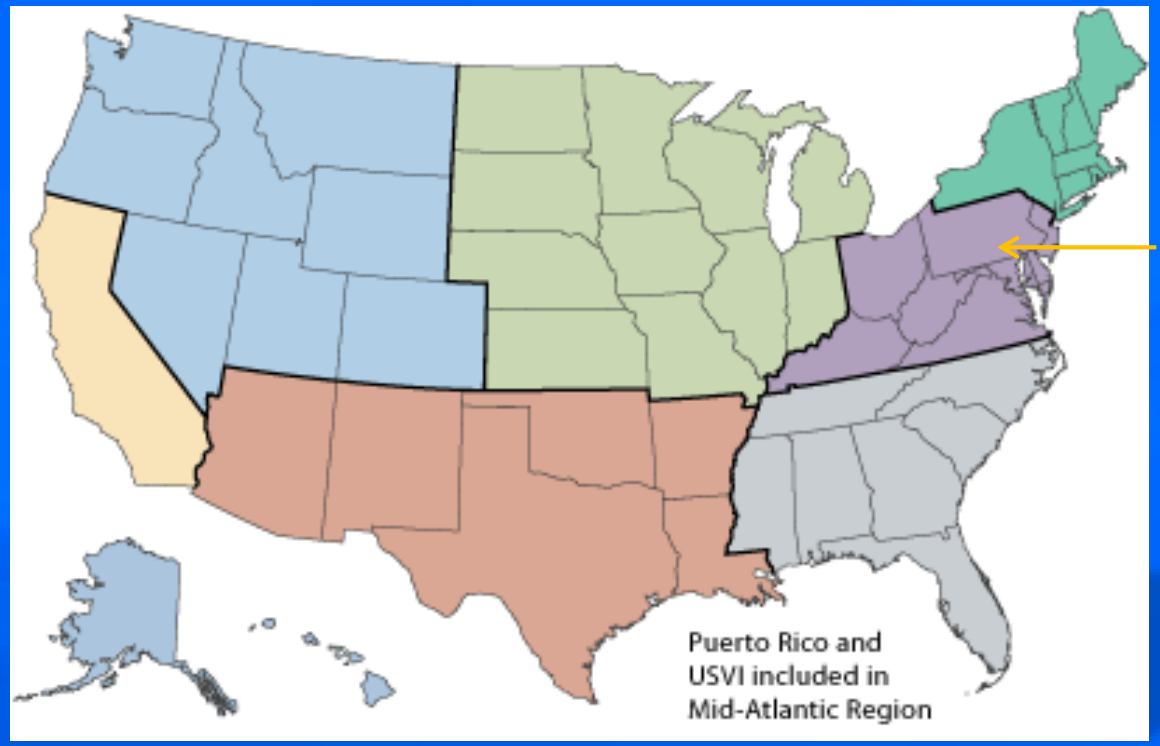
Propane

Hydrogen

Idle Reduction

EP-ACT
Eastern Pennsylvania Alliance for Clean Transportation

Where is EP-ACT?



Mid-Atlantic Region

EP-ACT
Eastern Pennsylvania Alliance for Clean Transportation

Services

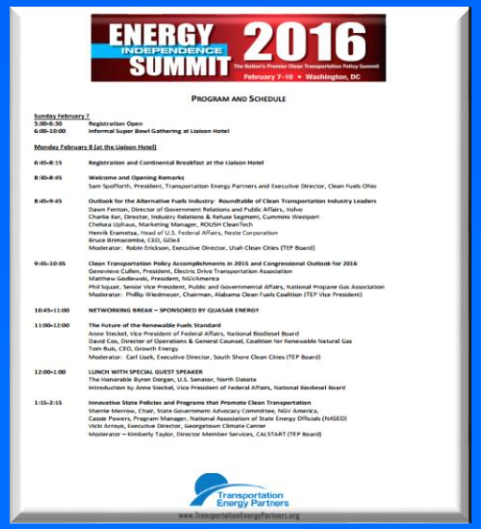
What we offer:

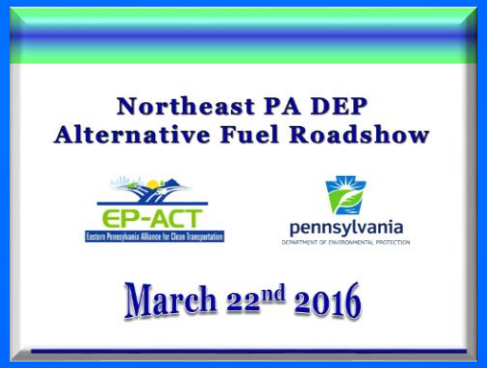
- Workshops/ educational seminars
- Training
- Fleet Analysis
- Facility Analysis
- Informational Resources
- Market Research
- Incentives
- Grant Writing
- Grant Administration
- Project Management
- Networking

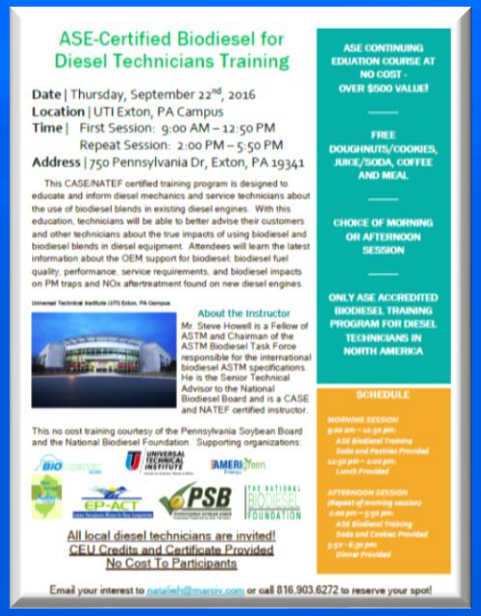
Who is EP-ACT?

- Department of Energy United States of America
- pennsylvania Department of Environmental Protection
- AQUA
- Delaware Valley dvrpc Regional Planning Commission
- Greater Philadelphia Chamber of Commerce — Get involved. Get results. greaterphilachamber.com
- PECO An Exelon Company
- Pennsylvania American Water
- PENSKE
- Shearon Environmental
- Sunoco
- ups
- W.W. Transport Inc.
- Zarwin • Baum • DeVito Kaplan • Schaer • Toddy • P.C. Attorneys at Law
- AAA Mid-Atlantic
- Air & Gas Technologies
- aramark
- ARI
- Clean Energy
- Colonial Airport Parking
- Delaware Valley DVC Concrete Co., Inc.
- LCSWMA Rethink. Recover. Renew.
- Lower Merion School District — Mentem Verum Tas
- Sharp AutoGas Powered by Propane — A Member of Alliance AutoGas
- TransNet
- UGI Energy Services
- Limousine and King Transportation Service, Inc.
- Oxford Engineering Company
- PGW
- West Chester University
- Agility fuel systems
- School District of the Township of Radnor PA — Delaware County
- First Priority Greenfleet
- Rhoads Energy Corporation
- Worley and Obetz
- AMERIgreen Energy
- Constellation An Exelon Company
- Roush Cleantech
- mobile fueling solutions — MFS · Virtual Pipeline
- NASD Norristown Area School District — Paths to Excellence
- Gannett Fleming
- GVF A Transportation Management Association
- The Partnership TMA
- TMA Bucks A Transportation Management Association
- TMACC Transportation Management Association of Chester County
- United States Environmental Protection Agency
- GSA

2016 Activities/Initiatives/Projects

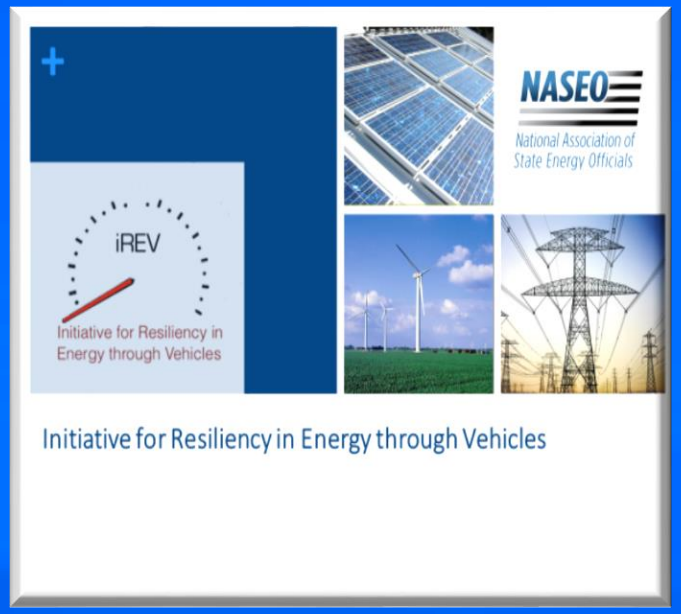


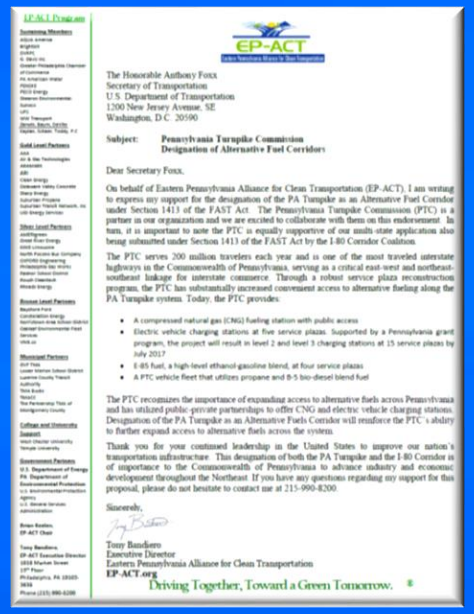


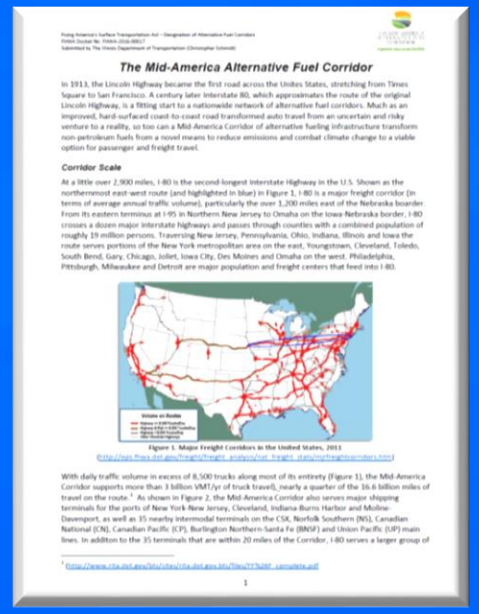


2016 Activities/Initiatives/Projects

Current: Activities/Initiatives/Projects







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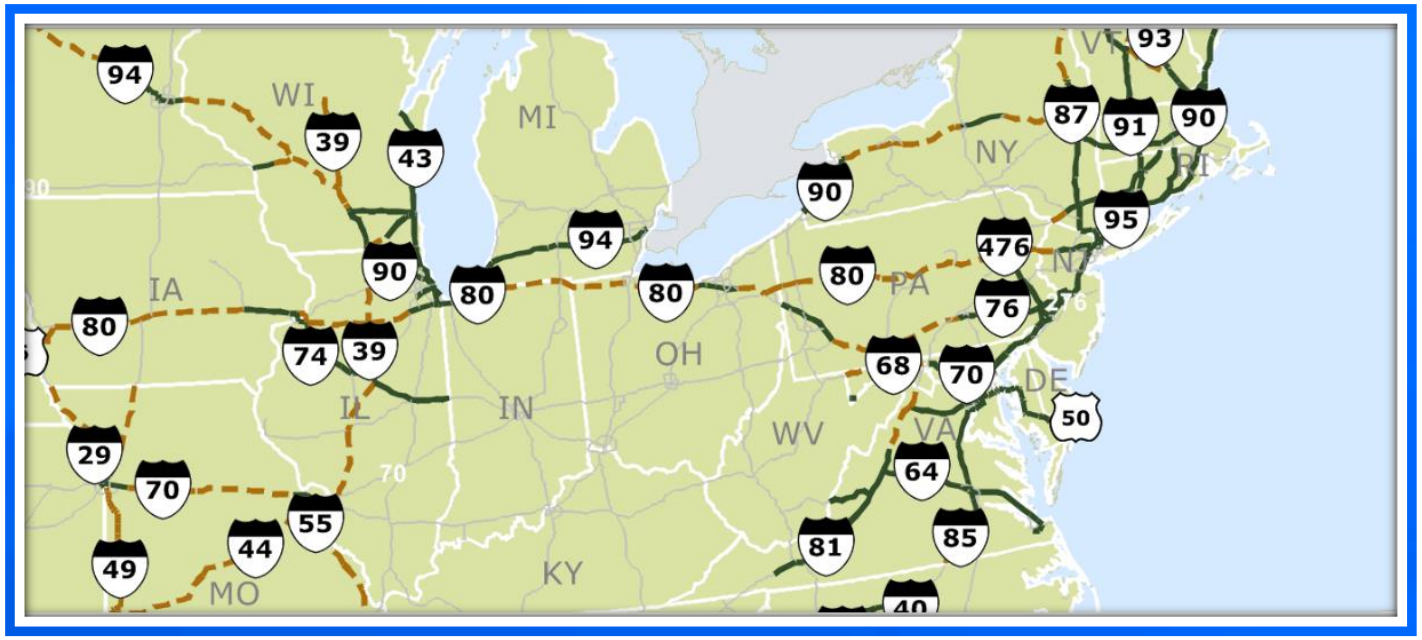
Current: Activities/Initiatives/Projects

Alternative Fuel Corridors



US Department of Transportation (US DOT)
Federal Highway Administration

Part of the Fixing Americas Surface Transportation Act (FAST)

- 55 Interstate Routes
- 35 states included
- 85,000 miles of road

- Rt. 76-476
  - PA Turnpike Commission
- I-80 Mid America
  - IL Dept. of Transportation
- I-95 corridor
  - Northeast Diesel Collaborative

- All selected for Autogas (LPG) Natural Gas (CNG & LNG) and EVSE's

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Eastern Pennsylvania Alliance for Clean Transportation

Current: Activities/Initiatives/Projects

V W Settlement Details

HOW

- Assuming an October 2016 settlement approval date, it can be expected that states must submit their mitigation plan in June 2017, and would receive funds in August 2017. *(These dates are preliminary/estimates and could change)*

	Percentage of Project That Can Be Funded Through Trust	
	Government-Owned Eligible Large Trucks	Non-Government Owned Eligible Large Trucks
Repower with new diesel or AFV engine	100%	40%
Purchase new diesel or AFV vehicle	100%	25% (50% for drayage trucks)
Repower with all-electric engine, including infrastructure	100%	75%
Purchase new all-electric vehicle, including infrastructure	100%	75%

