Sacramento
Clean Cities Coalition

SACRAMENTO METROPOLITAN
AIR QUALITY
MANAGEMENT DISTRICT

Welcome to the Sacramento Air District and Sacramento Clean Cities Natural Gas and Electric Vehicle Workshop

EV Smart Fleets

Making Electric Vehicles Affordable for Fleets

EV Smart Fleets seeks to address these barriers by aggregating state and local fleet purchases for EVs and charging stations through a multi-state aggregated EV solicitation and procurement agreement. EV Smart Fleets will leverage the purchasing volume of public fleets across the country in order to reduce vehicle and infrastructure costs, improve contract terms, provide access to a wider range of EV models, and expand access to charging infrastructure. This multi-state procurement will be issued and managed by the National Association of State Procurement Officials (NASPO) through its ValuePoint Program.

Clean Cities

Sacramento Clean Cities Coalition

Heavy Duty Diesel Truck Funding in Sacramento

Kristian Damkier
Sacramento Metropolitan AQMD
September 8, 2016

Overview

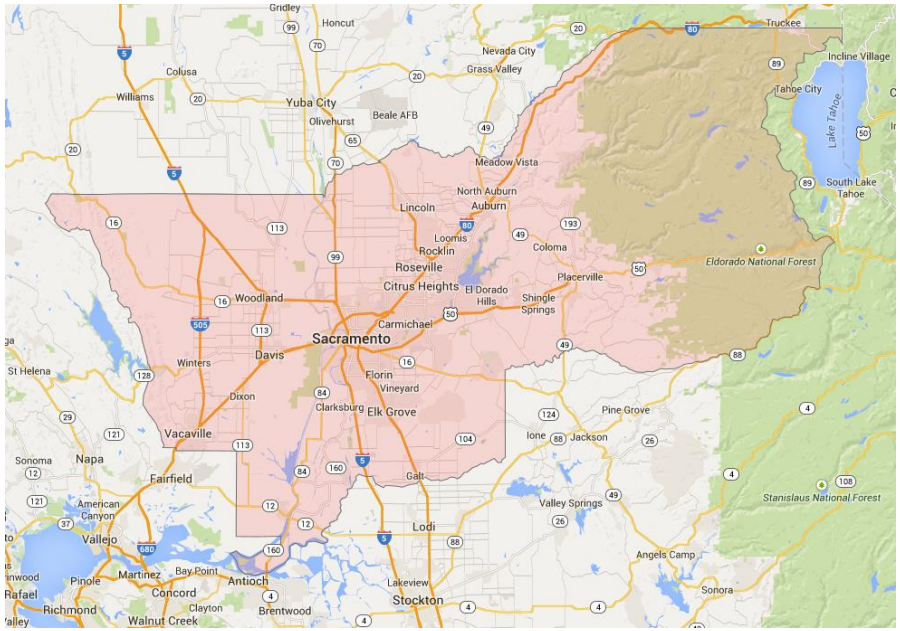
* District Overview
* Sacramento Federal Nonattainment Area
* Sacramento Emergency Clean Air Transportation (SECAT) Program
* Proposition 1B Funding Development
* Other Incentive Options

Sacramento Metropolitan AQMD

* Local government agency in Sacramento County
* Regulate sources of air pollution to protect human health
* Coordinate with state and federal agencies to clean up mobile sources

SACRAMENTO METROPOLITAN
AIR QUALITY
MANAGEMENT DISTRICT

Sacramento Federal Ozone Nonattainment Area



* Sacramento, Placer, El Dorado, Yolo, Solano, and Sutter Counties
* Does not meet federal health standards for air pollution
* Most pollution comes from cars, trucks, trains, and other mobile sources

Incentive Funding

* Applicants must be compliant with all ARB rules and regulations and local air district rules (if applicable)
* Funding cannot be used to help immediate compliance issues – only help fleets prepare for future targets
* Replacement trucks must use DEF (2010-compliant) or alternative fuels and operate mainly in California
* Staff can review and approve applications quickly

SECAT Program

* Created in 2000 to reduce pollution from trucks
* Funding replacement of older trucks with new clean vehicle projects
* Up to $60,000 per vehicle
* Funding based on engine model year and historic operation in the SFNA

SECAT Bucks for Trucks!
emergency clean air transportation program

Who is Eligible for SECAT?

* Heavier heavy-duty diesel vehicles with a 2009 & older engine (GVWR over 26,000 lbs.) equipped with a diesel particulate filter
* All lighter heavy-duty diesel vehicles (GVWR between 14,001-26,000 lbs.) with a 1999-2006 model year engine
* Registered Work Trucks (Currently WT – Previously Construction CT) with 2005 & 2006 model year engines driving less than 20,000 miles per year
* Limited Mileage Agricultural Trucks (AG) with any 2006 & older engine driving less than 15,000 miles per year
* Trucks compliant with other ARB regulations (e.g. Public Fleets, Solid Waste Collection Vehicles, Transit Fleet Rules)

Proposition 1B Funding

* Third truck solicitation is tentative 4Q/16 or 1Q/17
* Truck purchases are not required by regulation
* All private fleets eligible for alternative fuel & zero emission replacement
* Up to $200,000 per truck for advanced technology vehicles

Who is Eligible for Proposition 1B?

* Heavy-duty diesel vehicles with a GVWR over 19,500 lbs.
* At least 75% California operation in previous 24 months
* Minimum historic annual mileage:
  * 20,000 mi/yr for GVWR over 26,000 lbs.
  * 10,000 mi/yr for GVWR 19,501 – 26,000 lbs.
* California base-plate registration for previous 24 months
* Meets January 1, 2017 requirements without funding
* For-profit fleets delivering goods to an end user for a fee
* Combine 1B funds with voucher programs when available

Alternative Fuel Vehicle Funding Table

Truck Class	Old Engine MY	Technology	Max Funding
Class 7 & 8	2009 or older	Zero Emission	$200,000
		Hybrid / ZEV	$150,000
		Ultra Low NOx	$100,000
		Standard Hybrid	$80,000
		Natural Gas	$65,000
Class 6	1998 – 2009	Zero Emission	$100,000
		Hybrid / ZEV	$65,000
		Ultra Low NOx	$50,000
		Standard Hybrid	$45,000
		Natural Gas	$40,000

Other Incentive Options

* SMAQMD Carl Moyer Program
  * Funding for off-road diesel equipment replacement
  * Diesel ag pump electrification
  * Other source categories
* Clean Vehicle Rebate Project
  * Up to $5,000 for personal electric or fuel cell cars
* Hybrid Voucher Incentive Project
  * Up to $120,000 for hybrid & electric heavy-duty trucks

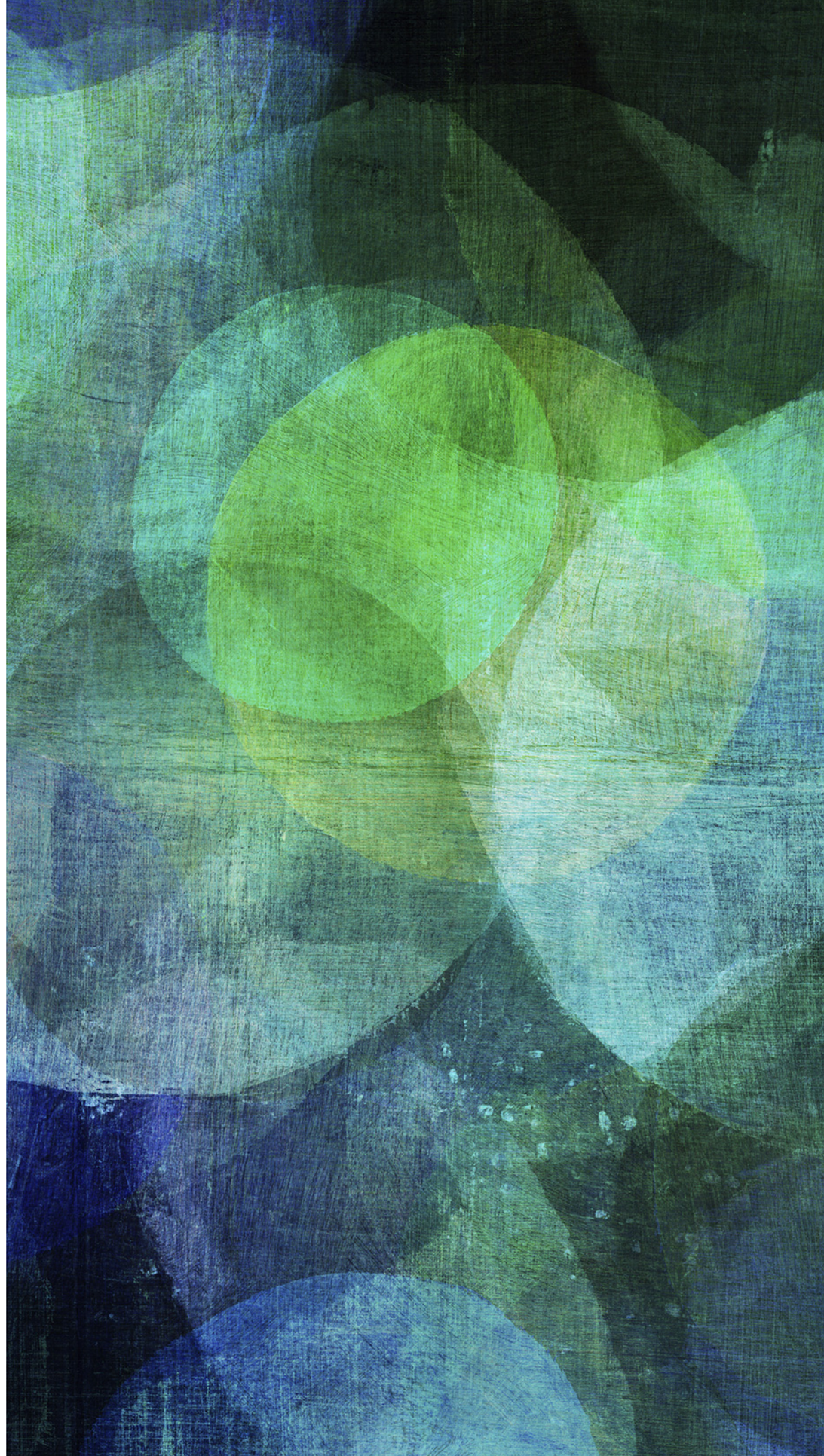
Contact Information

* SECAT – www.4secat.com
* Carl Moyer Funding – www.airquality.org
* CVRP – www.energycenter.org/clean-vehicle-rebate-project
* HVIP – www.californiahvip.org/default.aspx
* Kristian Damkier
  * kdamkier@airquality.org
  * (916) 874-4892

LEGISLATIVE UPDATE

CALIFORNIA LEGISLATURE PASSES 4 BIOENERGY BILLS

SB 1383 (Lara)
AB 2313 (Williams)
SB 840 (Section 9)
SB 840 (Section 11)