Eligible Beneficiary	Initial Allocations	Eligible Beneficiary	Initial Allocations	Eligible Beneficiary	Initial Allocations
Puerto Rico	$ 7,500,000	Louisiana	$ 18,009,993	Colorado	$ 61,307,576
North Dakota	$ 7,500,000	Kentucky	$ 19,048,080	Wisconsin	$ 63,554,019
Hawaii	$ 7,500,000	Oklahoma	$ 19,086,528	New Jersey	$ 65,328,105
South Dakota	$ 7,500,000	Iowa	$ 20,179,540	Oregon	$ 68,239,143
Alaska	$ 7,500,000	Maine	$ 20,256,436	Massachusetts	$ 69,074,007
Wyoming	$ 7,500,000	Nevada	$ 22,255,715	Maryland	$ 71,045,824
District of Columbia	$ 7,500,000	Alabama	$ 24,084,726	Ohio	$ 71,419,316
Delaware	$ 9,051,682	New Hampshire	$ 29,544,297	North Carolina	$ 87,177,373
Mississippi	$ 9,249,413	South Carolina	$ 21,636,950	Virginia	$ 87,589,313
West Virginia	$ 11,506,842	Utah	$ 32,356,471	Illinois	$ 97,701,053
Nebraska	$ 11,528,812	Indiana	$ 38,920,039	Washington	$ 103,957,041
Montana	$ 11,600,215	Missouri	$ 39,084,815	Pennsylvania	$ 110,740,310
Rhode Island	$ 13,495,136	Tennessee	$ 42,407,793	New York	$ 117,402,744
Arkansas	$ 13,951,016	Minnesota	$ 43,638,119	Florida	$ 152,379,150
Kansas	$ 14,791,372	Connecticut	$ 51,635,237	Texas	$ 191,941,816
Idaho	$ 16,246,892	Arizona	$ 53,013,861	California	$ 381,280,175
New Mexico	$ 16,900,502	Georgia	$ 58,105,433	Tribal Subaccount	$ 49,652,857
Vermont	$ 17,801,277	Michigan	$ 60,329,906	Trust Cost Subaccount	$ 27,000,000
				Tribal Cost Subaccount	$ 993,057
				Total	**$ 2,700,000,000**

Current/ Finished Projects

The Montgomery County NGV Conversion Initiative

is a comprehensive conversion project which includes some of Pennsylvania's largest companies and a diverse set of business platforms. This project seeks to partner local transportation organizations; municipalities; public transportation; carting; construction; and service industries into one unique application, while simultaneously utilizing private investment in infrastructure to help spur the usage of Compressed Natural Gas (CNG) as an alternative to gasoline and diesel.

ENDING DECEMBER 2016

The Eastern Pennsylvania Propane School Bus Conversion Initiative

seeks to help 6 counties in eastern Pennsylvania, utilize 50 new school buses that run on propane. The goals and the objectives of the project are to provide air quality benefits to school children who ride these buses and fuel cost savings to those districts who utilize propane to replace diesel in their vehicles. This project will be an aggregated project with 2 private bus companies and 4 school districts brought together by The Greater Philadelphia Clean Cities Program (GPCCP).

ENDED SEPTEMBER 2016

The Northeast Extension CNG Conversion Initiative seeks to spur the acceptance of utilizing compressed natural gas as a vehicle fuel. Our 2 project partner's unique application will convert 23 vehicles that will utilize a new CNG fueling station. This project will introduce CNG to the public and to private companies that run along the Northeast extensions of the interstate highway. The project will promote the economic and environmental benefits of CNG in the Northeastern part of Pennsylvania.

ENDING DECEMBER 2016

The Southeastern PA CNG Vehicle Conversion Initiative

This project will introduce CNG to southeastern PA by showcasing some of the region's most recognizable companies and their own fleets utilizing CNG as a motor fuel. The strength of this application comes from the commitment by all project partners, even business competitors, to utilizing PA's abundance of natural gas. The aggregation of all of our partners into a single application will promote the acceptance and new opportunities possible when businesses of all types support natural gas as a conventional motor fuel.

ENDED OCTOBER 2016

The Tinicum Township Propane Vehicle Conversion Initiative seeks to convert 3 separate fleets in Tinicum Township from gasoline to propane fuel. The aggregation of these companies together will convert 34 vehicles ranging from Ford Crown Victoria Police Cruisers to dedicated E-450 shuttle buses.

ENDING JUNE 2017

The W.W. Transport and Easton PA CNG Vehicle Conversion Project

This project seeks to expand the usage of natural gas as a domestically produced reliable vehicle fuel. This project will help spur the usage of CNG to an undersubscribed area, in both the availability of regional infrastructure and vehicle conversions. Our project will help purchase and convert 30 Class 8 diesel tractors to CNG. The development of this project will be instrumental in helping Northampton county and more specifically Easton PA with its foray into using CNG as a vehicle fuel.

ENDING DECEMBER 2016

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Eastern Pennsylvania Alliance for Clean Transportation

Current & Past Projects Vehicles Deployed

The Montgomery County NGV Conversion Initiative

32 Various dedicated CNG deployed

COMPLETED

The Eastern Pennsylvania Propane School Bus Conversion Initiative

38 dedicated Propane School Buses deployed

COMPLETED

The Keystone State LNG Conversion Initiative

20 LNG Class 8 Tractors

COMPLETED

The Southeastern PA CNG Vehicle Conversion Initiative

30 dedicated CNG under 14000 GVW

COMPLETED

The Tinicum Township Propane Vehicle Conversion

18 propane vehicles

8 LEFT TO COMPLETE

The W.W. Transport and Easton PA CNG Vehicle Conversion Project

5 dual fuel, 25 dedicated CNG ordered

COMPLETED

The Northeast Extension CNG Conversion

14 dedicated CNG vehicles deployed

COMPLETED

180 Various alternative fuel vehicles on the road in past 2 years

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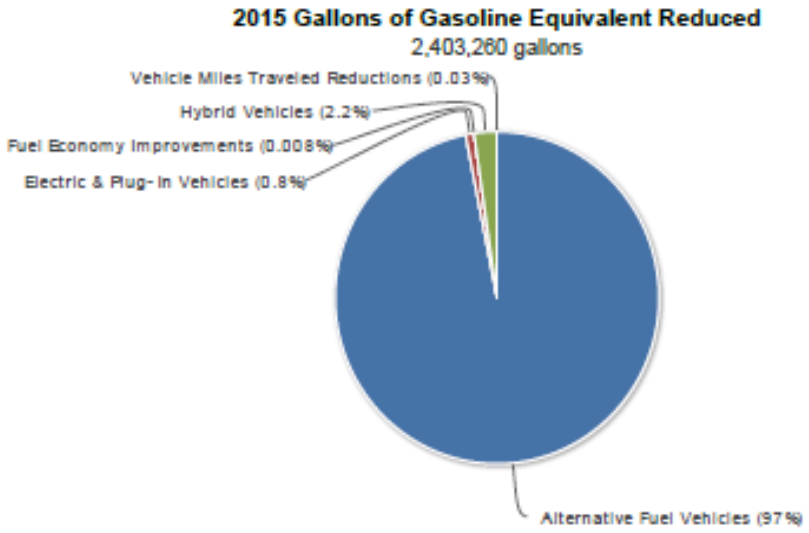
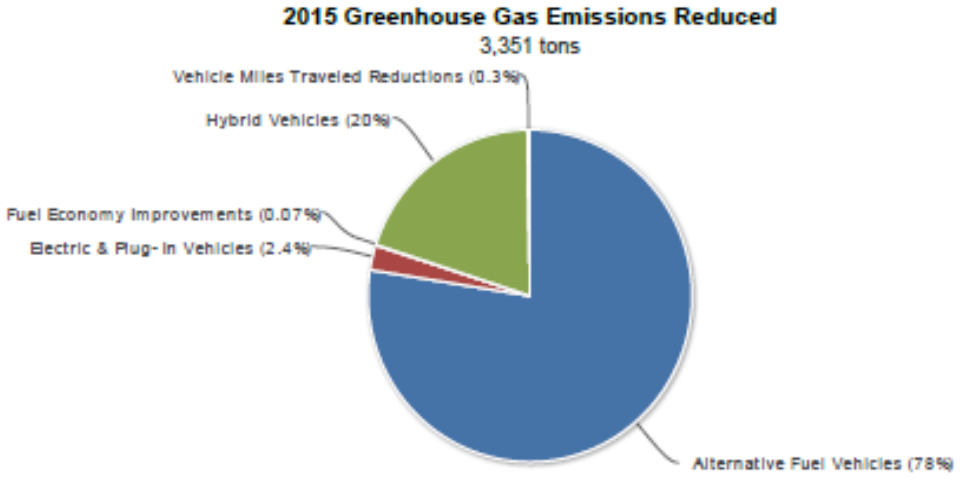
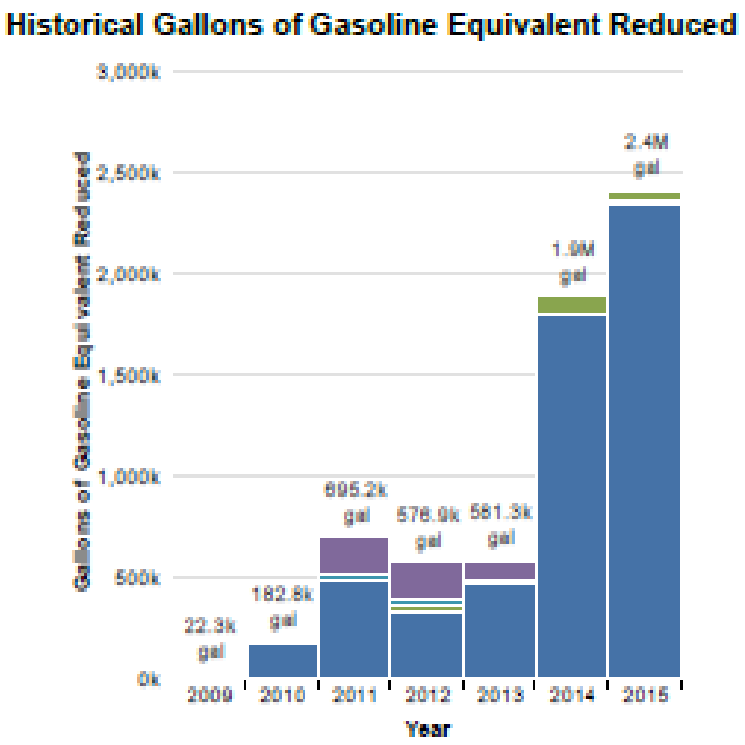
Eastern Pennsylvania Alliance for Clean Transportation