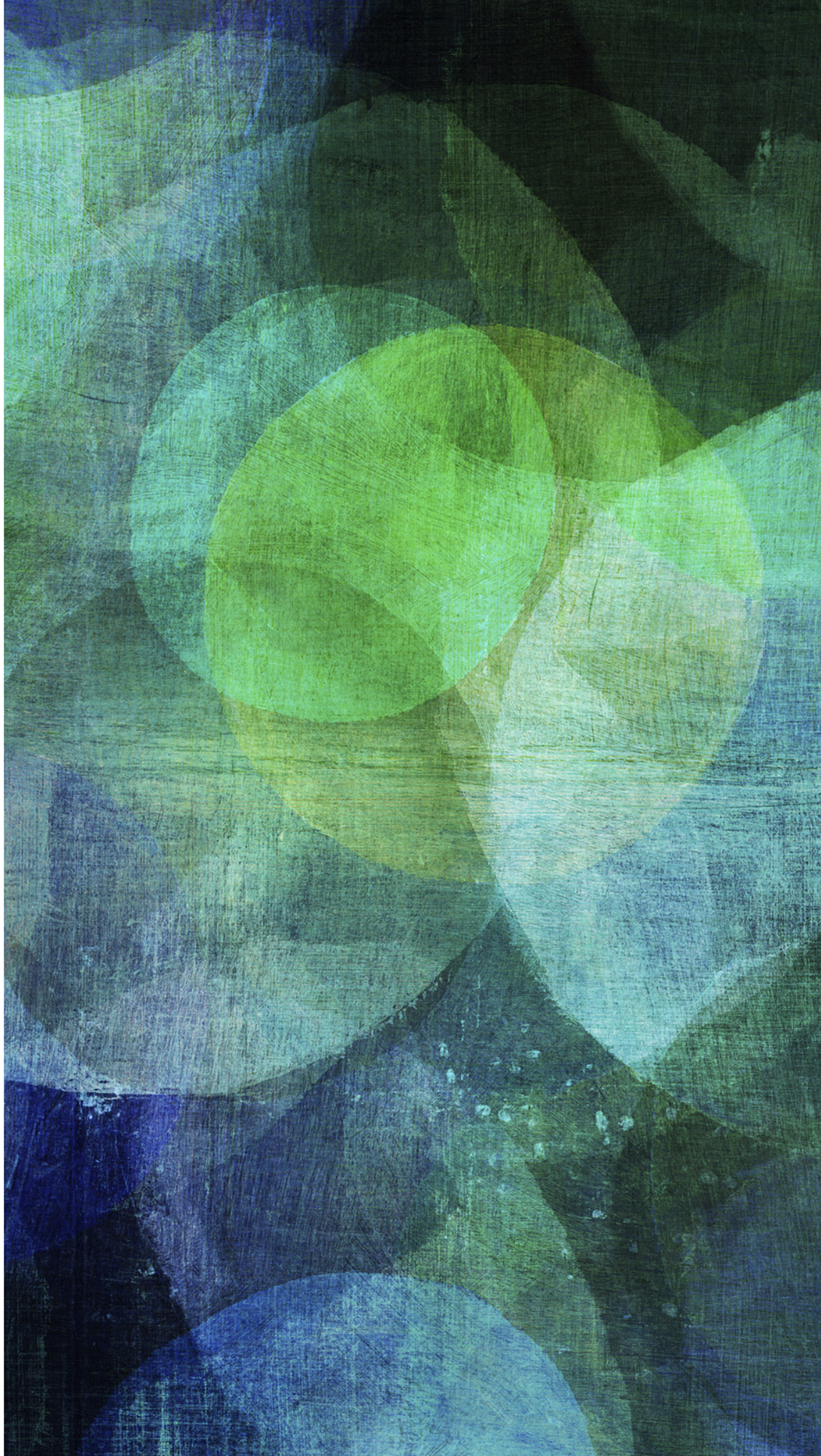


CA ENACTS SB 32 AND MAINTAINS LCFS

MIXED RESULTS ON CAP AND TRADE REVENUES

JULIA LEVIN BIOENERGY ASSOCIATION OF CALIFORNIA

J levin@bioenergyca.org



Cummins Westport
The Natural Choice

ISL G NEAR ZERO

Near Zero Emissions Natural Gas Engine

- CWI has been working on a project supported by the SCAQMD, CEC & SoCal Gas to develop technology that would reduce NOx emissions to below the 0.02 g/bhp-hr “Near Zero” level

- In 2014, CWI completed laboratory-based R&D, using prototype hardware, testing the ISL G for near zero emissions while maintaining current architecture

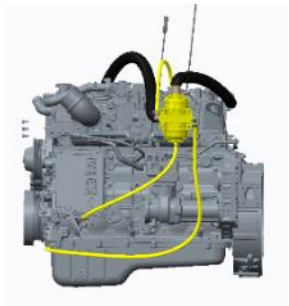
Emissions Criteria	Reduction	Near Zero
Particulate Matter (PM)	↓ **80%** below EPA standards	
Nitrogen Oxides (NOx)	↓ **90%** below EPA standards	
Engine related Methane (CH_4)	↓ **70%** reduction (crankcase and tailpipe)	
Greenhouse Gases (CO_2 equivalent)	↓ **9%** reduction (technology pathway for further reduction in 2019/2020)	

- 2015 work included
  - Component and engine design for high volume manufacture
  - Extensive component / system validation to demonstrate performance, reliability and durability, including field testing in California
  - Emissions certification

- 2016 Production begins

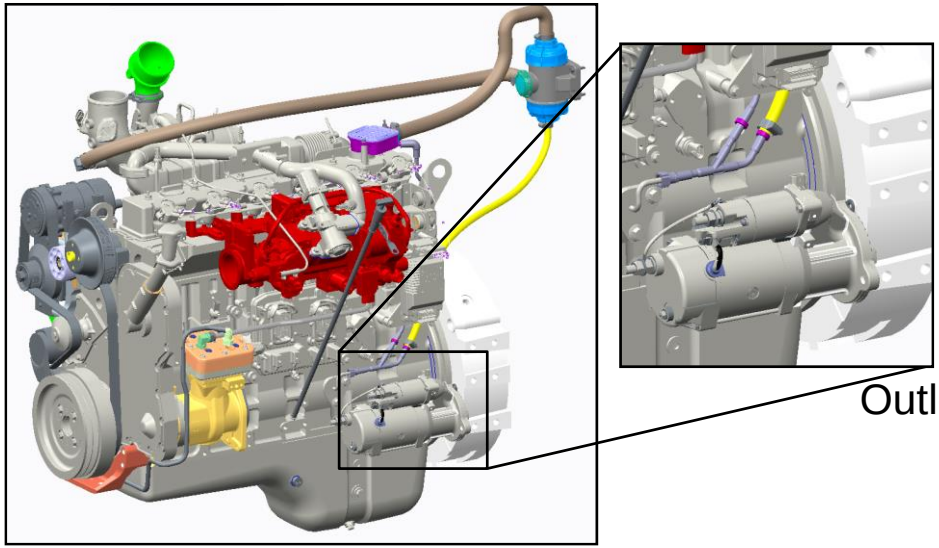
ISL G NEAR ZERO

- Base ISL G engine design is the same
  - Engine will be factory built at Cummins Rocky Mount Engine Plant
  - Ratings, warranty and operational / maintenance procedures will be the same
  - No change in technician service certification requirements
  - Compatible with CNG, LNG, or RNG
- Closed Crankcase Ventilation (CCV) will be added to engine
  - CCV system reduces engine related methane emissions by 70%
  - CCV filter change required at 2,000 hours
- Three Way Catalyst will change to meet next level emissions
  - Remains maintenance free
  - Larger size catalyst with addition sensor added
  - New substrate composition for durability and emission performance



Westport

Closed Crankcase Ventilation (CCV) System



Inlet (from valve cover)

Chassis Mounted

Filter (2,000 hour change)

Coolant supply/return

Outlet (to compressor inlet elbow)

Oil drain (to supplied connection on block)

ISL G Near Zero Ratings (same as MY2015 ISL G)

ENGINE MODEL	ADVERTISED HP(KW) @ RPM	PEAK TORQUE LB-FT @ RPM	GOVERNED SPEED
ISL G NZ 320	320 (239) @ 2000	1000 (1356) @ 1300	2200 RPM
ISL G NZ 300	300 (224) @ 2100	860 (1166) @ 1300	2200 RPM
ISL G NZ 280	280 (209) @ 2000	900 (1220) @ 1300	2200 RPM
ISL G NZ 260	260 (194) @ 2200	660 (895) @ 1300	2200 RPM
ISL G NZ 250	250 (186) @ 2200	730 (990) @ 1300	2200 RPM

Application guidelines are the same as ISL G i.e. up to 66,000 lb. GVW.

Why ISL G Near Zero vs Current ISL G?

- 90% lower NOx and 9% better GHG profile
  - Lowest emission mid range engine in North America
  - 10 ISL G Near Zero engines equal one ISL G in NOx emissions
- Better qualified for Non Attainment funding
- Features all the latest engineering improvements from the ISL G
  - Natural gas fleets looking to replace existing natural gas vehicles or engines will notice a dramatic improvement in reliability and uptime performance
- Allows fleets the opportunity to market “Near Zero” emissions
- “Go forward” product for CWI
  - OBD in 2018 will obsolete base ISL G

Near Zero Product Plan – Feb 2016

(Certified to ARB Near Zero NOx standard - 0.02 gm/bhp.hr.)

Engine	2016	2017	OBD	2018	2019
ISB6.7G *	Available	Available		Available	Available
ISB6.7G NEAR ZERO	Not Available	Not Available		Development Program Not Funded	
ISL G	Available	Available		Not Available	Not Available
ISL G NEAR ZERO	Available	Available		Available	Available
ISX12 G	Available	Available		Not Available	Not Available
ISX12 G NEAR ZERO	Not Available	Not Available		Available	Available

Legend

- Available
- Not Available

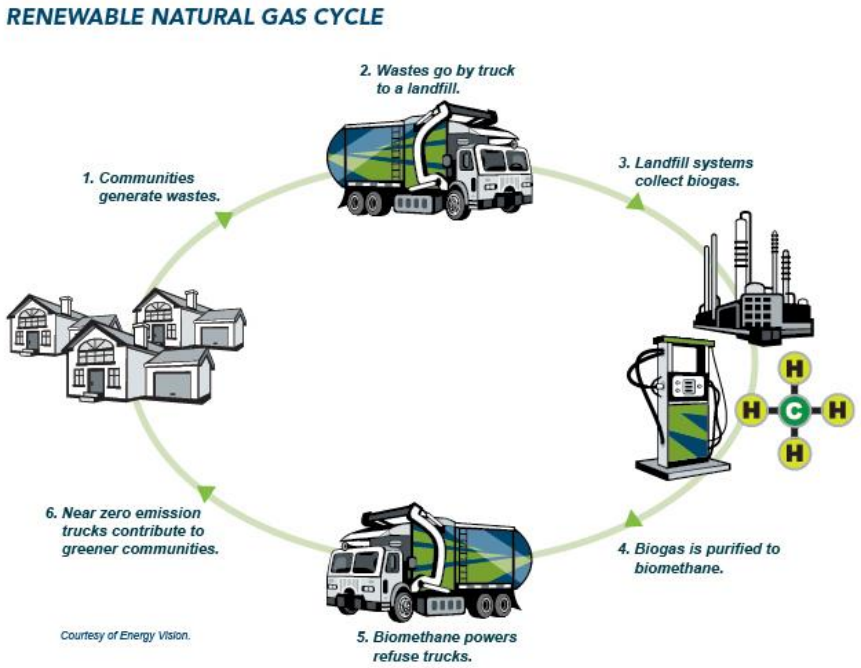
- * ISB6.7 G will be certified at launch to California ARB optional Low NOx (0.1 gm/bhp-hr.)
- Near Zero development funding for the ISB6.7 G has not be secured – no ISB6.7 G NZ in plan without funding
- ISX12 G NZ will be available in 2018
- Base ISL G and ISX12 G engines are not available post 2017 (not OBD compliant)

Cummins Westport

Use Renewable Natural Gas

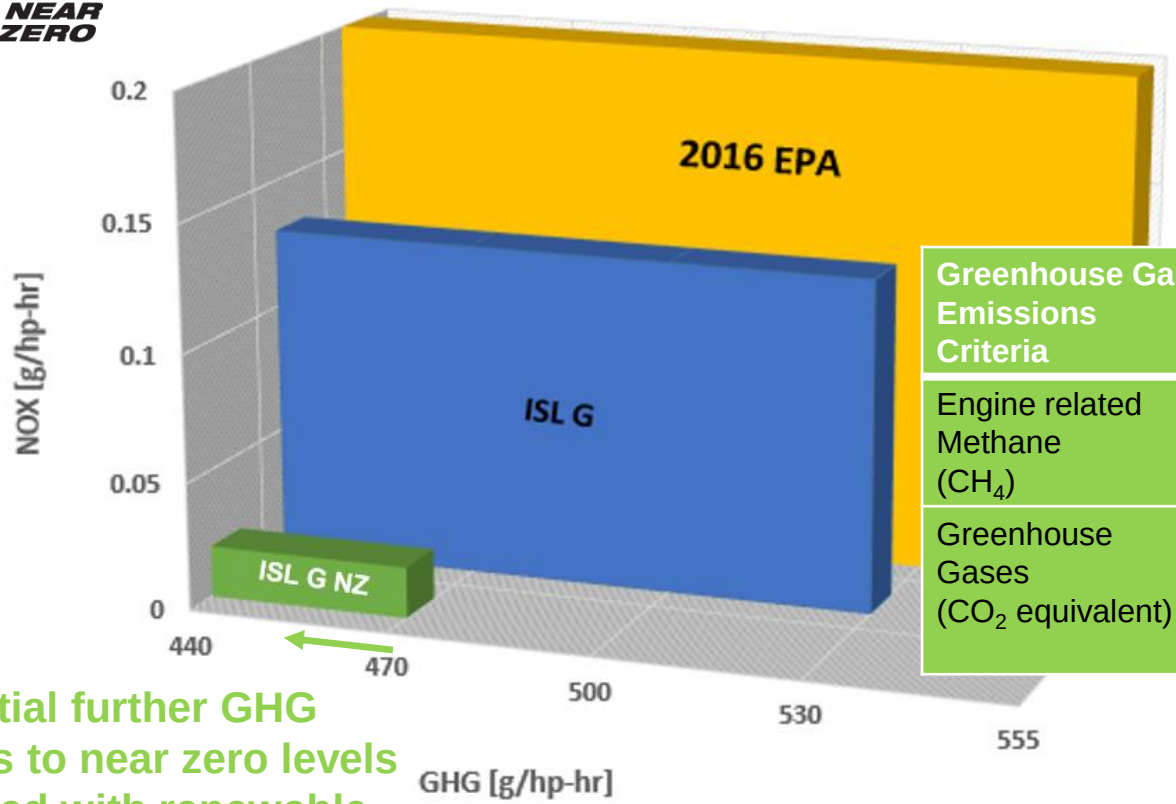
- Converting the methane that leaks from landfills or other sources to **RNG** fuel **has significant greenhouse gas emissions reduction benefits.**

- Use of **RNG** with ISL G Near Zero provides a GHG reduction over 80%
- In addition, there's a 100% displacement of fossil fuels as RNG is a renewable resource.