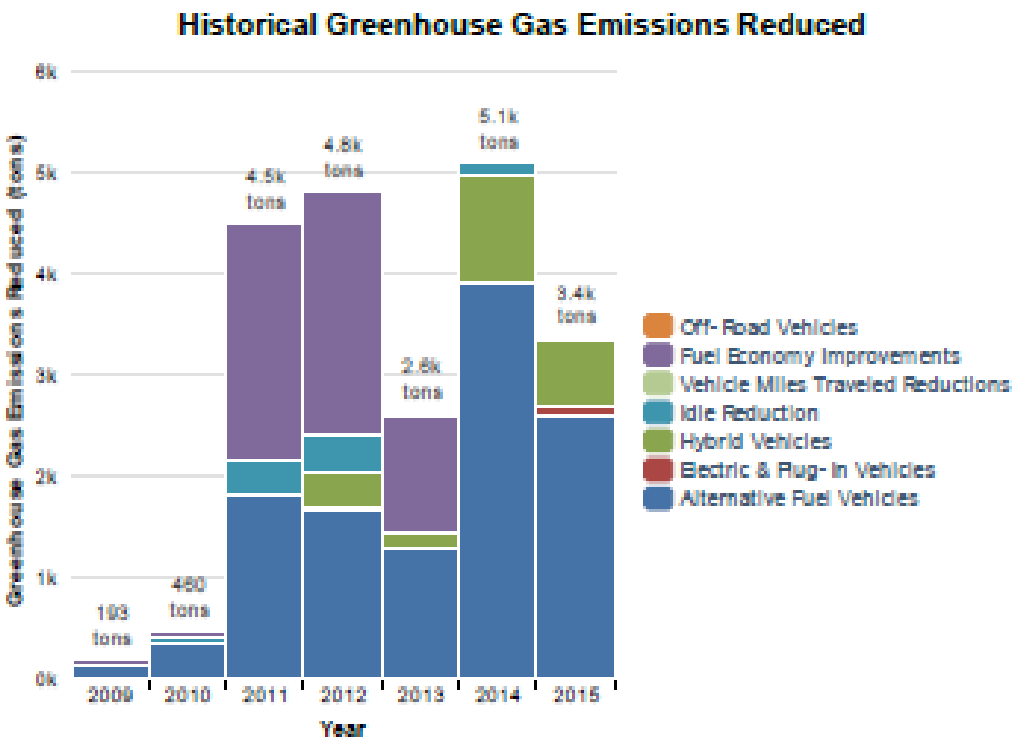
Snapshot of Performance





Snapshot of Performance





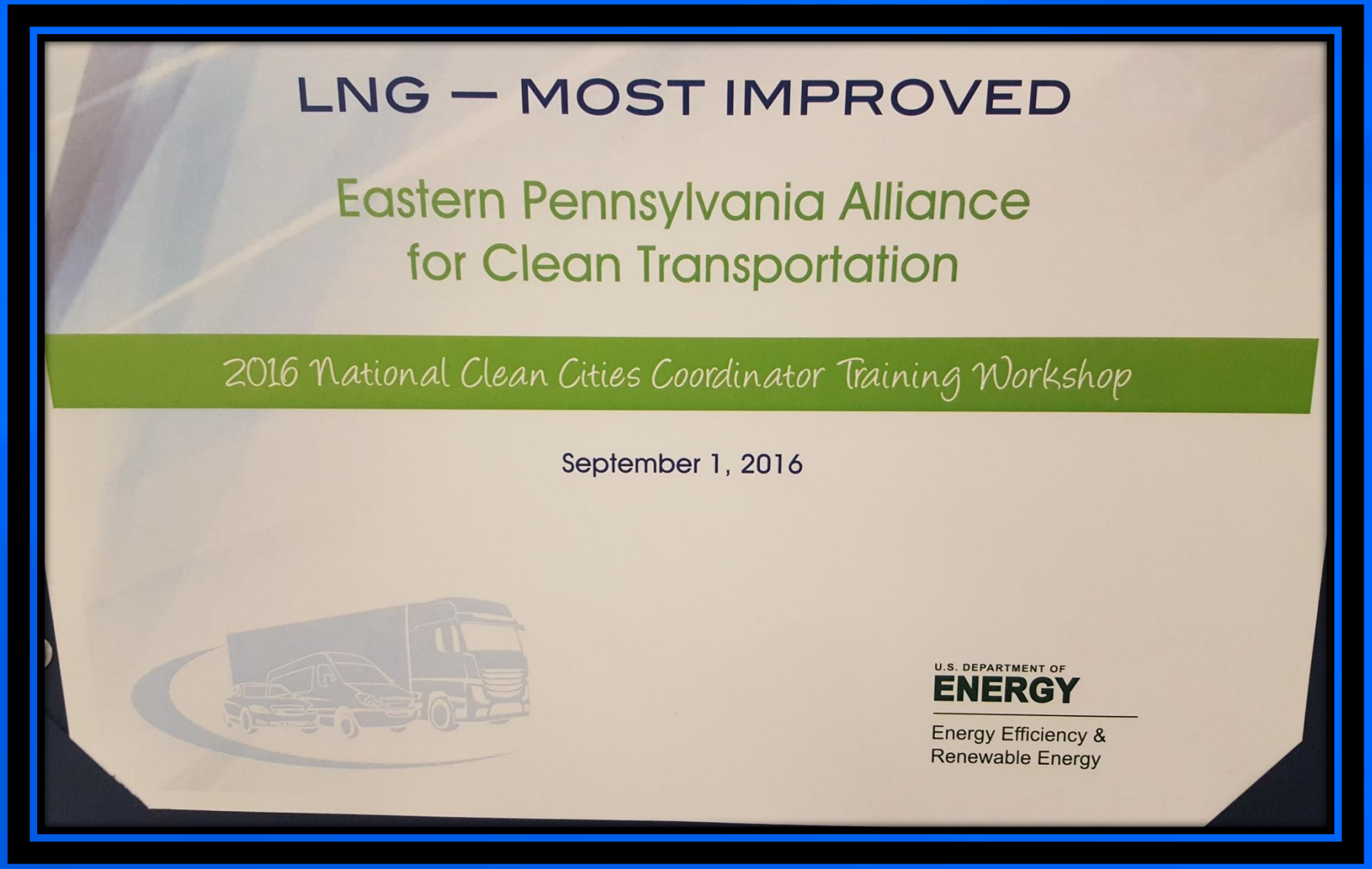
Snapshot of Performance

Last Year's Displacement (2014) = 1,886,660 GGE's
This Year's Displacement (2015) = 2,403,260 GGE's
Increase of Displacement = 516,600 GGE's
Percentage Increase = 27%

Last Year's GHG's Reduced (2014) = 5,085 tons
This Year's GHG's Reduced (2015) = 3,351tons
Decrease in Reduction = 1,734 tons
Percentage Decrease = 34%

EP-ACT
Eastern Pennsylvania Alliance for Clean Transportation

Snapshot of Performance



pennsylvania
DEPARTMENT OF ENVIRONMENTAL PROTECTION

EV Planning Workgroup

PECO®

An Exelon Company

PECO's Smart Driver Network

Smart Driver Network

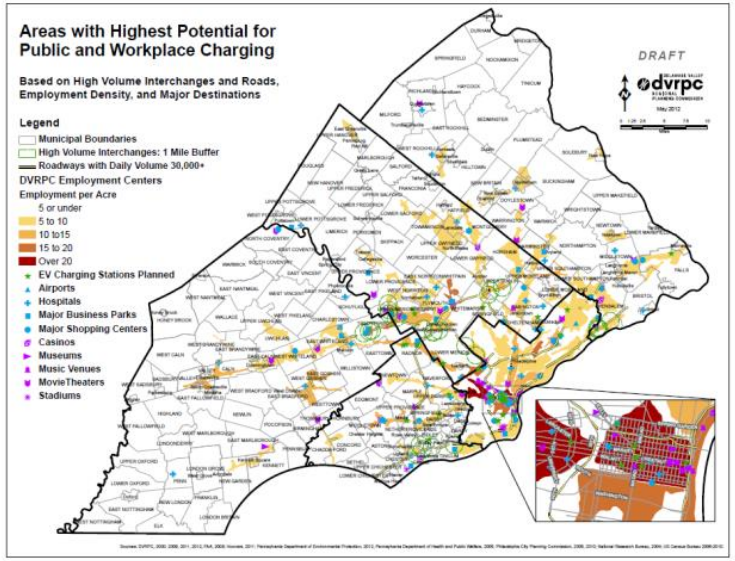
The Challenge:

- ✓ Achieve environmental and energy goals through expanding AFVs

Our Approach:

- ✓ Establish state goal of doubling deployment of EVs and NGVs in PA above forecast levels by 2030
- ✓ Develop state and regional EV and NGV infrastructure plans through planning collaboration between transportation experts, local governments and utilities

- ✓ Direct utilities to submit EV and NGV infrastructure investment plans that support establishment of public, backbone charging and refueling networks
- ✓ Authorize establishment of EV smart charging rates



PECO is pleased to be participating in the DEP-led PA EV Stakeholders Meetings in December

Electric Vehicles and EVSE's

EV Market Overview for EP-ACT
November 2016

About Us

First Priority GreenFleet brings to the market end-to-end solutions for fleets across a full product matrix of alternative fuel vehicle platforms designed to offer highly reliable performance, reduce total cost of ownership, and assist our clients in diminishing their environmental footprint.

Mission Statement: First Priority GreenFleet seeks to participate in revolutionizing the national, private and public commercial transportation industry by meeting the demand for Zero and Ultra Low Emission Vehicles and contribute to the effort to reduce greenhouse gas emissions, improve air quality and public health, and promote the social, environmental, and economic well-being of our communities.

Our History

First Priority GreenFleet is a subsidiary of First Priority Global. Established in 1998, First Priority Global is one of the world's leading manufacturers and distributors of a comprehensive array of firefighting, emergency medical, specialized rescue and mobile health solutions, conducting business throughout the U.S. and in over 30 countries around the world.

First Priority GreenFleet was established to meet the market demand for clean transportation solutions and assist both government agencies and private transportation enterprises in significantly reducing their environmental footprint and effecting a more sustainable future.

Our Products

First Priority Bus Sales

- The only full line of Zero Emission School Buses.
- The only Bus Sales Company capable of servicing zero emission school buses on both coasts.
- Expected to roll out the largest deployment of zero emission school buses in U.S. history in the Sacramento area.
- Working on similar size pilot programs in the Los Angeles area and in discussions with NY City agencies about rolling out first deployment of Electric School Buses in a pilot program w/ConEd (V2G).

Our Customers

Clean Transportation Market

- EPA mandates have put pressure on Federal, State, and local governments to dramatically reduce GHG, CO2 and all other particulates generated from operating diesel and conventional fuel buses and trucks. These mandates carry heavy fines and huge budget implications.
- The largest fleet of offenders to the EPA clean air mandates are School Buses. There are 480,000 yellow buses operating daily and many are scheduled to be retired in the next 5-7 years depending on geography.
- The second largest fleet of offenders are delivery trucks of which there are millions on the roads today. These trucks are subject to the same 2023 deadline from the EPA.
- Federal, State, and local governments recognizing the urgency of the climate and air quality conditions have established new rules, set aside funds for grants and vouchers to drive the cost of conversion to cleaner alternative fuel vehicles down, and provide necessary infrastructure.
- Together these rules and regulations require all existing trucks and School buses with a 2010 registration or earlier, to be off the road by 2023, making the market for new School bus purchases by 2023, $120 billion and Class 4-6 trucks $403 billion.

Key Activities US

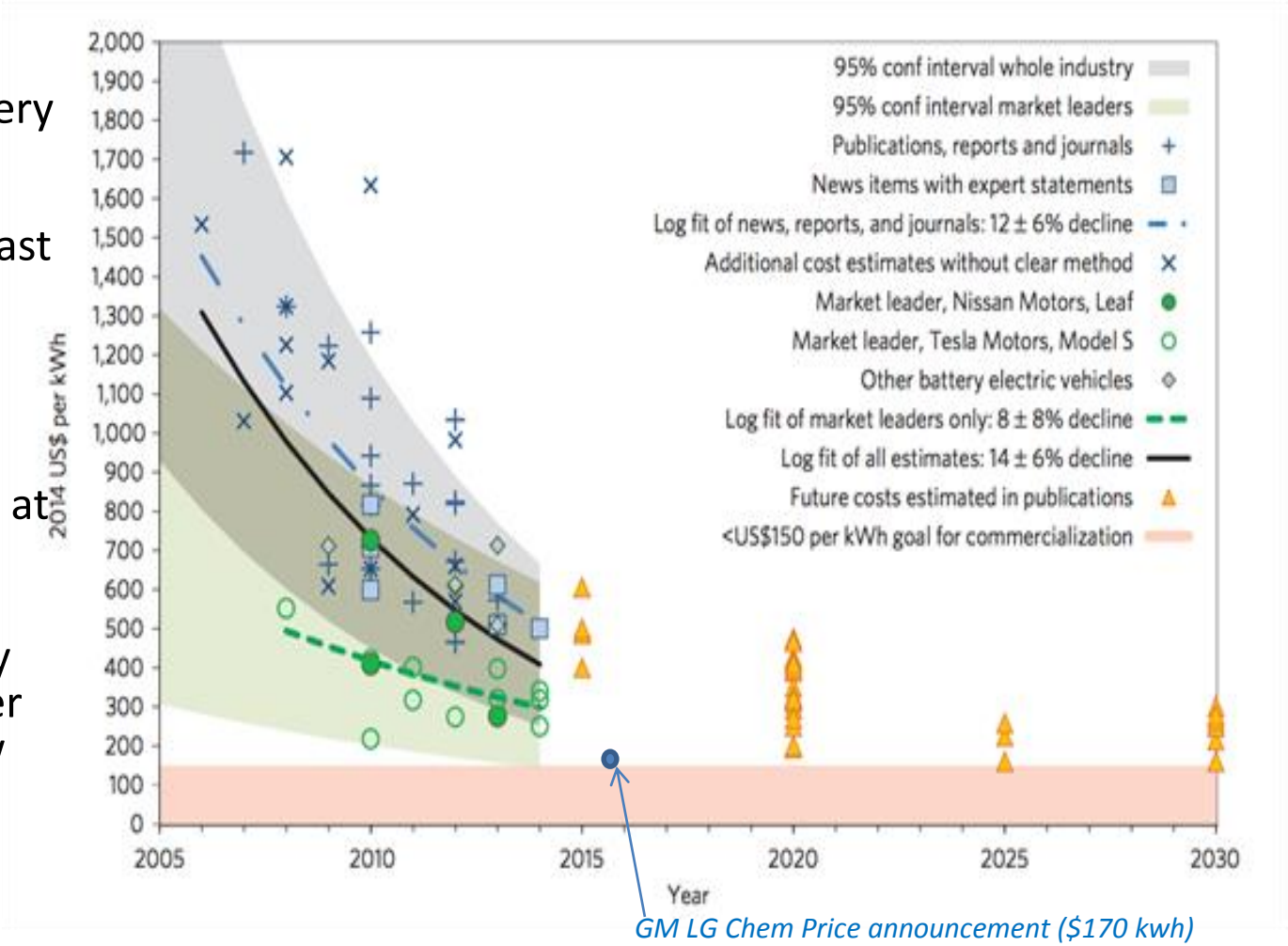
- HD Fuel Economy – Phase 2 (new rules for 2021-2027)
- Super Truck 2
- DOE EV funding
- Passenger car CAFÉ – mid term review 2017
- Clean Power Program
- Hydraulic Fracturing – Oil and Natural gas
- New Ozone Air Quality Standards
- Emerging standards for connected/automated vehicles
- “Clean” and Alt Fuel Highway Corridors

Where Are We Now?

- Conventional truck tech improving via M/HD Phase 1 fuel economy regulations
- Focus increasingly on integration/optimization and smart control technology
- Natural gas expanding – low diesel fuel cost a challenge – but Low NOx engines real and in production
- Renewable fuel growing thanks to credits
- Hybrids – Gen 2 systems and price points emerging in market
- E-trucks –relaunch coming with better market segment focus, support, manufacturers
- Traditional OEMs not as active in hybrid and electric – still waiting to see market – new OEMs and smaller and new innovative companies leading

Battery Costs Below 2020 Expectations?

- Report shows battery cost reductions happening faster, steeper than forecast
- Old forecast: $300/kwh by 2020
- New findings: Industry already $410/kwh; leaders at $300/kwh
- Behavioral and market factors may be more of a limiter than batteries now



Nature Climate Change report:
http://www.carbonbrief.org/blog/2015/03/electric-vehicle-batteries-already-cheaper-than-2020-projections/

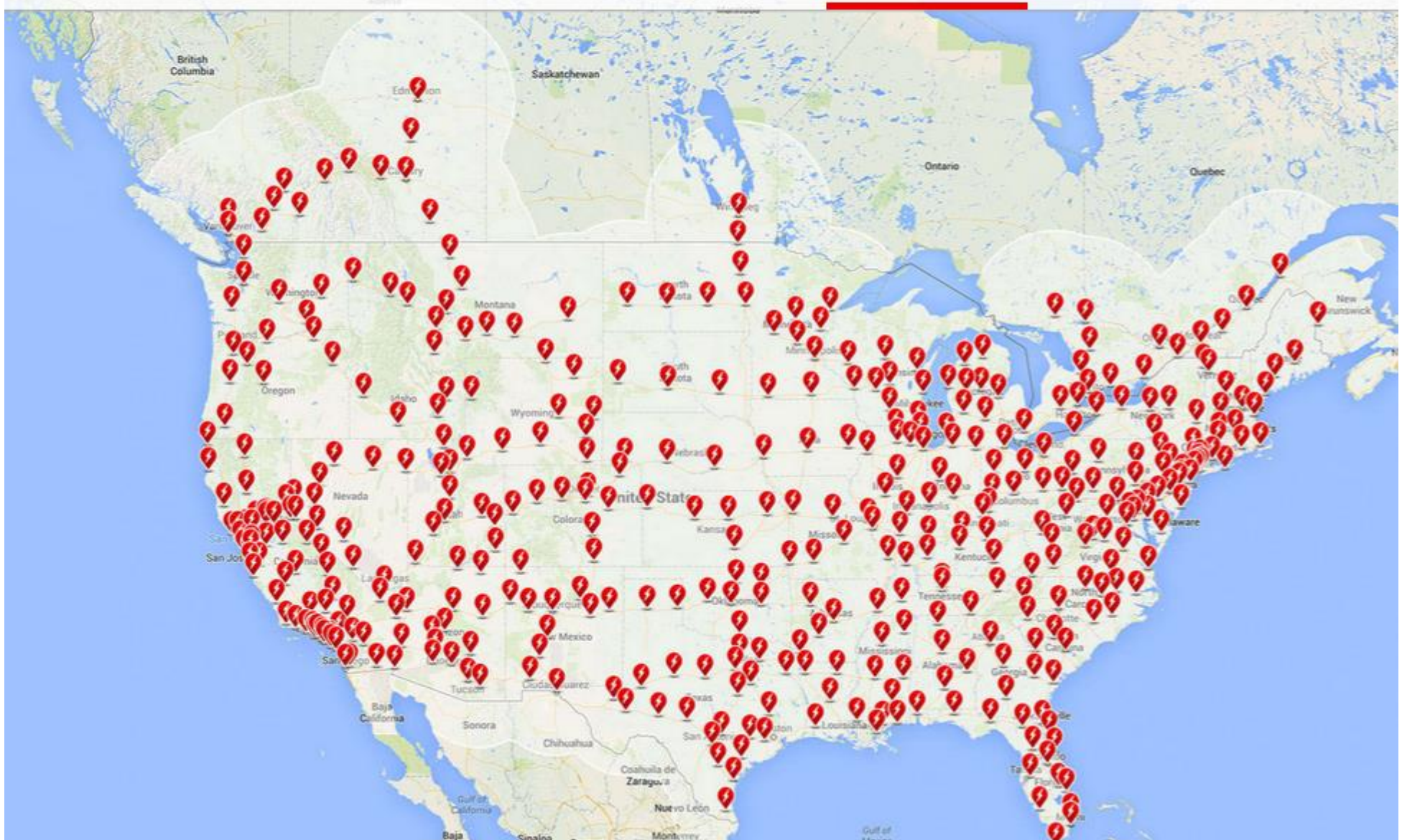
Semi?