Greenhouse Gas Reduction

ISL G NEAR ZERO



Greenhouse Gas Emissions Criteria	Reduction
Engine related Methane (CH_4)	↓ **70%** reduction (crankcase and tailpipe)
Greenhouse Gases (CO_2 equivalent)	↓ **9%** reduction (technology pathway for further reduction in 2019/2020)

Potential further GHG reductions to near zero levels when used with renewable natural gas (RNG)

ISL G NEAR ZERO

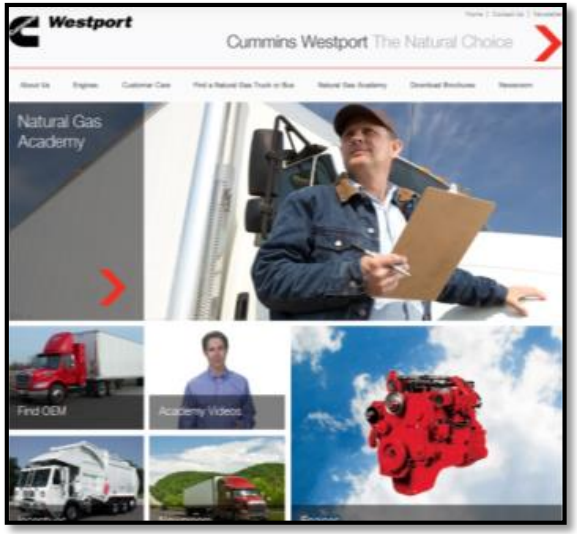
Summary

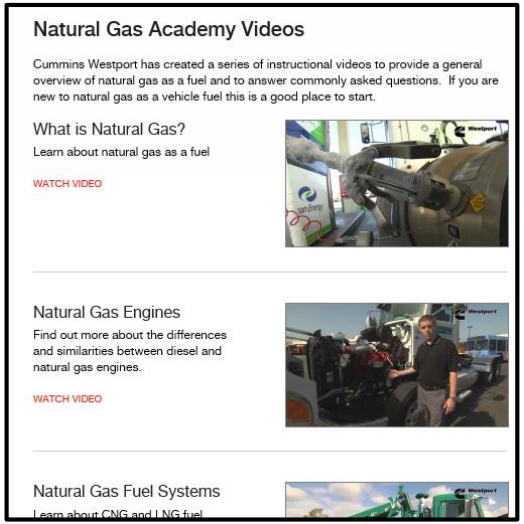
- Cummins Westport has certified the ISL G Near Zero (NZ) NOx with EPA and California ARB for Bus and Truck applications

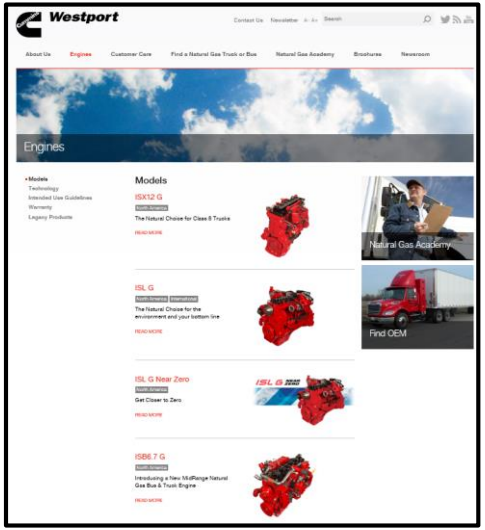
- Field testing is in progress in transit and refuse applications.
  - New orders daily

- ISL G NZ NOx engines will be factory built and available in 2016 for new Bus and Truck installations as well as for repowers of existing natural gas vehicles.
  - There are no plans for retrofit kits for existing engines

More information…www.cumminswestport.com







- Natural Gas Academy: great source of information about NG, technology, vehicles
- Series of instructional videos, including engine walk-arounds and service & driver training videos
- Engine information – specs, features, maintenance intervals
- Product Brochures & Bulletins available for download

CNG LNG RNG

Westport

Thank You

Keely King
Key Account Manager
Keely.king@cummins.com

GMERP Workshop

September 8th, 2016

Jeff Wittenberger
National Account Manager
Clean Energy

Agenda

- Benefits of Fueling with Natural Gas
- Clean Energy Overview
- Redeem Renewable Natural Gas and Near Zero Engines
- America's Natural Gas Highway and National CNG/LNG Stations
- Interstate 5 - CNG/LNG Heavy Truck Accessible Fuel Corridor
- Northern California CNG/LNG Stations

Benefits of Fueling with Natural Gas

Cleaner

Reduces a fleet's carbon footprint and NOx emissions

Domestic

Is abundant in North America and fuels the growth of our economy

Cheaper

Offers prices that are more stable and less volatile than gasoline and diesel

Safe

17 million+ vehicles around the world are fueling safely with natural gas

Competitive Edge

Gives fleets a green advantage to win bids and attract new customers

Reduced Maintenance

Runs cleaner, protecting vehicle engines

Clean Energy is the only natural gas fueling solutions provider in the industry to offer CNG, LNG & RNG fueling.

CNG

LNG

REGIONAL FLEETS

AIRPORT TRANSIT

REFUSE FLEETS

HEAVY DUTY TRUCKING

PUBLIC TRANSIT

CONSTRUCTION VEHICLES

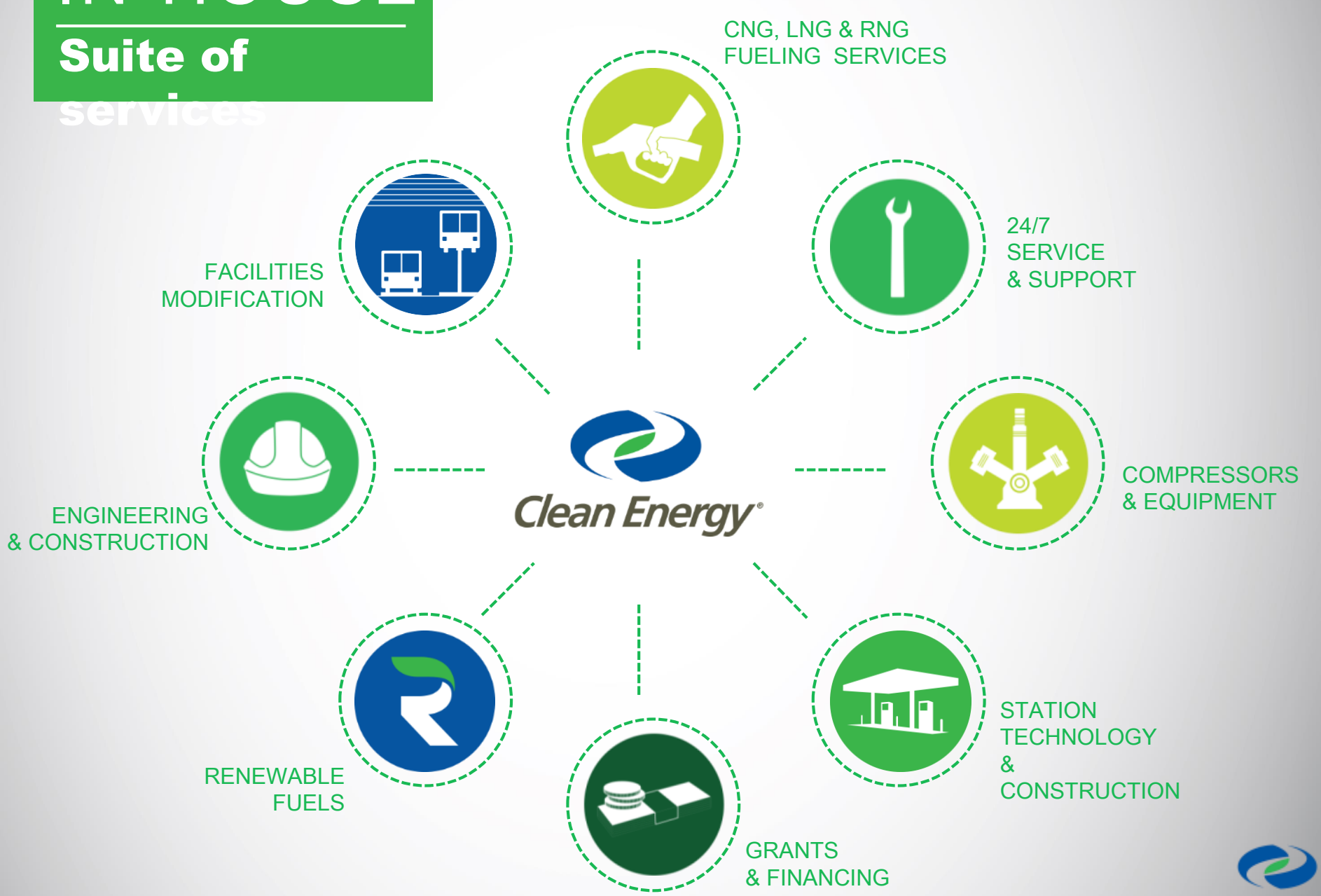
Largest Alternative Transportation Fuel Provider

900+ FLEET CUSTOMERS

40,000+ NGVS FUELED DAILY

550+ NATURAL GAS FUELING STATIONS

IN-HOUSE
Suite of services



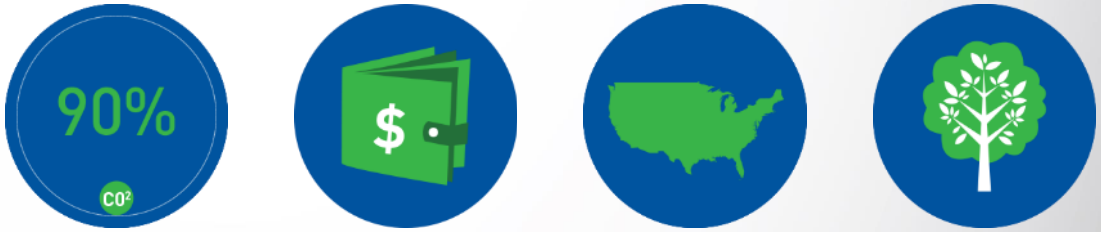
Lowest Emissions Offering Available

Cummins Westport

ISL G Near Zero NOx Engine

- First Mid-range engine in North America to reduce NOx emissions by 90% from EPA 2010 limit of 0.2 g/bhp-hr.
- Meets the 2017 EPA Greenhouse gas emission requirements.
- Certified by the EPA and California Air Resources Board

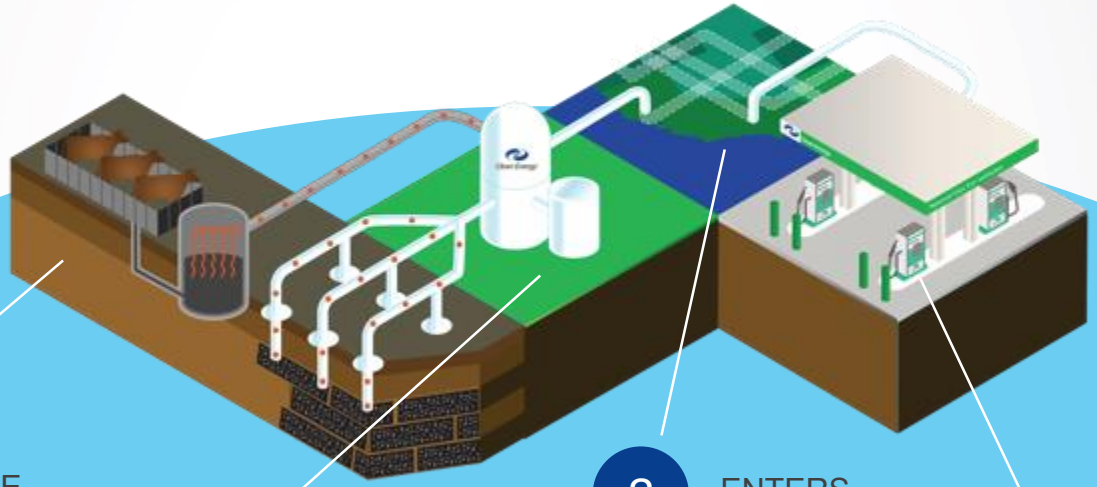
Redeem™ by Clean Energy®



CLEANER COST-EFFICIENT DOMESTIC RENEWABLE

The first renewable natural gas made from organic waste and available as a commercial vehicle fuel.