- Part of announced Master Plan Part 2
- Also to include high volume passenger transport, maybe pickup

Jerome Guillen, formerly with Daimler and Cascadia platform, heading up Tesla truck development

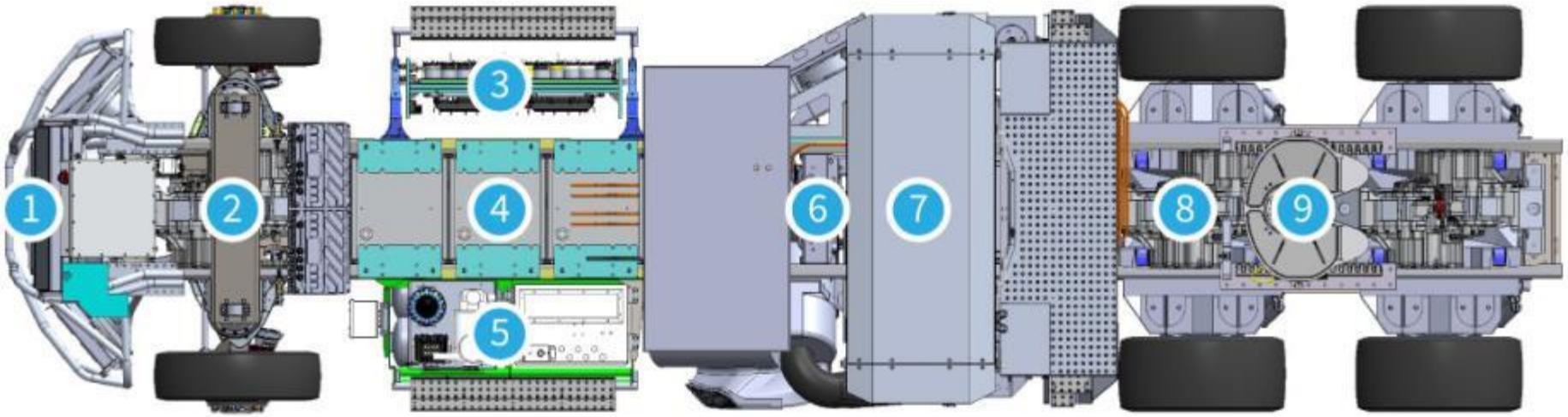
414 Supercharger stations with 2,277 Superchargers

◂ Asia-Pacific | Today | 2015 | 2016 | Europe ▸

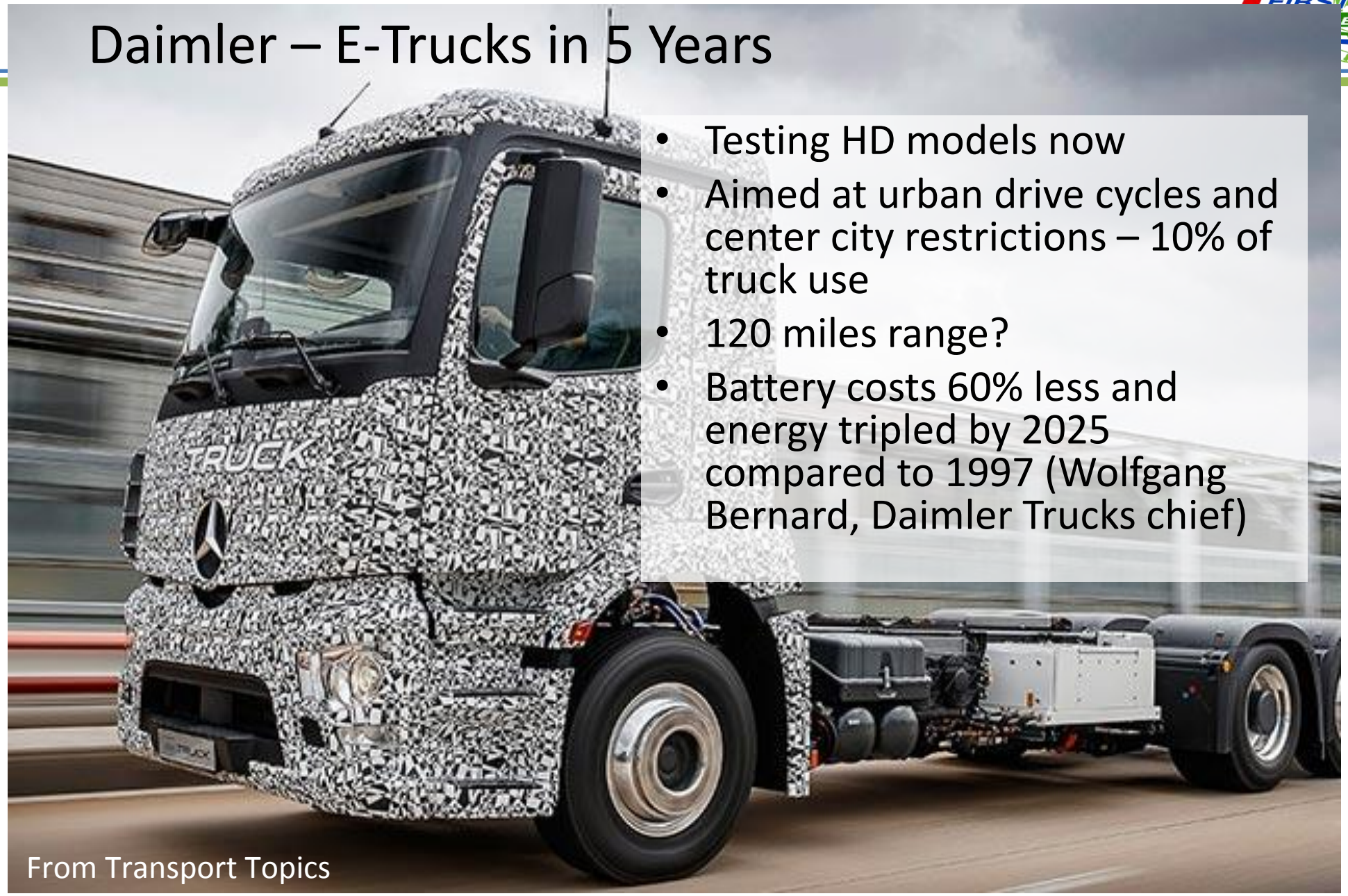


Nikola Motor Co

- Essentially a series-electric drive "locomotive" for line haul
- Integrates a fuel cell to extend range
- Products coming?



Daimler – E-Trucks in 5 Years



- Testing HD models now
- Aimed at urban drive cycles and center city restrictions – 10% of truck use
- 120 miles range?
- Battery costs 60% less and energy tripled by 2025 compared to 1997 (Wolfgang Bernard, Daimler Trucks chief)

From Transport Topics

Courtesy: HD Trucking

Mack Unveils Electric Refuse Truck at Waste Expo using Wrightspeed powertrain

Courtesy: Trucks.com

First E-Highway Test
Begins June 22 in Sweden


VOLVO AUTOMATED SAFETY


BROMMA
BROMMA
OOCL
LBCT
LBCT
011
ZERO EMISSION

Horsefly Delivery Drone

FAA Approved Testing to Start

Proterra Catalyst E2
350 mile range!

- 600 miles in test conditions: 194-350 in transit operations
- 440-660 kwh battery pack

Zero Emission Bus Market Growing in the United States

El Dorado National Fuel Cell Bus

Complete Coach Works Electric Bus

BYD Electric Bus

Proterra Electric Bus

New Flyer Industries Electric Bus




Almost Twenty ZEB Products Across Nine Bus Makers and Up-fitters









BYD to Zenith – Growing Electric Options

- BYD, a world leader in batteries and buses, has qualified Class 5 truck; focusing on Class 5,7 and 8 for US
- Mitsubishi E-Cantor coming late 2016
- Zenith ramping up, Amp/Workhorse, Motiv, Orange, Transpower, Phoenix growing – and, **First Priority GreenFleet** (bought EVI assets)

1 FIRST PRIORITY™ GREENFLEET

OUR MANUFACTURERS

- DEMERS AMBULANCES
- LION
- TRANS TECH a TCI Company
- 1ST FIRST PRIORITY RENAISSANCE REMOUNT
- BRAUN CUSTOM AMBULANCES Built for Life
- McCOY MILLER
- Road Rescue In Service for Life
- MARQUE Vision Comes to Life

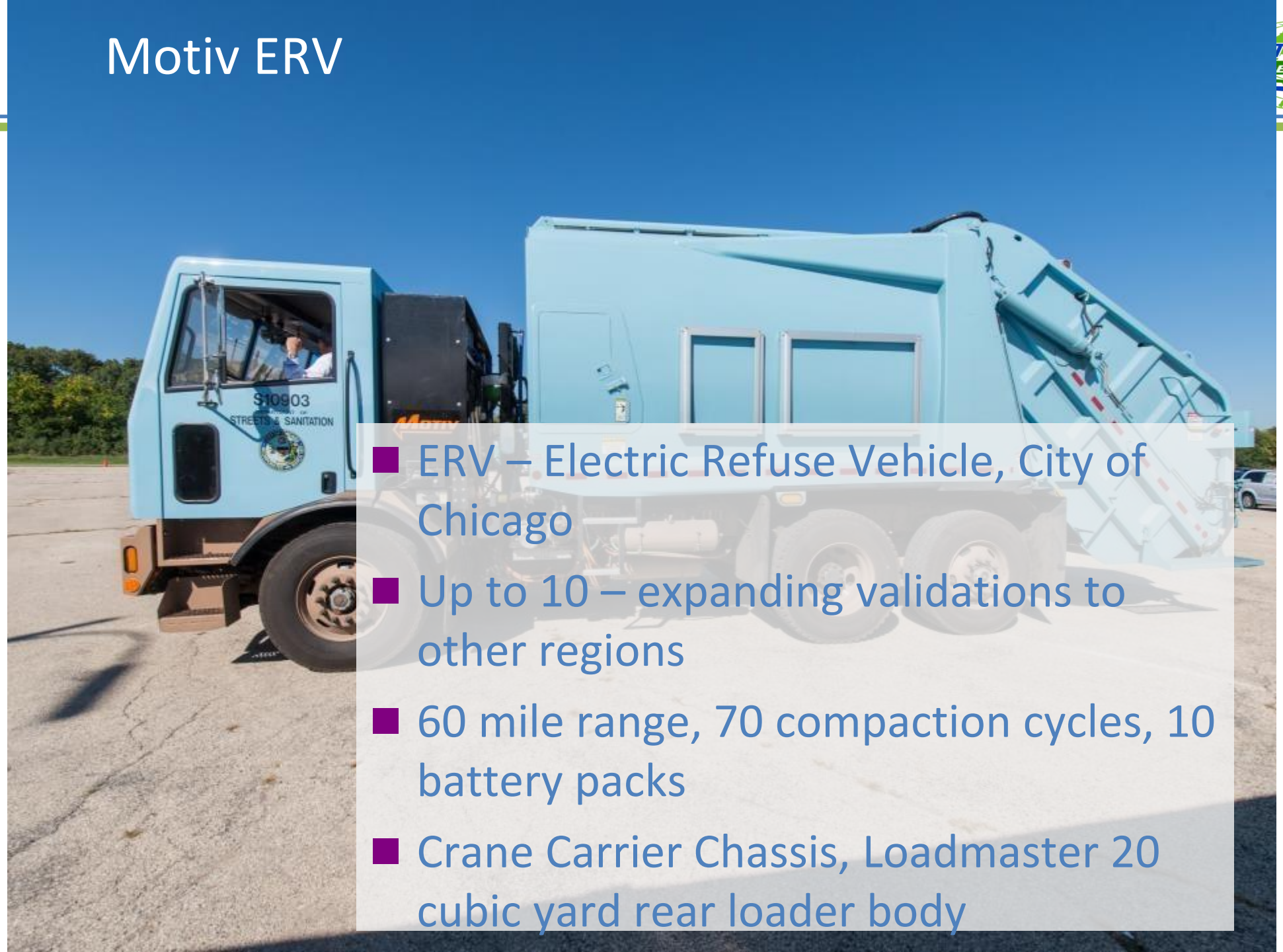
ZE, PHEV Delivery Trucks

Motiv

Motiv, EDI (FPGF)

First Priority GreenFleet & BYD

Motiv ERV



- ERV – Electric Refuse Vehicle, City of Chicago
- Up to 10 – expanding validations to other regions
- 60 mile range, 70 compaction cycles, 10 battery packs
- Crane Carrier Chassis, Loadmaster 20 cubic yard rear loader body

Orange EV

- All electric yard tractor – now an on-road version, too
- Up to 80,000 pound loads, up to 20 hour work days

Terminal Tractors, Shuttle Carriers

- Kalmar announces electric versions with fast charge capability
- ZE terminal tractors (yard hostlers, yard goats) prime candidates for pilot scale deployment

Hybrids "Back" – New Players, Prices

- New conversion, retrofit options showing more attractive price points
- Hino Class 5 Cab-over highly competitive for price and selling well

XL Hybrids

- New and existing vehicle conversion to cost-effective hybrid electric on Class 2-6 chassis
- Solid payback in high mileage applications
- Fast conversion uses known QVM approach

Lightning Hybrids

- Retrofit or conversion
- Hydraulic hybrid system
- Benefits for reduced brake wear, improved stopping, fuel savings
- Currently Class 2-5

Plug In Work Trucks Odyne Systems

- Odyne next generation systems in deployment nationwide
- Significant work site engine off power; idle reduction; hybrid driving capability
- Several models
  - Plug-in hybrid utility bucket trucks
  - PHEV “digger-derrick” version
  - PHEV underground compressor truck
  - Class 4-8

Altec JEMS

- Jobsite Energy Management System
- Operates boom, tools without engine
- New versions can provide Automated Idle Management System; engine-off cab comfort
- HVIP incentives for larger systems

EDI (Efficient Drivetrains Inc) Export Power PHEV

- California hybrid & EV drivetrain developer, supplier (Partner w/FPGF)
- Architecture allows high power export from vehicle
- Of interest to commercial, military markets
- Powered relief centers during Lake Fire

"The EDI trucks will allow new operational efficiencies for both maintenance with no service interruption, and disaster relief. We can power about 100 homes at the same time off of that vehicle."