HOW REDEEM IS MADE



1

CAPTURE & EXTRACT

Methane is derived from various organic waste sources such as landfills and farms.

2

PROCESS & PURIFY

After it is processed to Required standards of Purity, methane becomes a Renewable substitute for Natural gas.

3

ENTERS INTERSTATE FUEL PIPELINE

Once compressed or liquefied, methane gas is sent into the interstate fuel pipeline system.

4

MADE AVAILABLE AT FUELING STATIONS

The methane gas is routed to designated Clean Energy stations which fuel an array of commercial vehicles.

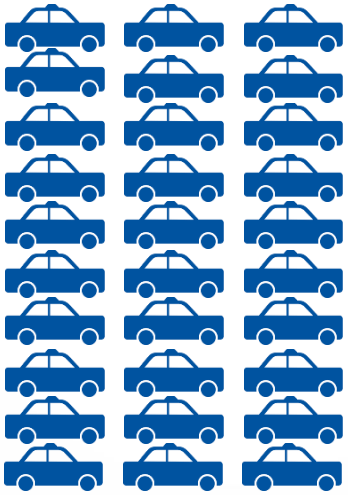
Environmental Comparison

Traditional LNG
per 100,000 miles

8

Redeem LNG
per 100,000 miles

31

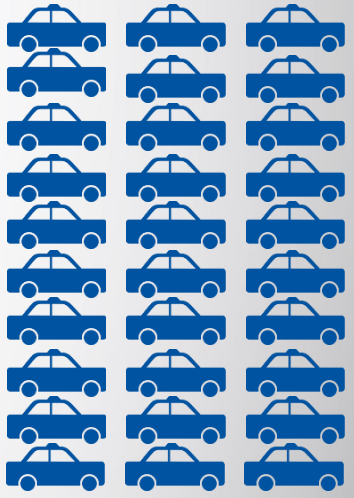


Traditional CNG
per 100,000 miles

11

Redeem CNG
per 100,000 miles

34



GHG Equivalent to Removing Vehicles from Road Annually

Redeem™

Fueling nearly 400 trucks with clean, renewable natural gas in CA, TX & FL.

Largest consumer of Redeem™ in North America, consuming over 2 Million GGEs annually, thus reducing their footprint by 15,870 metric tons of GHG Emissions every year.

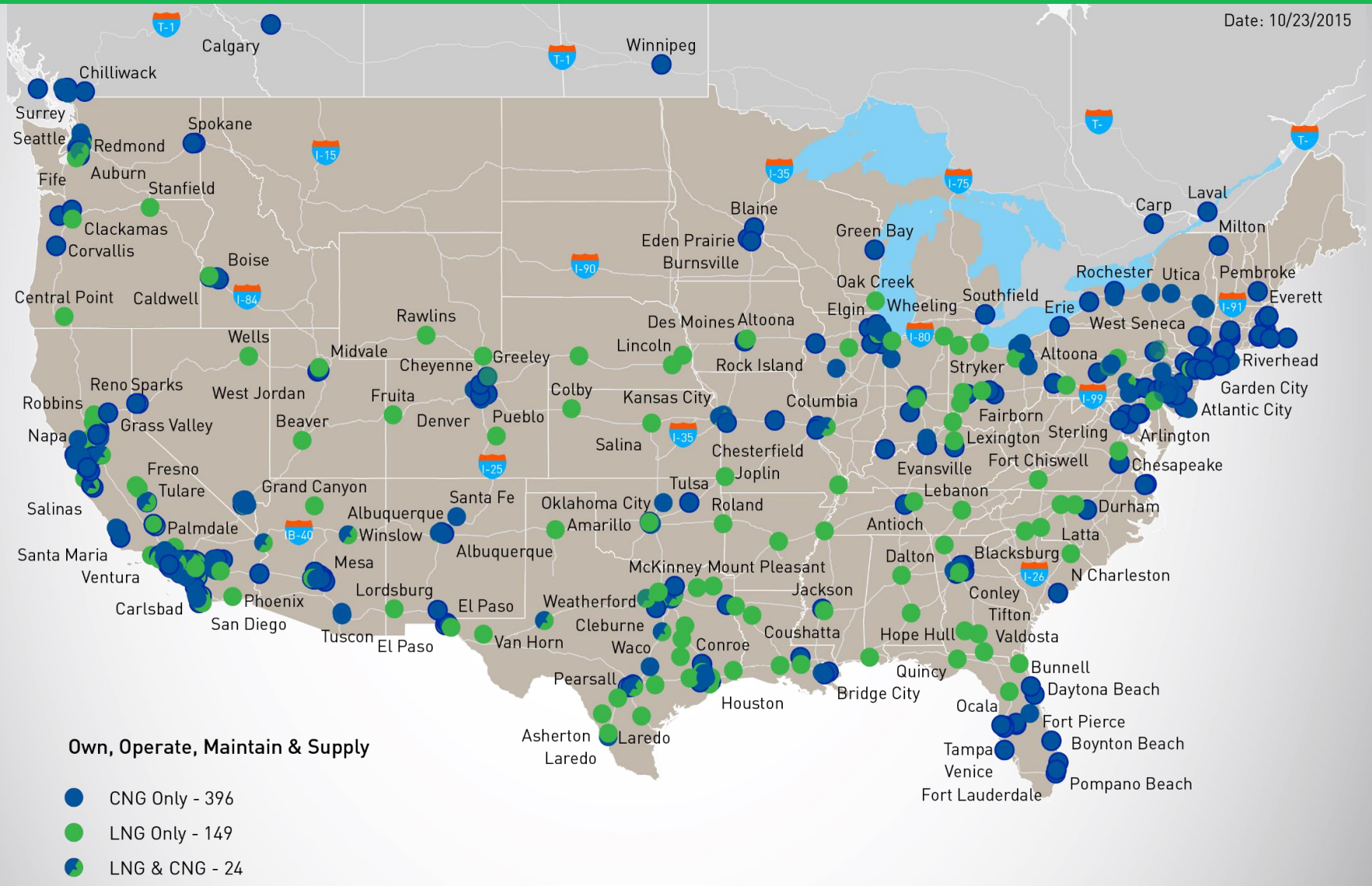
That's similar to:

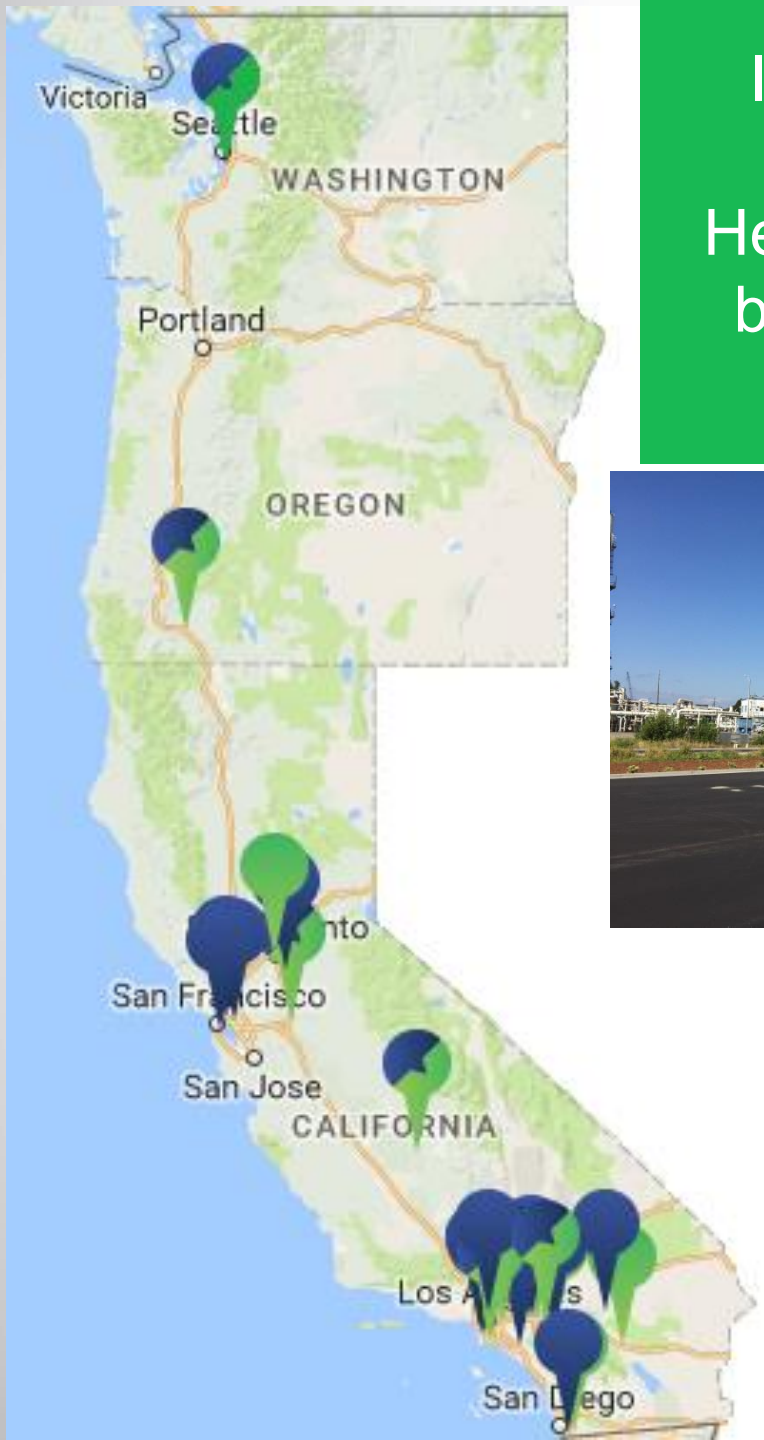
Removing **3,349** Cars from the Road

OR

Planting **406,339** Trees

Most Robust Nationwide Network: Public & Private Locations





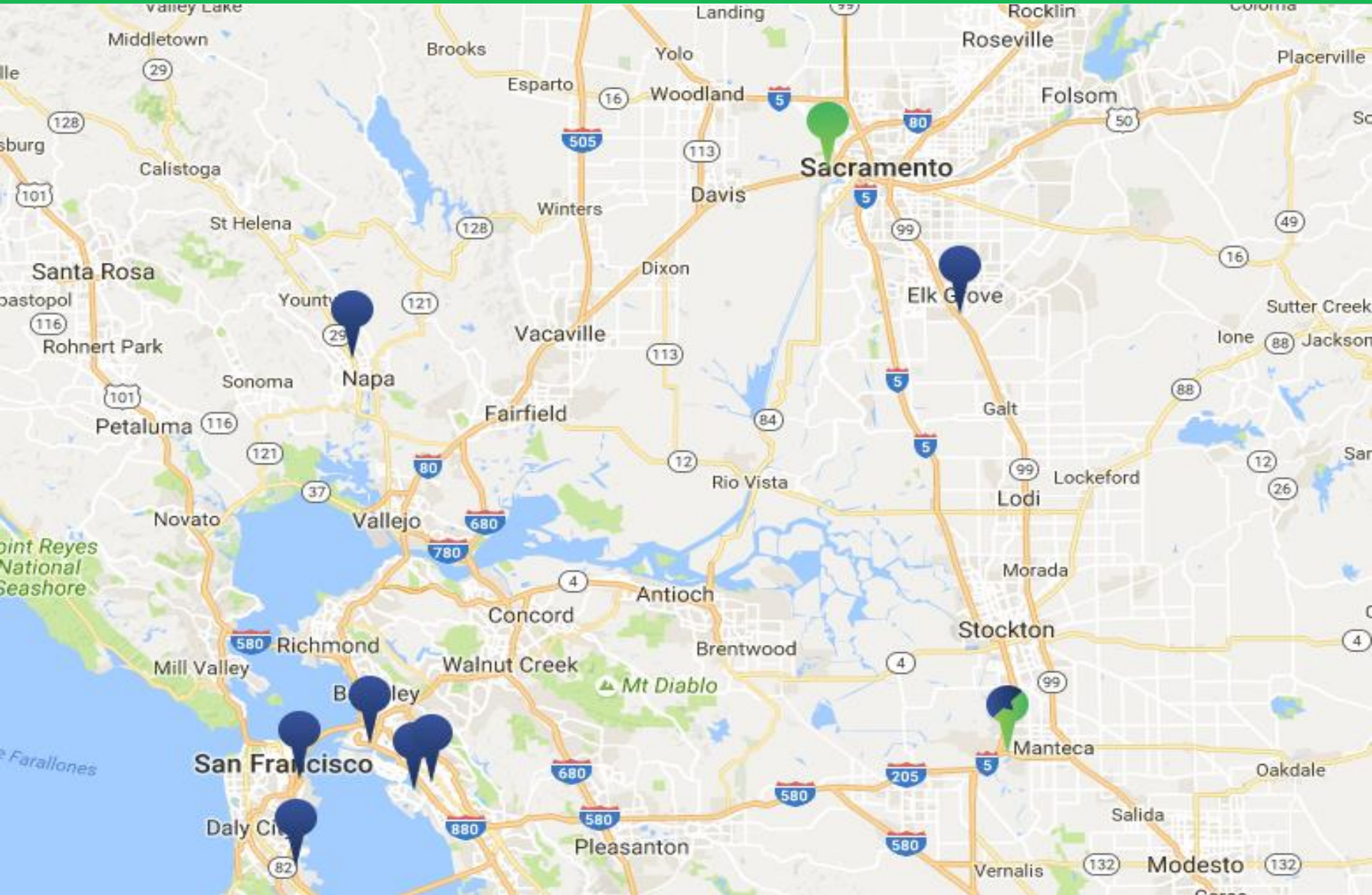
Interstate 5 Corridor Now Connected!

Heavy Duty Truck Accessible Fueling for both CNG and LNG from San Diego to Tacoma

Tacoma, WA LNG Station and Seatac, WA CNG Station

Central Point (Medford), OR CNG/LNG Station

Clean Energy – CNG and LNG in Northern California



Jeff Wittenberger

National Account Manager

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ReFuel

Renewable Natural Gas for Transportation

Sean Moen

General Manager

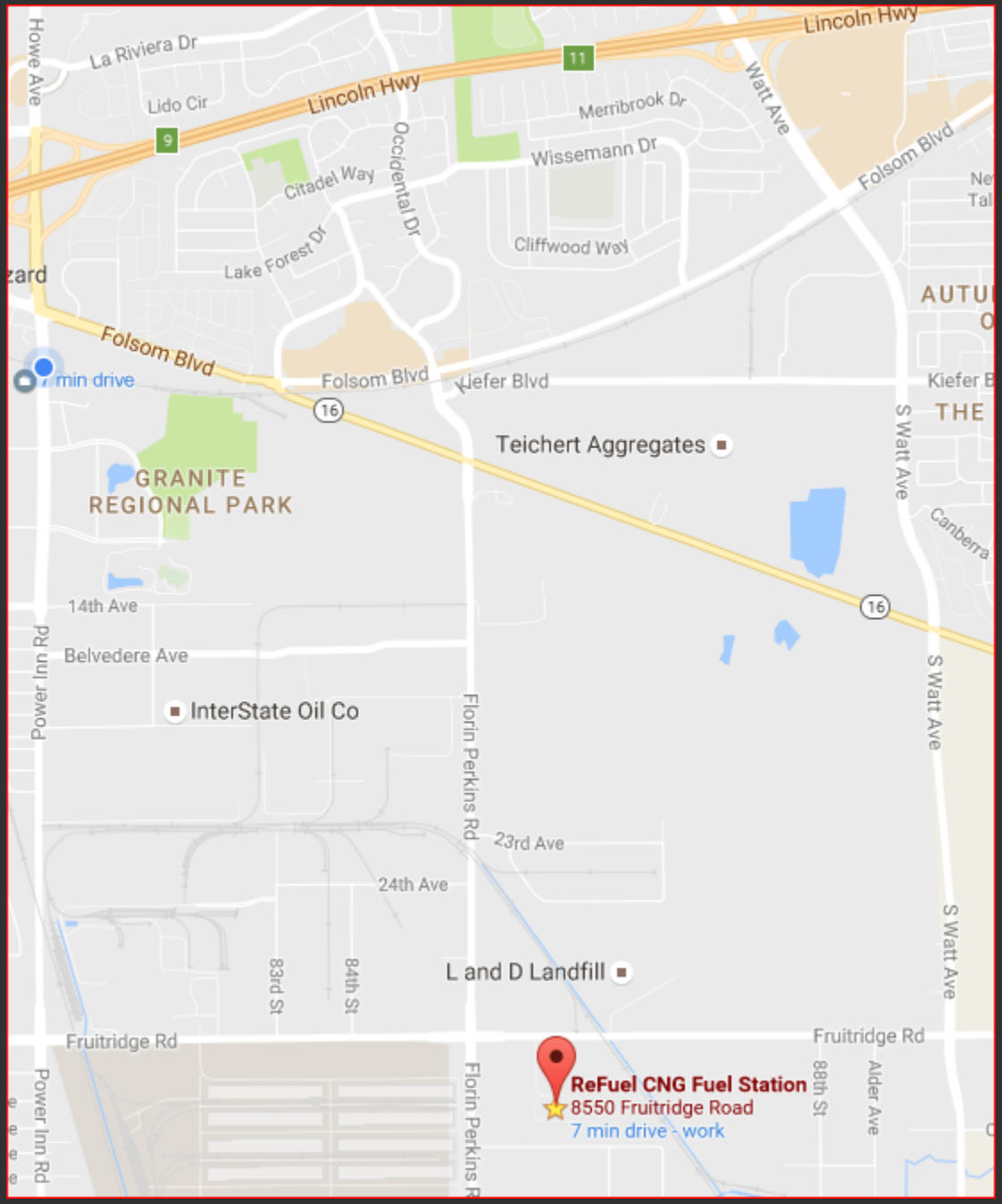
About ReFuel

- Established in 2012 by Atlas Disposal
  - Local Sacramento Commercial Refuse Company
- Partnered with Clean World to develop Renewable Natural Gas (RNG) for Transportation Fuel
  - Anaerobic Digester
  - Food Waste to Fuel
  - Carbon Negative transportation fuel
- Testimony to Public/Private Partnership & Community support

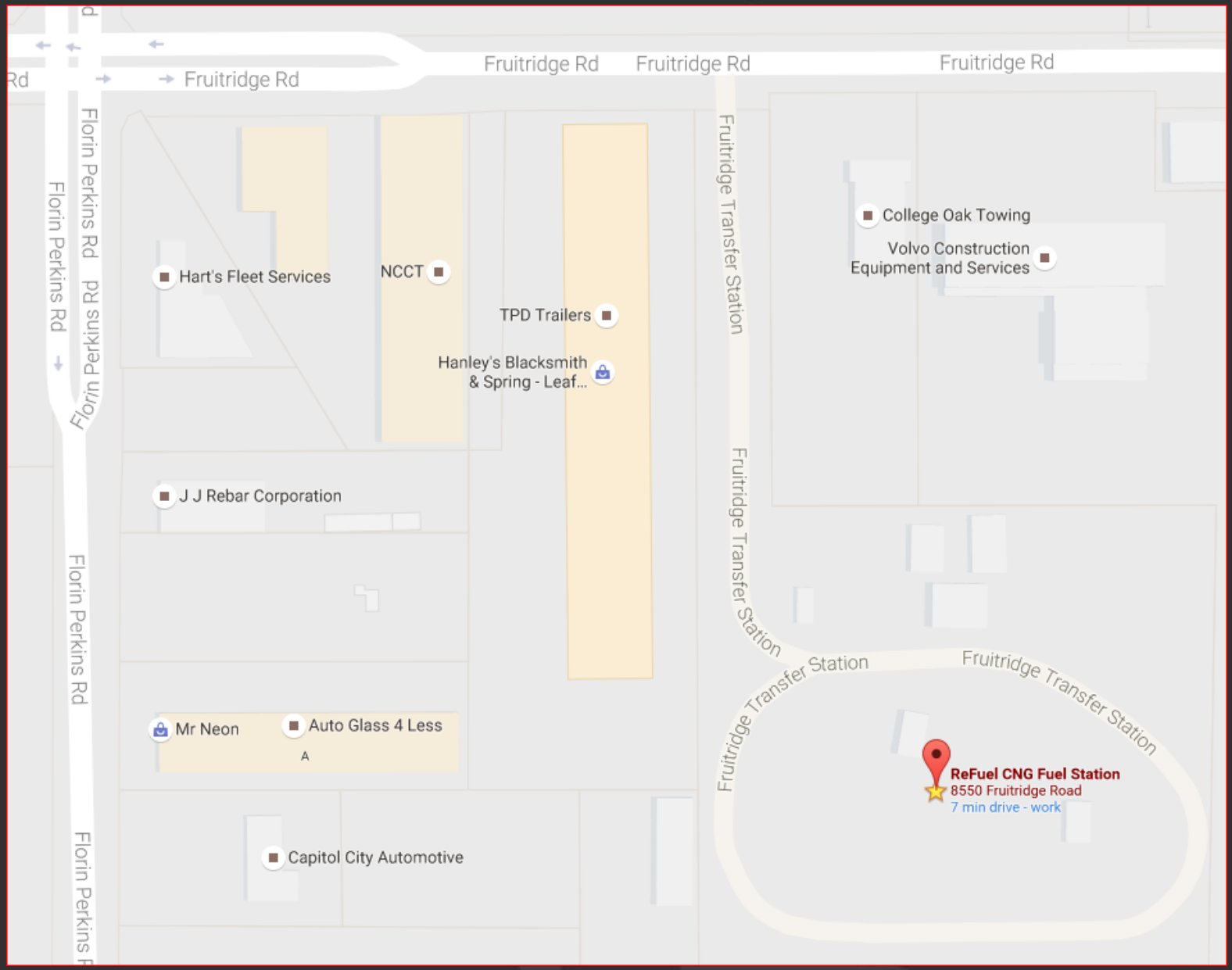
ReFuel

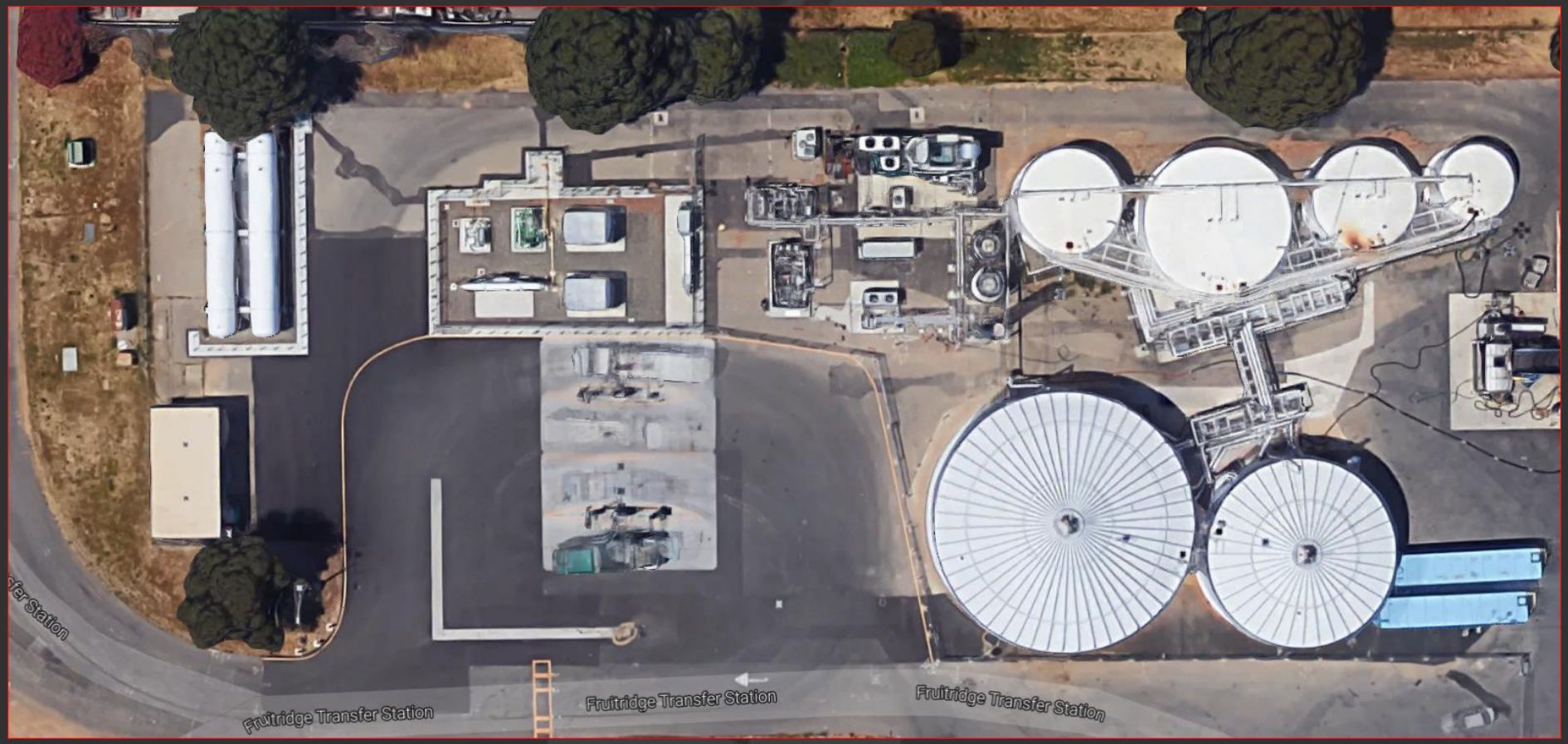
ReFuel Sacramento

- Our Location
  - 8550 Fruitridge Road
    - Between South Watt & Florin-Perkins
- Station Specs:
  - 2 Compressors
  - 4 Fueling Lanes
  - 24/7/365 Fueling Access (Cardlock)
  - Local Site Support & Maintenance
  - Surveillance
- Currently engineering site expansion