Dave Meisel,
Senior Director, Transportation, PG&E

NAFA SUSTAINABLE FLEET ACCREDITATION PROGRAM
In collaboration with CALSTART

What Can Fleets Do?
Take Control!

- Fleets - take control of own destiny and footprint – by measuring actions and planning changes via Sustainable Fleet Accreditation
- Developed ***BY AND FOR FLEETS:*** validates real fleet progress against sustainability standard
- Metrics: **reduce fuel use**; **reduce climate and criteria emissions**; **increase efficiency**
- LEED-like structure: Provides independent review of fleet progress – gives guidance on strategies – but encourages **innovation**

THANK YOU

Brett Gipe
Chief Commercial Officer
443-370-8782
bgipe@firstpriorityglobal.net

AIR PRODUCTS

Hydrogen Fuel Cells

Hydrogen Fuel Cell Cars

Presentation by:

Nick Mittica, Commercial Manager

November 22, 2016

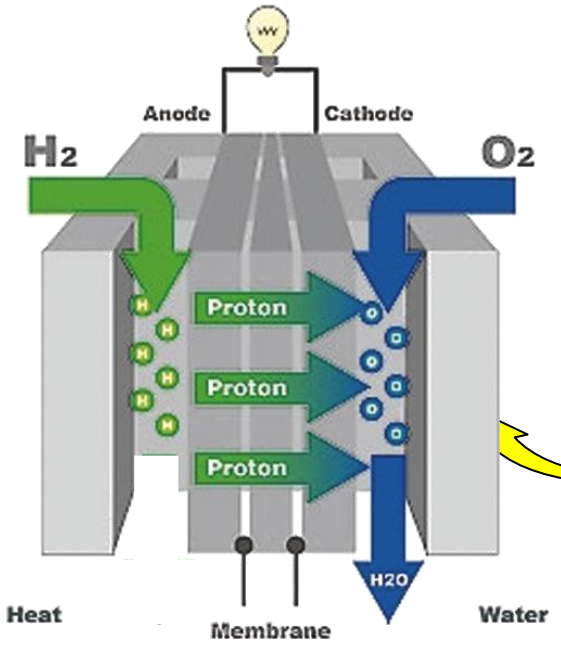
60+ Years of Hydrogen Experience

- One of largest hydrogen producers in the world
  - Produce ~6 million kgs/day (>2 billion standard cubic feet)
- Bulk, liquid, and pipeline distribution
- Unique product offerings for H_2 fueling
- H_2 energy projects since 1993
  - > 200 hydrogen station projects
  - > 1,500,000 fuelings/yr
  - > 5,000,000 total fuelings
  - Twenty countries

Question: Is a Hydrogen Fuel Cell Car an Electric Car?

Answer: Yes!

How do Fuel Cell Vehicles Work?



- A fuel cell is an electric generator.
- Uses H2 and O2 to produce heat, power and water
- Fuel cells are 2-3 times more efficient than internal combustion engines

Why Hydrogen Fuel Cell Cars?

- Efficiency: Two to three times more efficient than an internal combustion engine
- The automobile is removed from the emissions discussion!
- Form, Fit and Function of H2 fuel cell cars consistent with driver's expectations

Why Hydrogen?

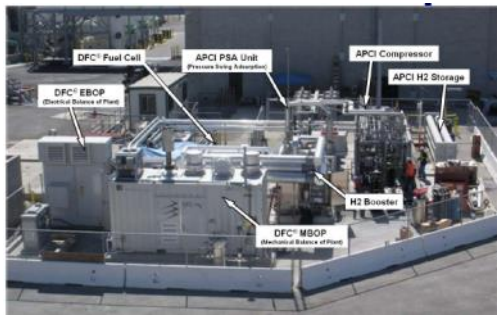
- It’s the most abundant element in the world.
- It’s carbon-free.
- It’s not toxic.
- It can be produced from natural gas or renewable resources in the US and reduce our dependence on imported oil.
- When used in a fuel cell, the only emission is water.

AIR PRODUCTS

Hydrogen Energy Markets

- Transportation

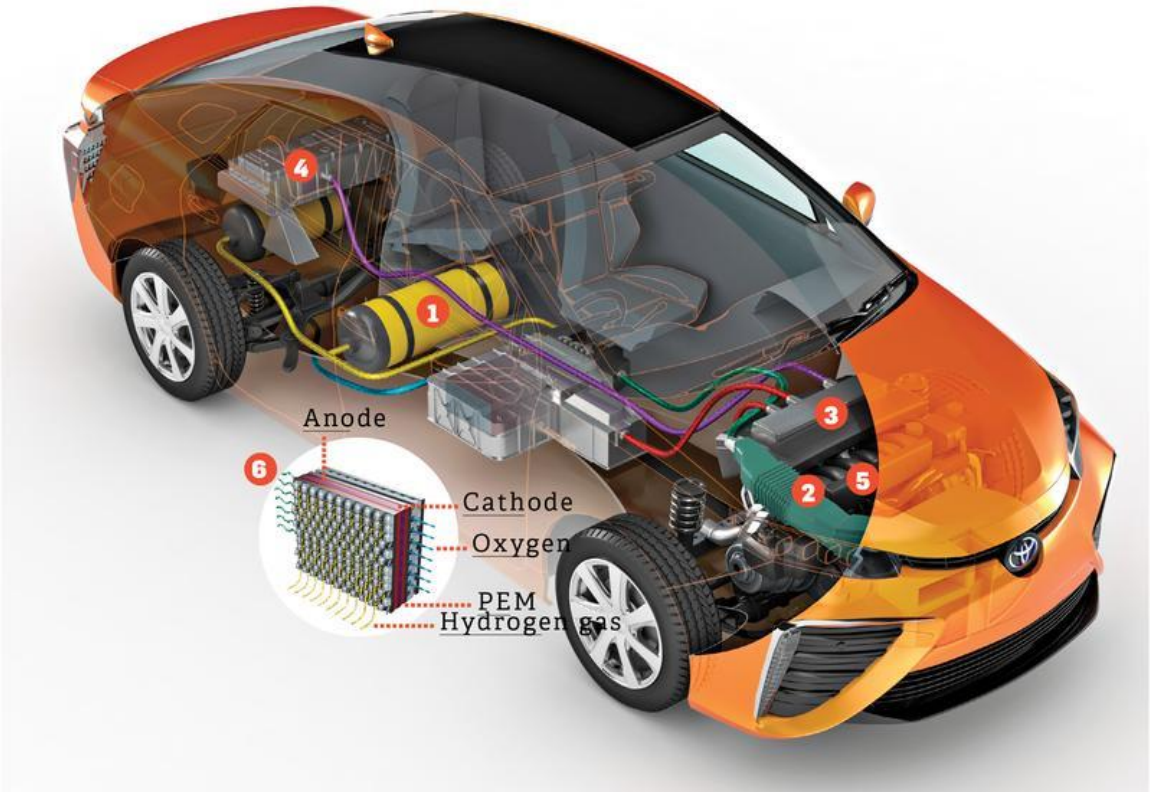
- Power Generation



AIR PRODUCTS

Hydrogen Vehicles Today

Toyota Mirai



1. Hydrogen tank
2. Airflow
3. Power Control Unit
4. Battery (Ni-metal hydride)
5. Electric motor
6. Fuel cell

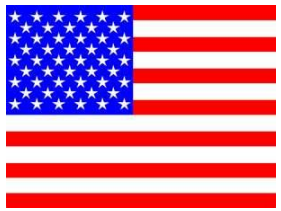
Automotive Industry Update

- Toyota, Hyundai and Honda have launched cars commercially in select markets. Available for purchase or lease
- Automaker partnerships announced in order to facilitate development and create larger scale faster
- All major car companies developing these vehicles. Others expected to launch cars 2018-2020

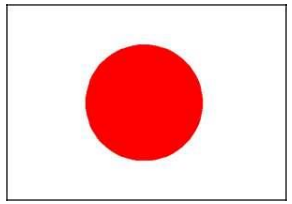
AIR PRODUCTS

Where Will the Cars Go?

- Locations where fueling infrastructure is built
- Regions where demographics support the sale of vehicles
  - Early adopters of new technology
  - Desire to be "Green"
  - Financial ability to pay premium
- Government Policy
  - Environmental regulations
  - Financial incentives

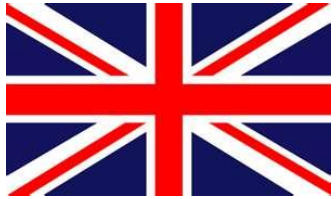


United States



Japan

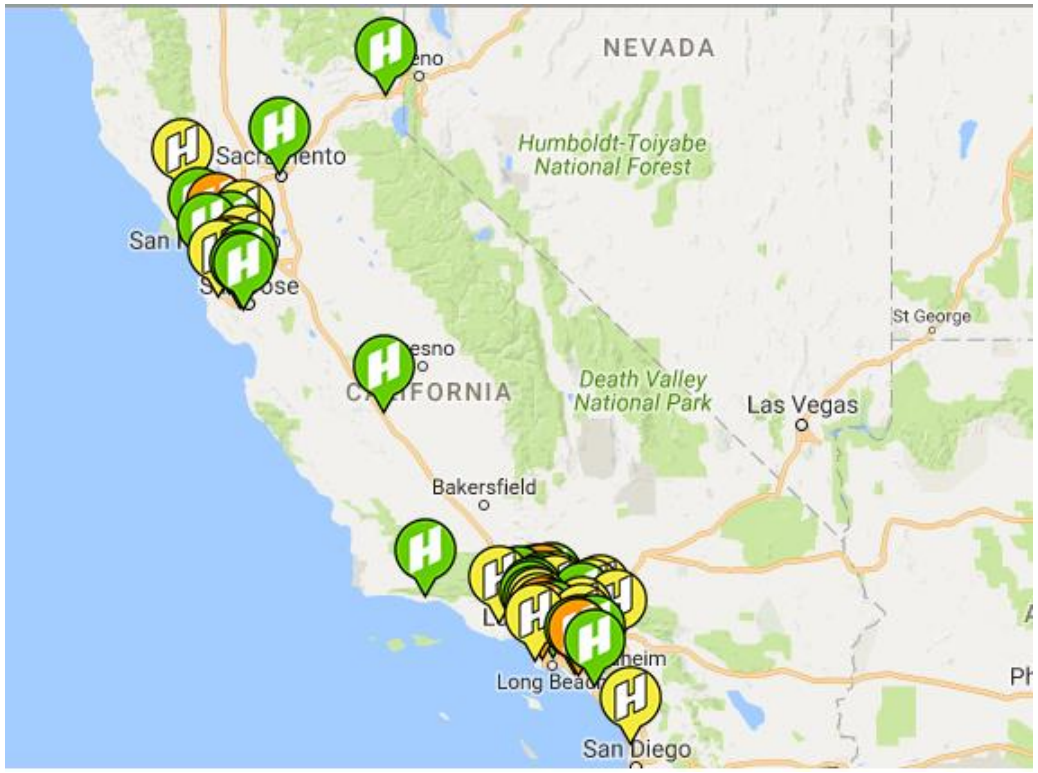
Germany



UK

CA is the first US market.
Northeast ZEV states are next.

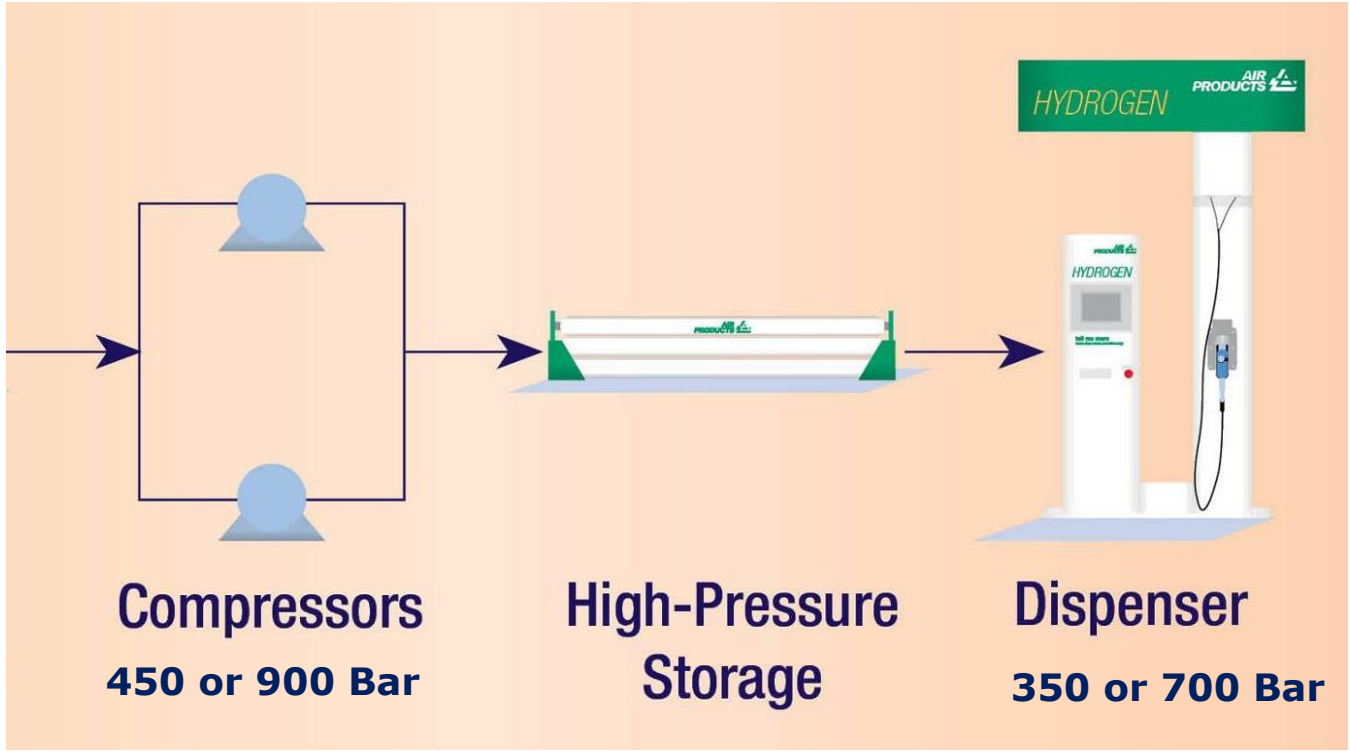
CA H2 Fueling Stations



- 23 retail stations operational, 5 non-retail stations operational
- 25 retail stations under development
- 29 being built in CA with Air Products SmartFuel® technology
    - 21 retail stations are operational
- Additional funding announcements expected by end of the year

Typical Hydrogen Fueling Station

Hydrogen Supply



AIR PRODUCTS

Station Deployment – West LA

Santa Monica, H2 Station

Hydrogen Dispensing Stations in CA

Shell, Torrance – Pipeline

UCI, Torrance

Hydrogen Dispensing Stations in CA

PA Fueling Stations

- Air Products, Trexlertown, PA

- Three forklift deployments
  - Wegmans, Pottsville, Sysco, Philly, P&G Mehoopany
- Penn State
  - Bus fueling station. Commissioning in progress

The Bottom Line

- The use of hydrogen as a fuel continues to be evaluated globally in many applications.
- Automotive manufactures are launching commercial fuel cell vehicles now. More will be sold in coming years!
- Hydrogen production and delivery infrastructure exits today! Industry stakeholders are collaborating on deployment of new H2 fueling stations in select markets.