Lincoln Hwy
La Riviera Dr
Howe Ave
Lido Cir
Lincoln Hwy
11
9
Merribrook Dr
Watt Ave
Wissemann Dr
Folsom Blvd
Citadel Way
Occidental Dr
Cliffwood Way
Lake Forest Dr
Folsom Blvd
min drive
Folsom Blvd
Kiefer Blvd
16
Teichert Aggregates
S Watt Ave
GRANITE
REGIONAL PARK
Canberra
16
14th Ave
Belvedere Ave
Power Inn Rd
InterState Oil Co
Florin Perkins Rd
23rd Ave
24th Ave
S Watt Ave
83rd St
84th St
L and D Landfill
Fruitridge Rd
Fruitridge Rd
Power Inn Rd
Florin Perkins Rd
ReFuel CNG Fuel Station
8550 Fruitridge Road
7 min drive - work
88th St
Alder Ave

ReFuel


Fruitridge Rd
Fruitridge Rd
Fruitridge Rd
Fruitridge Rd
Florin Perkins Rd
Florin Perkins Rd
Florin Perkins Rd
Florin Perkins Rd
Fruitridge Transfer Station
Fruitridge Transfer Station
Fruitridge Transfer Station
Fruitridge Transfer Station
College Oak Towing
Volvo Construction Equipment and Services
Hart's Fleet Services
NCCT
TPD Trailers
Hanley's Blacksmith & Spring - Leaf...
J J Rebar Corporation
Mr Neon
Auto Glass 4 Less
Capitol City Automotive
ReFuel CNG Fuel Station
8550 Fruitridge Road
7 min drive - work


Fruitridge Transfer Station
Fruitridge Transfer Station
Fruitridge Transfer Station

ReFuel Expansion

- Actively looking for partnerships to expand
- Co-op with other fleets
- Promotional Fuel Price for Demos

Thank you

Sean Moen – General Manager
sean@atlasrefuel.com
916-288-2804

ReFuel

GMERP – Natural Gas and Zero Emission Vehicle Workshop

Electrifying Commercial Weight Chassis' with Zero Emission Technologies – Why Future Proof Design Matters Today

Shyam Nagrani

VP Marketing

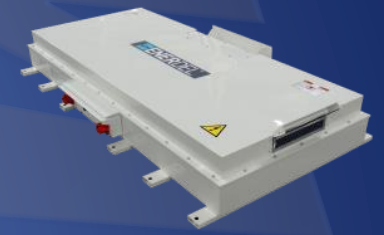
Motiv Power Systems

Future Proofing Electric Vehicles

- Battery – most expensive component
  - Trucks have long lives
  - Battery lives generally shorter
  - Batteries replaced midlife of the truck
  - Original batteries likely not available
  - Redesigning powertrain very expensive

Electric Powertrain requirements

- Batteries
  - Support any battery chemistry
    - Li Ion
    - Sodium Nickel Chloride
    - Other chemistries - newer, improved batteries
    - Use old and new packs in the same vehicle
  - Different electrical characteristics
    - Voltages, impedences, protocols, etc
  - Mix&Match in the same vehicle
    - For the best Energy/Power density

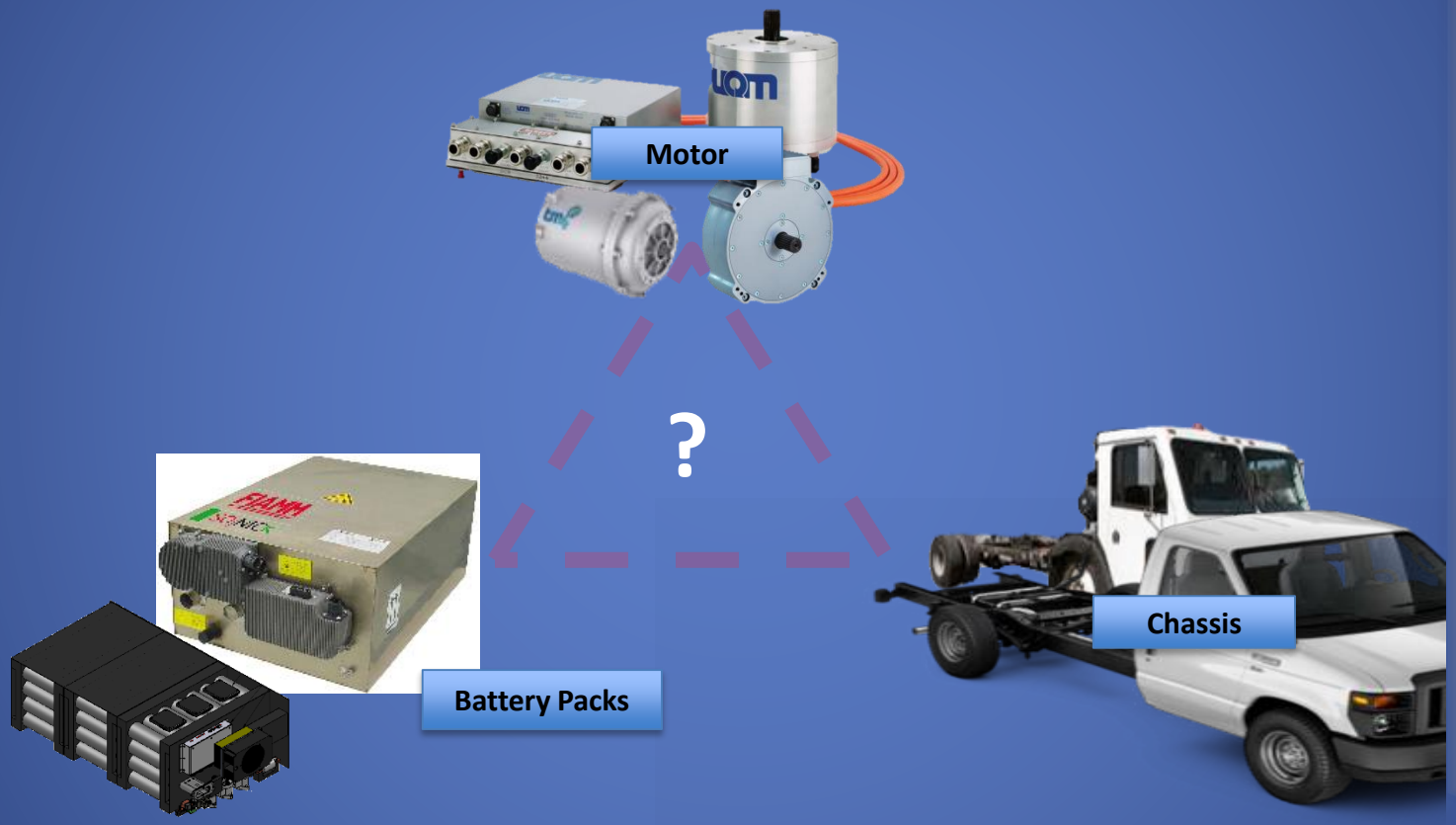


Electrify any Truck

6 Motiv-Powered Electric Vehicles

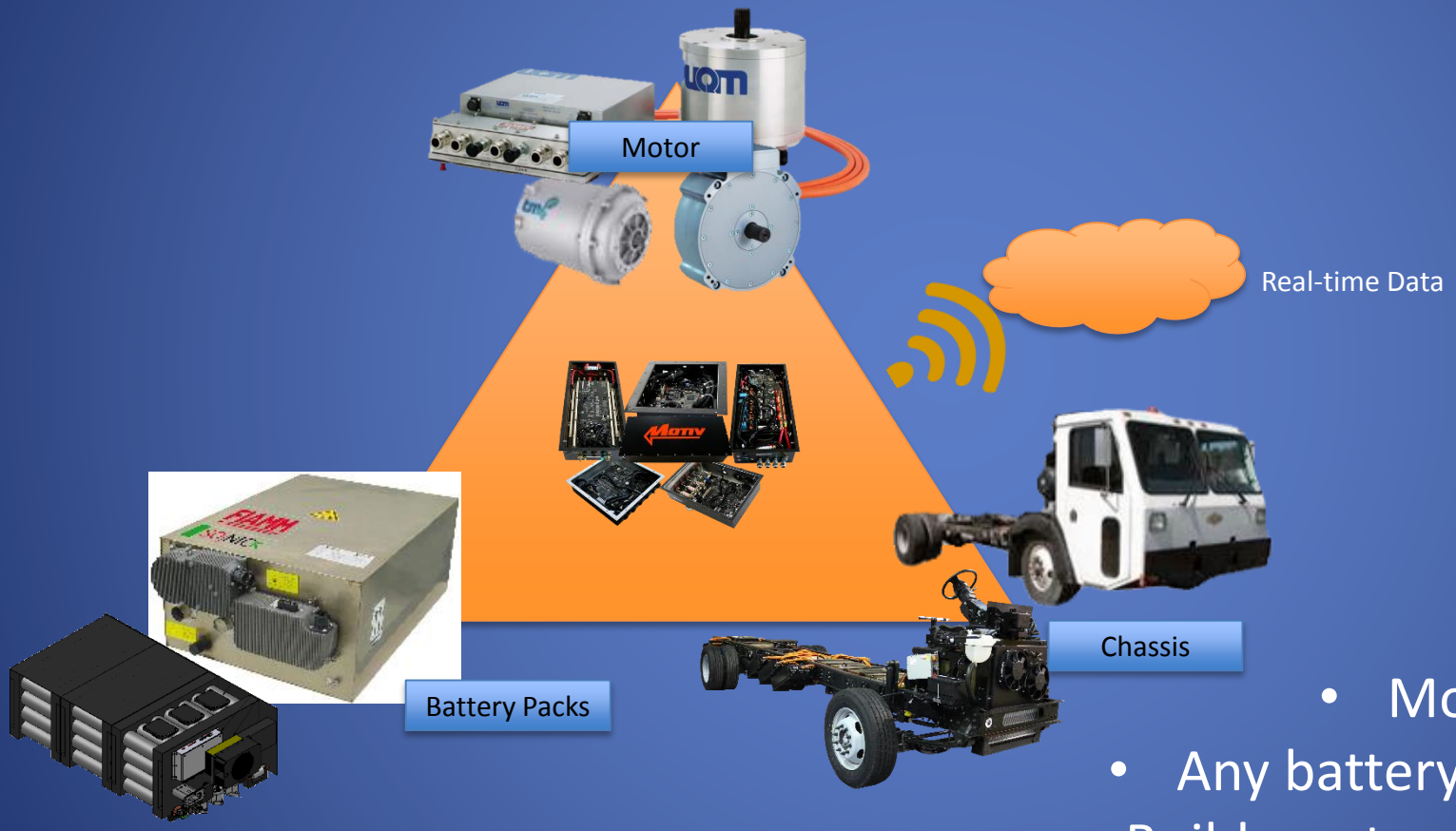
Motiv's All-Electric Powertrain

The “Missing Piece” for Electric



Components are available, but they don’t work together

The Solution:
Motiv's Patented All-Electric Powertrain

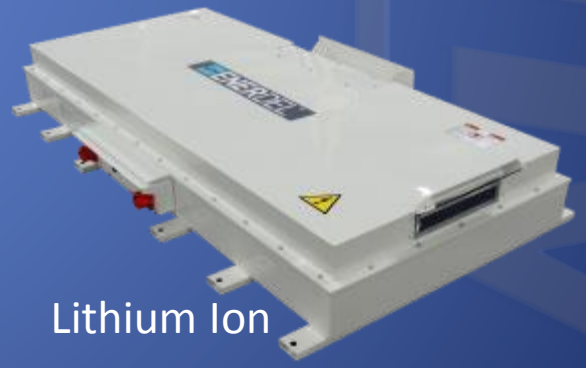


- Modular, Scalable
- Any battery/any motor/any chassis
- Build on standard diesel assembly lines

Na Ni & Li Ion Batteries

- Pros
  - High Energy Density 120 Wh/kg
  - Ambient temperature independent
  - Mature Technology – since 2000
  - Very reliable - >200M miles
  - No Toxic Materials – fully recyclable
  - Maintenance-Free Operation
- Cons
  - Lower Power Density

Sodium Nickel Chloride



Lithium Ion

Electric Powertrain Value Chain

Glider

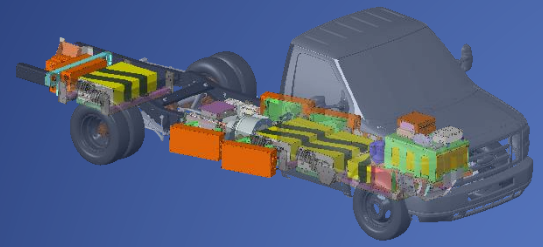
Battery Electric Chassis

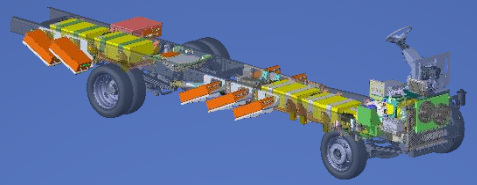
Chassis OEM → Upfitter → Body Builder → Finished Vehicle → Dealer → One Invoice → Fleet

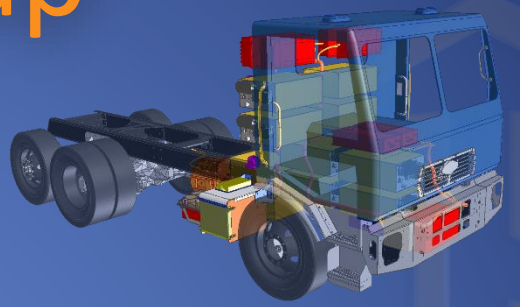
Motiv Electric Powertrain

Same Build Process as Natural Gas “kit”

Chassis Line-up

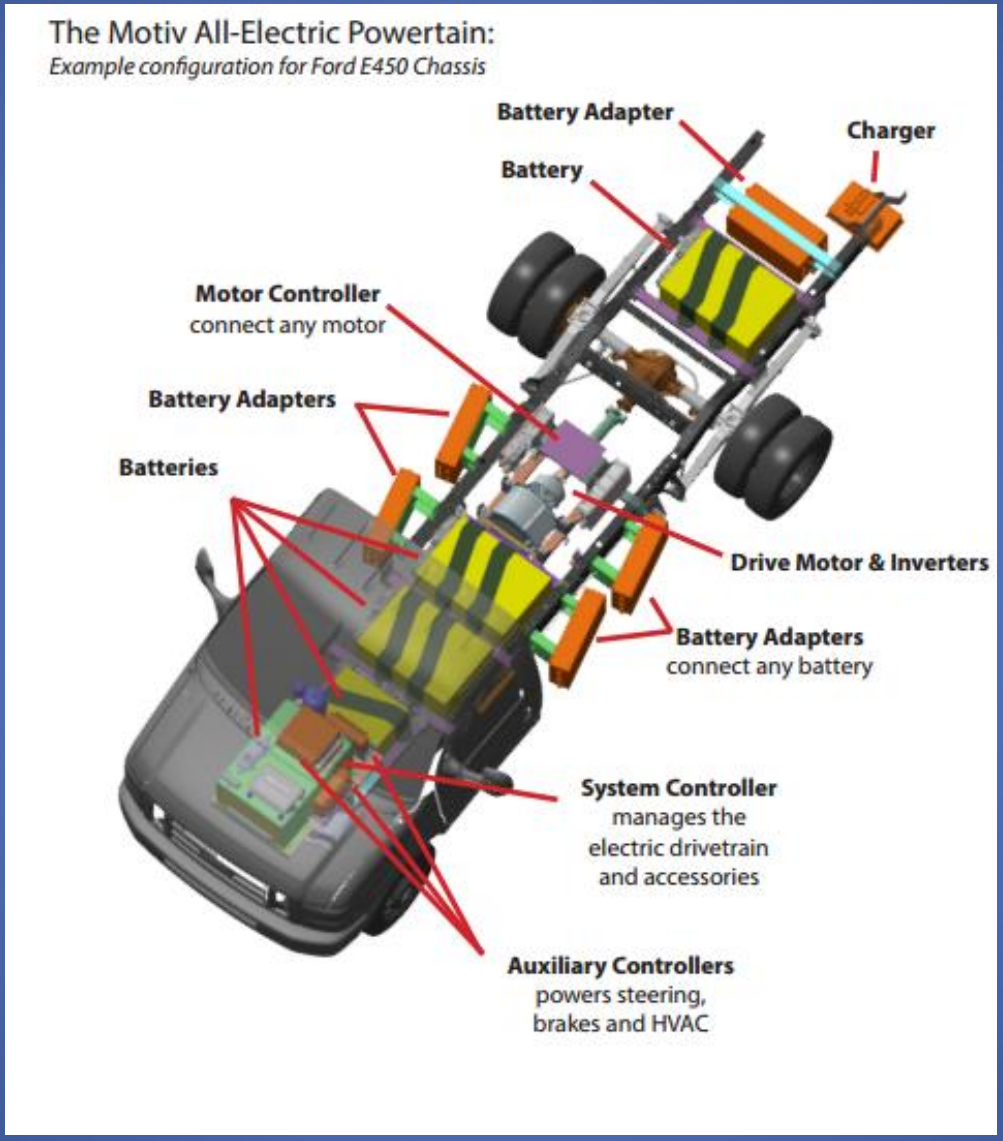




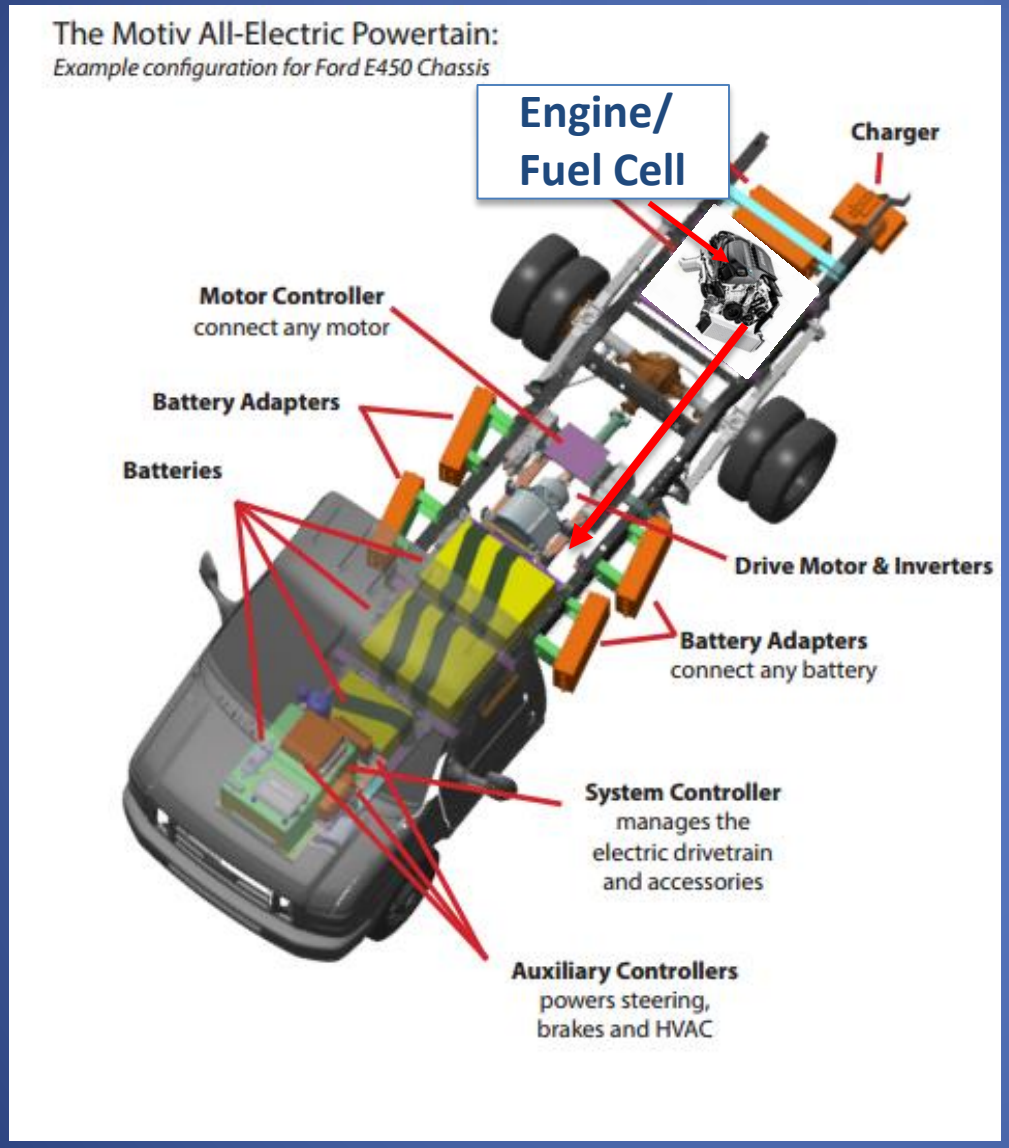


Ford E450	Ford F59	Class 8
Class 4 – 14,500 GVWR	Class 6 – 22,000 GVWR	Class 8 – 66,000 GVWR
68 – 100 miles range	58 – 85 miles range	50 – 80 miles range
8 hr charge time	8 hr charge time	8 hr charge time
School Bus (Trans Tech) Shuttle (Ameritrans) Parcel (Rockport) Flatbed (CTEC)	Parcel (Morgan Olson) Linen (Morgan Olson) School Bus (GAS)	Refuse (Loadmaster) Drayage

All-Electric Powertrain



Different Powertrains



- ***Electric***
- ***Series hybrid*** - basically an electric powertrain with a range extender (engine) which powers the battery, electric motor always drives the wheels, e.g. Chevy Volt, *Motiv Powertrain can support series hybrid*
- ***Parallel hybrid*** – both engine & motor drive the wheels, e.g. Prius

Complexity

Trans Tech e-series School Bus

Kings Canyon
Unified School District
Reedley, CA

Ameritrans ECO-CHARGE

Google /City of Mt View
Free Community Shuttles
Mt

e-Cargoport

Rockport COMMERCIAL VEHICLES

MOTIV

Delivery Van

Electric Flatbed Worktruck

City of Santa Ana
Parks & Recreation Dept Work Truck

Electric Walk-In-Van

AmeriPride Walk-in-Van
Vernon, CA

GAS/Creative Bus Type B/C
e-School Bus

Southern California
School District

Cumberland/Motiv ERV

cumberland servicenter inc.
Since 1965

City of Chicago
E-Refuse Truck

Motiv Today

- Started in 2009, 48 employees
- HQ - Foster City, CA,
- Manufacturing - Hayward, CA
- 15 Motiv-powered vehicles with fleets
- >170,000 VMT total
- ~50 vehicles by year end
- ~$25M in grants, $9M in private investment
- HVIP approved

Thank You!

Shyam Nagrani
VP Marketing
shyam@motivps.com

www.motivps.com

Motiv Power Systems
Foster City, CA

First Priority GreenFleet

Clean Transportation Solutions

EFFICIENT DRIVETRAINS®
Zero Emissions, Full Power

Company Overview

First Priority Global Ltd. is the parent company to First Priority Emergency Vehicles (FPEV) and First Priority GreenFleet Ltd. (FP GreenFleet).

First Priority Emergency Vehicles is one of America's leading designers, manufacturers and distributors of a comprehensive array of mission specific, firefighting, medical, rescue, public safety and mobile health vehicles and equipment.

First Priority GreenFleet brings to market end-to-end solutions for fleets across a full product matrix of alternative fuel vehicles designed to offer highly reliable performance, significantly reduce total cost of ownership, lower fuel expenses and diminish our client's environmental footprint.