AIR PRODUCTS

Additional Resources

- Air Products
  - www.airproducts.com/h2energy
- Automotive Manufacturers
  - http://www.toyota.com/fuelcell/
  - www.hyundaiusa.com/tucsonfuelcell/
  - http://world.honda.com/FCXClarity/
- Fuel Cell and Hydrogen Energy Association
  - www.FCHEA.org
- California Fuel Cell Partnership
  - www.fuelcellpartnership.org

Thank you…
tell me more

www.airproducts.com/h2energy

EASTERN PENNSYLVANIA ALLIANCE FOR CLEAN TRANSPORTATION

EP-ACT

BREAK

LANDIRENZO®
USA

Natural Gas

LANDIRENZO®
USA

EP-ACT Annual Meeting – 2016

Keeping Alt Fuels Relevant

EcoMobility Since 1954

Opportunities for LD/MD Vehicles – Innovation and Future Product

2017 Corporate Focus

LANDIRENZO USA

Sustainability in Transportation

Natural Gas and RNG as a fuel reduces heat trapping Green House Gases by 25-30% compared to gasoline or Diesel, and 98% less carcinogenic particulate matter

Fuel Diversity

Natural Gas offers fleets an additional, clean choice to utilize during weather emergencies and offers a cost effective solution for environmental mandates

Efficiency and Cost Improvements

Landi Renzo continues to develop more efficient solutions and long term price stability

Collaborative Clean Corridors

FAST Act Clean Corridors will be eligible for vehicle and infrastructure funding

2017 Corporate Focus: Challenges

LANDIRENZO USA

Low Oil Prices

Low Oil Prices have slowed the growth of the alternative fueled vehicle industry, end users and government need to be educated through Clean Cities and industry leaders

Long Term Price Stability

Natural Gas as a transportation fuel will continue to trend below current and future oil pricing. Local natural gas utilities need to continue to provide outreach to fleets

Partner With Competitive Suppliers

Infrastructure Providers need to partner with natural gas suppliers for more competitive rates

Aggregate Procurement

DOE Funded Project for a Regional and National Vehicle Procurement Opportunity

Landi Renzo University: Research & Development

- Established in 2006
- $50 million investment
- The most advanced technical center in the world for emissions analysis
- Center of Excellence for the study of the alternative fuels and Eco-Mobility

Ford Product Overview

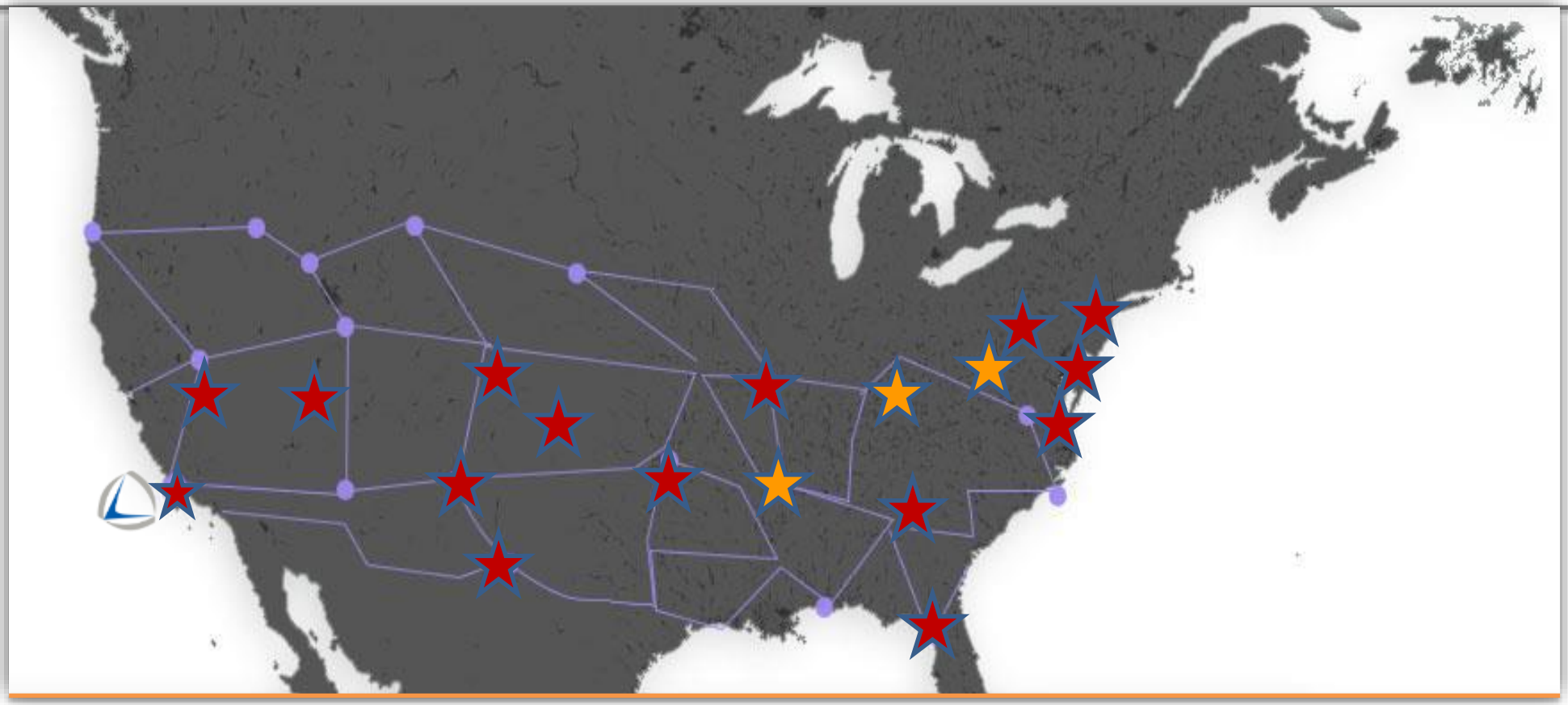
LANDIRENZO USA

	F-250/350 Pickup	6.2L	Bi-Fuel Dedicated	CNG	EPA 50 State
	F-350 Chassis Cab	6.2L	Bi-Fuel Dedicated	CNG	EPA 50 State
	F-450/550 Chassis Cab	6.8L	Bi-Fuel Dedicated	CNG	EPA 50 State
	F-650 Chassis Cab	6.8L	Dedicated	CNG	50 State
	E-450 Cutaway	6.8L	Dedicated	CNG	50 State
	F-53/59 Stripped Chassis	6.8L	Dedicated	CNG	50 State

QVM QUALIFIED VEHICLE MODIFIER

Distribution & Service Channels

LANDIRENZO USA



STRUCTURAL METAL SMF FABRICATORS, INC.
We Build Solutions

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SINCE 1848

J&J TRUCK BODIES & TRAILERS®

Auto Port INC.

ZORESCO

1954

Moving Forward!

2016

Barry P. Carr
Director, Business Development
Landi Renzo USA
(315)278-2061
bcarr@landiusa.com

ROUSH®

CLEANTECH

Autogas, LPG, Propane

ROUSH CLEANTECH

Derek Whaley
Business Development
North East & Central
North America

ALTERNATIVE FUEL SOLUTIONS:

Powered by:

BLUE BIRD

ROUSH CLEANTECH

Ford

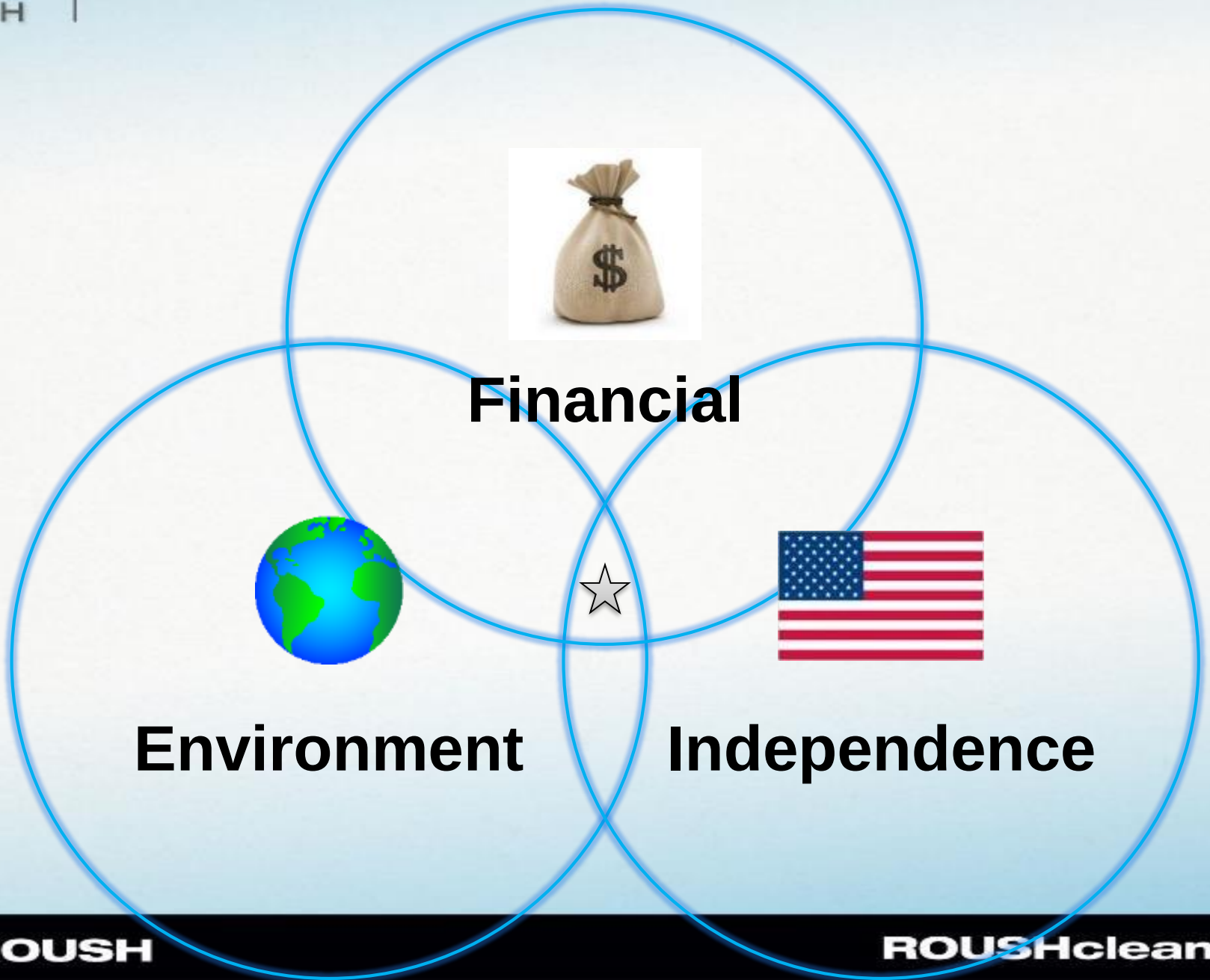
Alt. Fuel Experience

- Compressed Natural Gas (CNG)
  - Design of fuel system.
  - Calibration.
  - EPA and CARB certification.
  - Vehicle integration.

- Electric
  - Over 16,000 recharging stations built.
  - Blink ECOtality contract with U.S. DOE.

- Hydrogen
  - 207.297 MPH (world land-speed record.)
  - Vehicle design.
  - Aerodynamics development.
  - Vehicle fabrication.
  - Propulsion system integration.

Where Does Propane Fit?



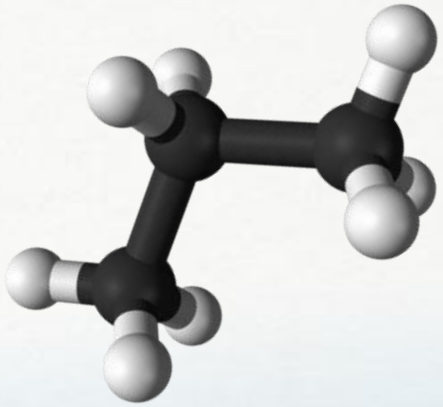
What is Propane Autogas?

- Abundant Domestic Fuel:
  - 90% of propane used in the U.S. comes from the U.S.
  - 7% of propane used in the U.S. comes from Canada
  - Major natural gas shale found in northeast U.S.

- Growing Acceptance:
  - Largest public refueling infrastructure of any alternative fuel
  - Powers over 23 million vehicles worldwide
  - Price gap continues to widen

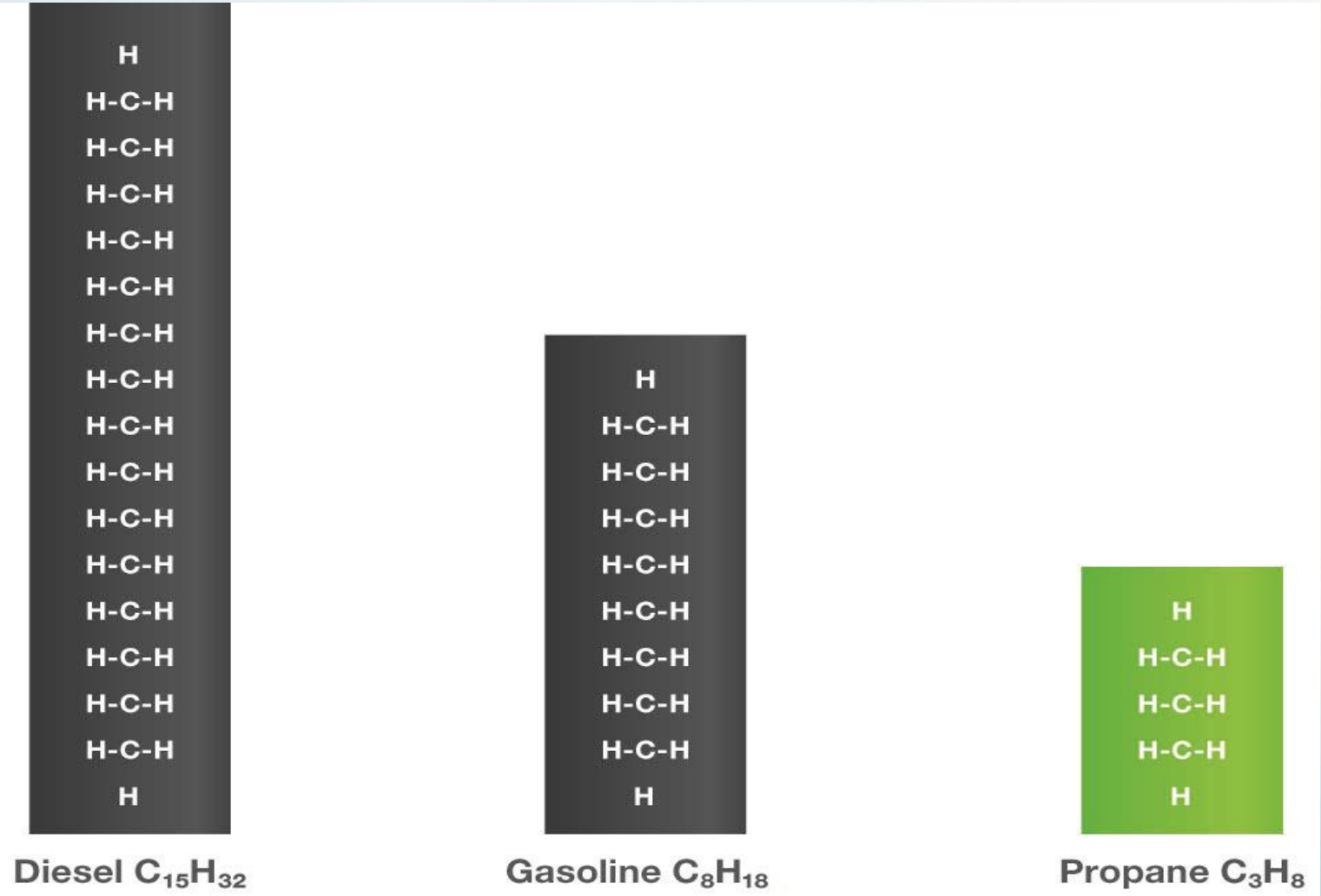
- Environmentally Friendly:
  - 60% reduction in Nitrogen Oxide (NO_X) emissions
  - 80% reduction in Hydrocarbon emissions
  - 100% reduction in Particulate Matter (PM) emissions

- Fuel Safety:
  - Low operating pressure (150-250 psi)
  - Narrow flammability range



Propane Molecule
(C_3H_8)

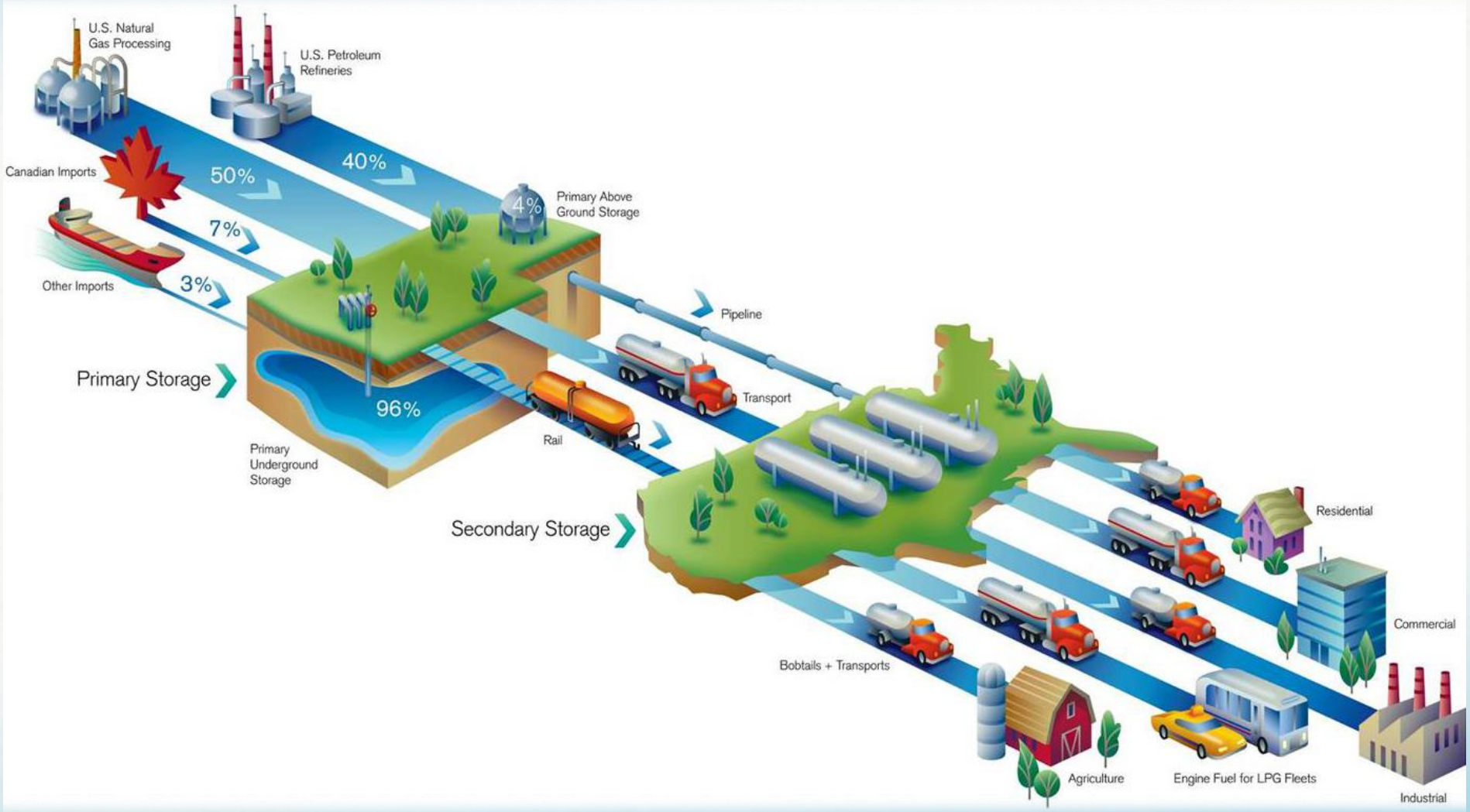
Propane: A Low Carbon Fuel



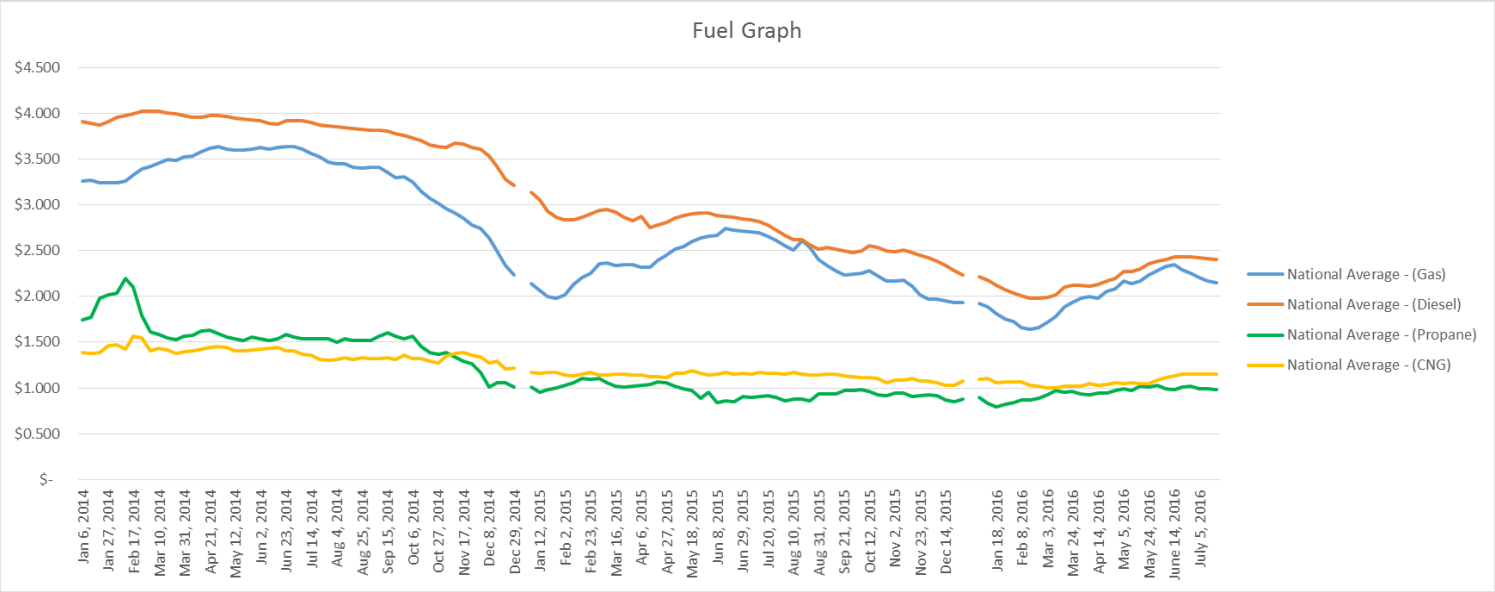
Shale Map of US

Source: U.S. Energy Information Administration

US LPG Consumption



Fuel Information



- As much as gasoline and diesel has dropped in price, propane has followed suit
- On a national average, propane is 59% less expensive than diesel
- There is a Federal fuel rebate through the end of 2016
  - Propane - $0.36

Cost per Mile

Environmental Benefits

- Propane poses no harm to groundwater, surface water, or soil
- Propane autogas is a nontoxic, non-carcinogenic, and non-corrosive fuel
- Emissions reductions compared to diesel:
  - 60% less NO_x emissions
  - 80% reduction in Hydrocarbons
  - 100% reductions in Particulate Matter
- Today we meet the next level of EPA emissions

ROUSH CLEANTECH

ROUSH CLEANTECH

QVM QUALIFIED VEHICLE MODIFIER

OVER

11,000

VEHICLES

Ford F-53 / F-59 | Ford E-450 | Ford F-250/350 | Ford F-450/550 | Ford F-650 / 750 | Blue Bird Vision | Micro Bird G5

Who We Are

PROPANE

GAS

CNG

Product Overview

Model Years

2017

Engine Size / Manufacturer

6.8L V10 (3V) Ford Engine with exclusive ROUSH CleanTech Propane Fuel System

Applications

169” / 189” / 217” / 238” / 252” / 273” / 280” wheelbase configurations

6-speed automatic transmission

Fuel Tank Capacity

Short: 50 gallons (47 usable)

Mid-Ship: 70 gallons (67 usable)

Extended Range: 100 gallons (93 usable)

Technical Specifications

EPA and CARB approved

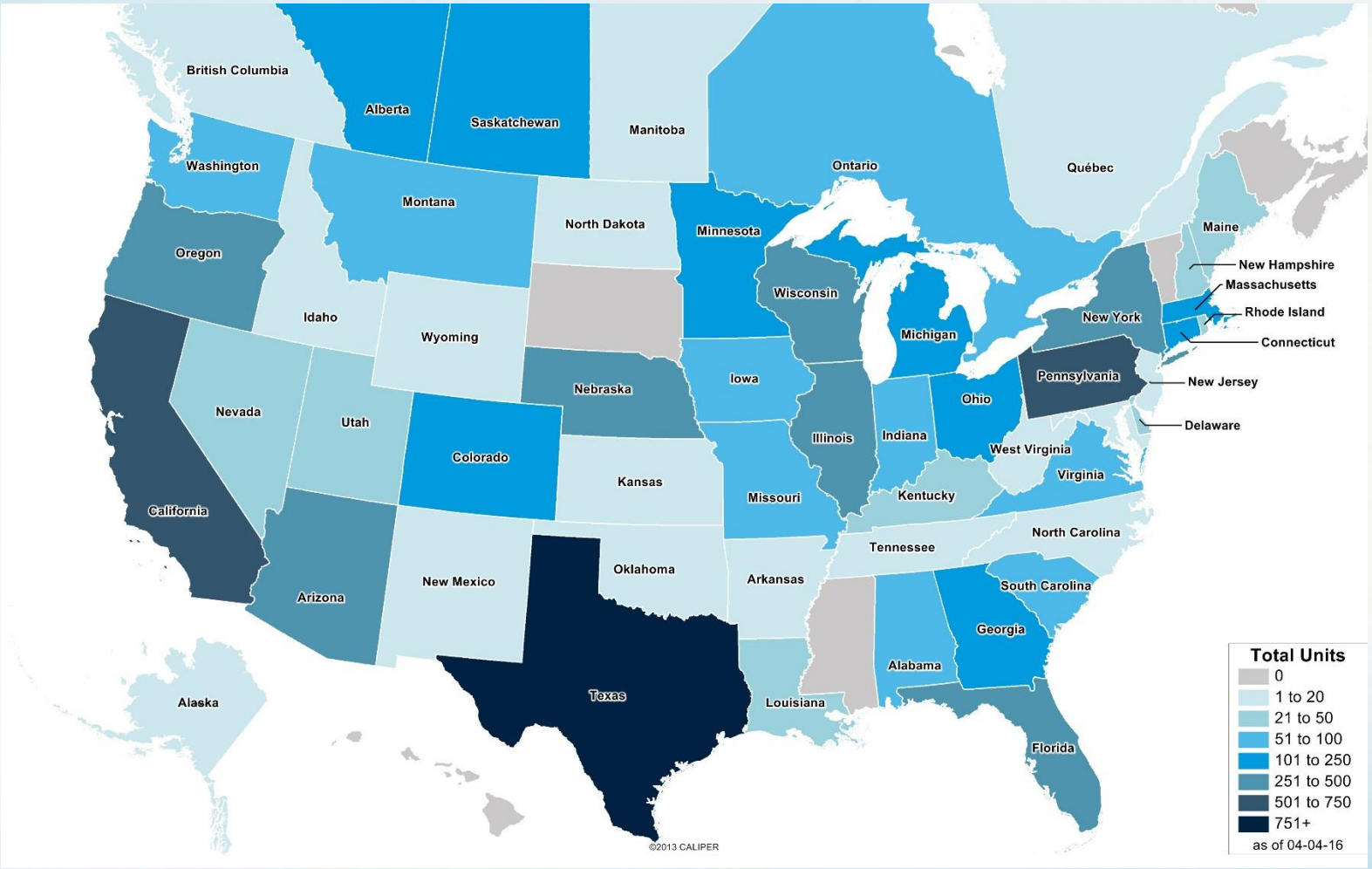
GVWR: 33,000 lbs

Up to 77 passengers

Blue Bird Vision

(Type C)

Deployments



7,800 Ford/ROUSH propane powered Blue Bird Visions sold since introduction

Council Rock SD

Upper Moreland SD

Boston Public Schools

On-Site Refueling

East Penn Schools, PA

Derry Twp Schools – Hershey PA

Customer Deployments

Customer Deployments

Customer Deployments

ROUSH CLEANTECH

Derek Whaley
Business Development
North East & Central Regions
North America

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Biodiesel

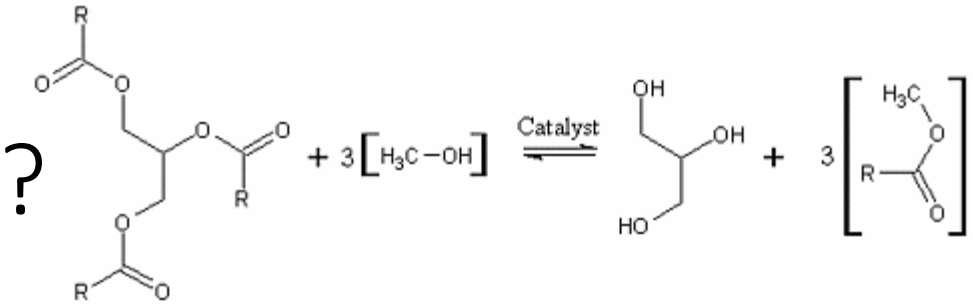
Overview: The Benefits of Biodiesel

Soundview Energy, Inc.

Daniel Falcone

November 22nd, 2016

Biodiesel: What is it?



- Biodiesel is a domestic renewable fuel for diesel engine application made from fats & oils, such as, soybean oil and used cooking oil.
- Chemically, biodiesel is made through a process of transesterification in which mono-alkyl esters are produced most commonly from triglycerides esters.
- It is a biodegradable product which comports to CAA health effect testing.
- It is a qualifying advanced biofuel that can be used in diesel engines (without modifications) in blend ratios ranging from 5% to 100% offering both economic and GHG/Enviornmental advantages.

Specifications: ASTM D6751

Property	ASTM Method	Limits	Units
Calcium & Magnesium, combined	EN 14538	5 max	ppm (ug/g)
Flash Point (closed cup)	**D 93**	**93 min.**	**Degrees C**
Alcohol Control (One of the following must be met)			
1. Methanol Content	EN14110	0.2 Max	% volume
2. Flash Point	D93	130 Min	Degrees C
Water & Sediment	**D 2709**	**0.05 max.**	**% vol.**
Kinematic Viscosity, 40 C	D 445	1.9 - 6.0	mm^2/sec.
Sulfated Ash	D 874	0.02 max.	% mass
Sulfur			
S 15 Grade	**D 5453**	**0.0015 max. (15)**	**% mass (ppm)**
S 500 Grade	**D 5453**	**0.05 max. (500)**	**% mass (ppm)**
Copper Strip Corrosion	D 130	No. 3 max.	

Property	ASTM Method	Limits	Units
Cetane	D 613	47 min.	
Cloud Point	**D 2500**	**Report**	**Degrees C**
Carbon Residue 100% sample	D 4530*	0.05 max.	% mass
Acid Number	**D 664**	**0.50 max.**	**mg KOH/g**
Free Glycerin	**D 6584**	**0.020 max.**	**% mass**
Total Glycerin	**D 6584**	**0.240 max.**	**% mass**
Phosphorus Content	D 4951	0.001 max.	% mass
Distillation, T90 AET	D 1160	360 max.	Degrees C
Sodium/Potassium, combined	EN 14538	5 max	ppm
Oxidation Stability	**EN 14112**	**3 min**	**hours**

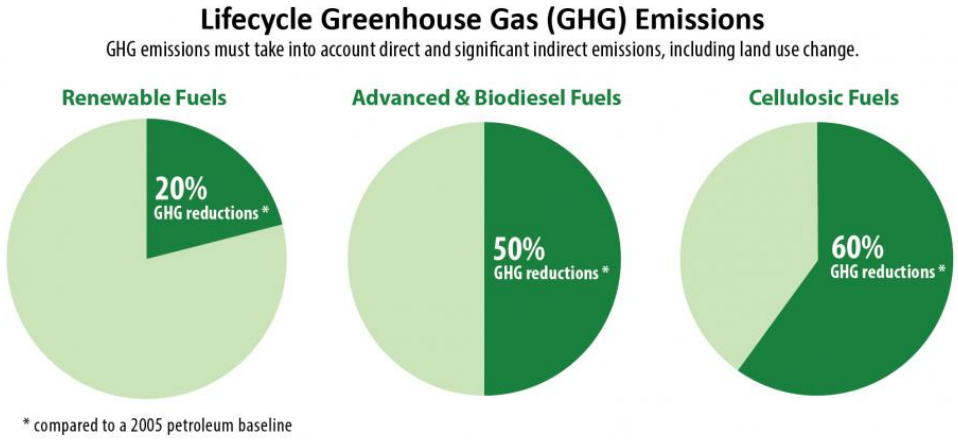
ASTM D6751 is the approved standard for B100 and for blending up to B20 and has been in effect since 2001.

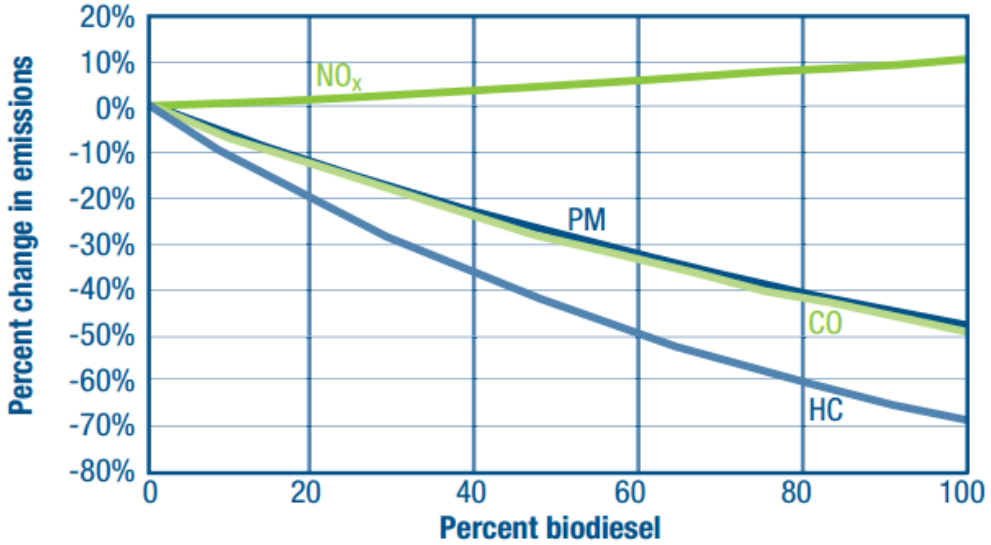
- The laboratory analysis is a *performance based standard* (feedstock and process neutral) ensuring the industry is equipped with a reliable quality control methodology.

ASTM INTERNATIONAL
Standards Worldwide

Emissions: Reduction Levels

- Advanced Biofuel Qualified: Biodiesel produces lifecycle greenhouse gas emissions that are at least 50% less than baseline lifecycle greenhouse gas emissions.
  - On average, Biodiesel reduces US greenhouse gas emissions by over 80%





Basic Emission Correlation. Average emission impacts of biodiesel for heavy-duty highway engines. Source: U.S. EPA[2].

Market Adoption: OEM Blend Allowances

- In the GVW Class 5-8 vehicles that account for 92% of on-road diesel fuel use, nearly 90 percent of the medium- and heavy-duty truck OEMs support B20 biodiesel blends

- For a complete listing of OEM position statements on biodiesel, as well as the current U.S. Diesel Vehicles List, visit: www.biodiesel.org/using-biodiesel/oem-information

Models equipped with Cummins engines are B20 approved
See NBB website for more details.

Economic Overview: Tax Incentives & RINs

Upstream
(Production/Import)

- **RIN Generation:** 1.5 RINs are generated per gallon of produced/imported biodiesel.
  - RINs are traded in a free market where they are ultimately retired by a renewable fuel exporter or an obligated party.
  - 2016 RINs, as benchmarked by Argus, are valued at $1.0350*.

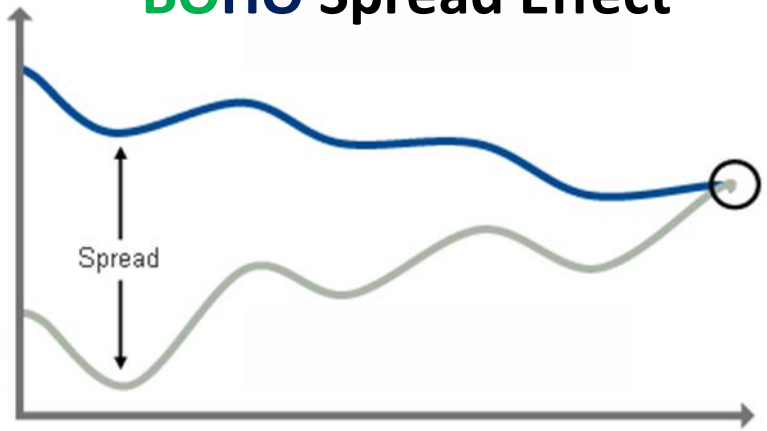
Downstream
(Blenders/Marketers)

- **Blender's Credit:** A $1.00-per-gallon tax incentive program issued to IRS qualified parties for blending renewable fuels into qualified petroleum products.

End Users
(Consumption)

- Negotiated discounts to ULSD predicated on upstream value chain
- State-by-State tax credit programs

BOHO Spread Effect



*RIN valuation is subject to change with market volatility

Regulation: Renewable Fuels Mandate

- All diesel fuel sold in Pennsylvania ***must contain at least 2% biodiesel (B2)*** one year after in-state production of biodiesel reaches 40 million gallons. The mandated biodiesel blend level will continue to increase according to the following schedule:

- 5% biodiesel (B5) one year after in-state production of biodiesel reaches 100 million gallons;
- 10% biodiesel (B10) one year after in-state production of biodiesel reaches 200 million gallons; and
- 20% biodiesel (B20) one year after in-state production of biodiesel reaches 400 million gallons.

- All biodiesel retailers in Pennsylvania must register with the Pennsylvania Department of Agriculture each year. Additional compliance and blending standards, in-state registration requirements, and certification and enforcement guidelines apply.

Ending: Soundview Energy, Inc.

- Who is Soundview Energy?
  - SVE is specialized team focused on the commercial trading, risk management, logistics, quality assurance & marketing of petroleum and renewable fuels.
  - The group leverages its experience, relationships & wide industry scope to deliver leading consumer experiences across a multitude of product ranges and cross-blends.
    - Products: ULSD, ULSHO, Biodiesel, Residual Fuels & Biodiesel Blended Products

Daniel Falcone
Soundview Energy, Inc.

Wholesale Division Manager
400 Kelby Street Suite 1002
dfalcone@sve-approved.com
Office: 201-461-0012
Cell: 917-533-4853

Please contact today to discover markets we serve & full product offerings!

EASTERN PENNSYLVANIA ALLIANCE FOR CLEAN TRANSPORTATION

EP-ACT

2017 Planned Activities

UPCOMING EVENTS- 1ST QUARTER

- 1ST RESPONDERS TRAINING PHILADELPHIA FIRE ACADEMY-5200 PENNYPACK ST. PHILADELPHIA, PA 19136
- JANUARY 10, 2017 - 8:00AM-5:00PM
- PHILADELPHIA AUTO SHOW- JANUARY 28-FEBRUARY 5, 2017
- ENERGY INDEPENDENCE SUMMIT- FEBRUARY 15-17, 2017- WASHINGTON D.C.
- ANNUAL FUEL DISPLACEMENT REPORT TRAINING- FEBRUARY, 2017- DATE TBD
- CNG DEDICATED EVENT- MARCH, 2017- DATE TBD

UPCOMING EVENTS- 2ND QUARTER

- ODYSSEY DAY- APRIL 20, 2017
- ACT EXPO- MAY 1-4, 2017- LONG BEACH, CA
- 1ST EP-ACT ANNUAL GOLF OUTING/AWARDS DINNER- MAY 15TH, 2017- MCCALL COUNTRY CLUB
- PROPANE DEDICATED EVENT- JUNE, 2017- DATE TBD

UPCOMING EVENTS- 3RD QUARTER

- ANNUAL TOSITA EV EVENT- JULY 12, 2017
- HYDROGEN DEDICATED EVENT- AUGUST, 2017- DATE TBD

UPCOMING EVENTS- 4TH QUARTER

- ANNUAL STAKEHOLDERS' MEETING- NOVEMBER 21, 2017

- LOCATION TBD

EASTERN PENNSYLVANIA ALLIANCE FOR CLEAN TRANSPORTATION

EP-ACT

Panel Session
What Can We Do Together?

Thank you for attending...
"Making Alternative Fuels Relevant, Again"

EASTERN PENNSYLVANIA ALLIANCE FOR CLEAN TRANSPORTATION

EP-ACT

Annual Meeting
November 22th 2016

We would like to give a special thanks coffee break sponsor :

LANDIRENZO

We would like to give a special thanks to our host and lunch sponsor:

PECO®

An Exelon Company

EP-ACT

Eastern Pennsylvania Alliance for Clean Transportation

Would like to wish everyone a Happy Thanksgiving and a Happy Holiday Season. We appreciate all you do to keep us

"Driving Together, Towards a Green Tomorrow®..."