1ST FIRST PRIORITY GLOBAL

First Priority Emergency Vehicles

1ST FIRST PRIORITY EMERGENCY VEHICLES

First Priority Emergency Vehicles designs, manufactures, distributes and services emergency and specialty vehicles in the US.

- Established in 1998.
- Robert Freeman, CEO

First Priority GreenFleet

1 FIRST PRIORITY GREENFLEET

First Priority GreenFleet converts and services zero and ultra low emission vehicles in the US.

- Established in 2015.
- Alex Cherepakhov, CEO

First Priority GreenFleet: **Mission Statement**

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

First Priority Global – US Locations

Headquartered in Stockton, CA, First Priority GreenFleet is a one-stop shop for alternate-fuel, sustainable fleet vehicles. Headquartered in New Jersey and with facilities in North Carolina, California and Texas, First Priority Global has operations across the United States.

Our Family of Brands

RENAISSANCE by 1ST FIRST PRIORITY EMERGENCY VEHICLES
1-800-247-7725
www.EmergencyVehicleCenter.com

1ST FIRST PRIORITY EMERGENCY VEHICLES

1ST FIRST PRIORITY GREENFLEET

BRAUN CUSTOM AMBULANCES Built for Life

ODYSSEY Specialty Vehicles

EVI TRANSPORTATION ELECTRIFIED

DEMERS AMBULANCES

1ST FIRST PRIORITY GLOBAL

LION

McCOY MILLER

DIAMOND

KME KOVATCH

Road Rescue
AN ALLIED SPECIALTY VEHICLES COMPANY
In Service for Life

TRANS TECH a TCI Company

BQR The Barangay Quick Responder

Our Customers & Partners

First Priority *GreenFleet*

Service, Manufacturing, Distribution

GREENFLEET PRODUCT LINE

Manufacturing

Electric Buses

Electricity Storage and Management

Service Centers

CNG Trucks/Vans (Conversions)

CNG Buses (Conversions)

Electric Trucks/Vans

Your one-stop shop for:

- Manufacturing, Sales/Distribution, and Service of Zero- and Ultra-Low Emission Alternative Fuel Trucks & Buses
  - Full-Battery Electric
  - PHEVs
  - REEVs
  - CNG
  - Propane
  - Multi-propulsion system

Contact

www.fpgreenfleet.net

Brett Gipe

443-370-8782

bgipe@firstpriorityglobal.net

Company Introduction

EFFICIENT DRIVETRAINS®

September 2016


The *RACE* to Zero Emissions has
ACCELERATED across the globe

Why the Acceleration?

Emissions Reduction Regulations, Anti Idle Laws, & Electrification Quotas

- Worldwide movement to *electrify/hybridize* vehicles of all types – for compliance
- Industry regulators like EPA, CEC, CAFE, FAME, EEI are driving aggressive mandates through 2050
- U.S & China lead by mandating alternative fuel, reduced emissions, and zero emissions vehicles
- Pressure is increasing on OEMs and fleet owners to produce and acquire cleaner vehicles
- For commercial vehicles - a technology gap exists

1.5M
ZEVs in California
By 2025

1B
Metric Ton Carbon Pollution Reduction
By 2027

2M
Electric and PHEV vehicle quota in China
By 2018

54
MPG CAFÉ Standard
By 2023

EFFICIENT DRIVETRAINS®

EDI - Unique technology offering

Drivetrains, Control Software, Power Export

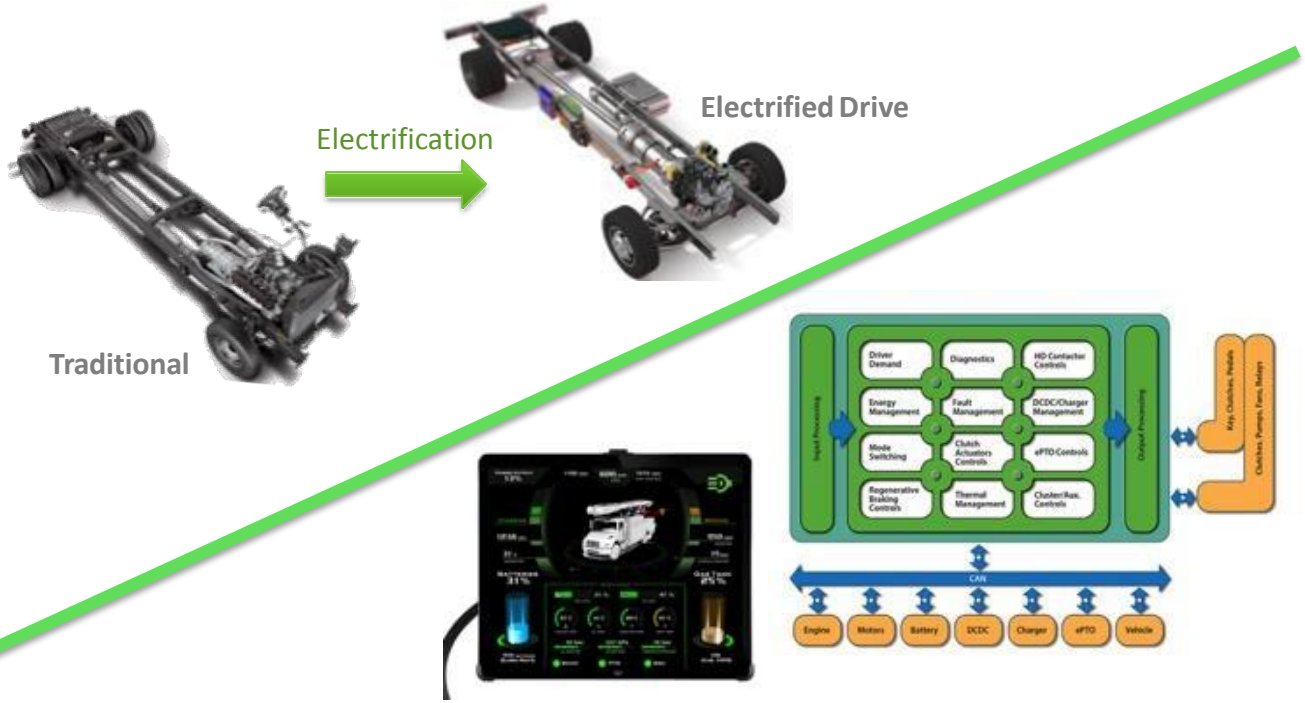
- **Unique 4 mode PHEV drivetrains**
- **Fully electric EV drivetrains**
- **Broadest range of drivetrain installations in the industry**
- **Light, medium, heavy duty**
- **All fuels (gas, diesel, cng, others)**
- **Flexible software architecture**
- **Significant IP/patent position**
- **Strong EV and Hybrid performance**

EDI's Technology Offering

Proprietary drivetrain solutions paired with open software architecture

DRIVETRAIN TECHNOLOGIES:

EDI PowerDrive ™: **an INDUSTRY FIRST** zero emissions/plug-in hybrid (PHEV) drivetrain solution with **4 modes of operation**: 1- Full electric, 2- high power electric, 3- parallel and 4- series hybrid modes



CONTROL AND TELEMATICS SOFTWARE:

EDI PowerSuite™: software for controlling complex drivetrain and battery system functions, diagnostics, fault management, and communicating with operators and external networks

SIGNIFICANT IP POSITION

Licensed by major OEMs

- **U.S. Patent 5,842,534**
- **U.S. Patent 6,054,844**
- **U.S. Patent 6,116,363**
- **U.S. Patent 7,217,205**
- **U.S. Patent 6,809,429**
- **U.S. Patent 6,847,189**
- **U.S. Patent 6,931,850**
- **U.S. Patent 7,261,672**
- **U.S. Patent 8,057,354**
- **U.S. Patent 7,713,166**
- **China Patent AL 02803392.2**
- **Korea Patent 0916987**
- **Europe Patent 1047087**
- **China Patent 201420058968.5**
- **China Patent 201420058406.0**
- **China Patent 201420058967.0**
- **Others in process**

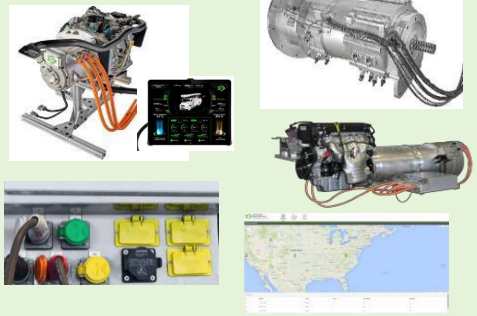
Examples of customers and EDI solutions

Customers and Partners

PG&E
North American Repower
Ford
Shaanxi
Toyota
Peterbilt
BAIC
Altec
Xinkai Auto
Siemens
Freightliner
Greenkraft Inc.
AM General
Foton
United States Postal Service
Alabama Power
VanDyne

More coming soon…

Products/Solutions



1)EDI PowerDrive™ EV and PHEV Drivetrains
2)EDI PowerSuite™ Vehicle Control and Telematics Software
3)EDI Power2E™ Power Export Solutions

Recent Industry Implementations

EFFICIENT DRIVETRAINS®

Technology in Action: EDI Joins Red Cross Support Efforts

American Red Cross

As the trio of California wildfires created havoc in Northern California, EDI, in support of PG&E is provided critical and sustained energy sources at two Red Cross Fire Evacuation Centers. During this state of emergency, EDI team members provided 24x7 support and uninterrupted power supply to the evacuation camps--powering the lighting, emergency kitchen infrastructure, charging evacuees cell phones, and other critical equipment.

"We emphasize the importance for each of us to have an emergency plan before a natural disaster occurs. By supporting first responders with new technologies like this next-generation electric hybrid truck, we are furthering our collaboration toward increasing local emergency preparedness."."

Barry Anderson
PG&E, Vice President of Emergency Preparedness

EFFICIENT DRIVETRAINS®

Contact

Jim Kjellsen
Efficient Drivetrains Inc. (EDI)

Email: jkjellsen@efficientdrivetrains.com
www.efficientdrivetrains.com

EFFICIENT DRIVETRAINS®

Electric Trucks

September 2016

9%

New Energy
-Solar
-Battery Storage
-LED

48%

Automotive
-Global leader in plug-in car sales in 2015
-15,000 electric bus orders

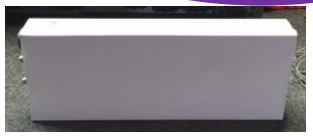
43%

Consumer Electronics
-1.5M cells/day
-OEM/ODM

SAMSUNG

TOSHIBA
NOKIA
ASUS
DELL

16 GWhr current production

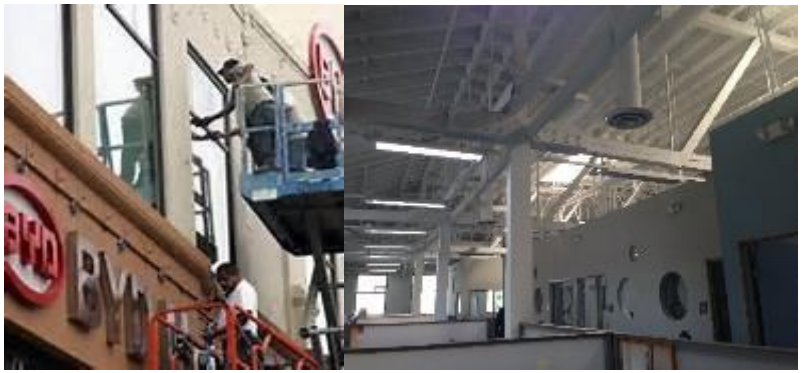


60% Investors from USA
10% Berkshire Hathaway

$12B Revenue
200,000 Employees

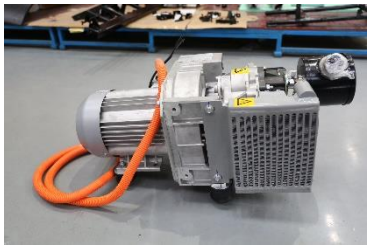
Presence in North America

<u>Regional HQ in Los Angeles</u>
- Opened 2011
- 35,000 sq ft
- 100 yr old building, green renovation
- Management, sales, accounting, maintenance, engineering



<u>BYD Bus & Coach; BYD Energy</u>
- Both opened 2013
- BYD Bus & Coach: 120,000 sq ft
  - Capacity: 150-200 buses
  - Adding 247,000 sq ft by Feb 2017
- BYD Energy: 44,000 sq ft

Technology – Components



Batteries

High Voltage Distribution Box

3-in-1 Controller Box

Air Compressor - Brakes

Charging Port

V2G

A/C PTC

Power Steering

DC-to-DC Converter

Electric Motor

Power output

Power input

BYD Trucks

Urban Delivery

Goods Movement

Refuse

Good & Bad for Electric Trucks

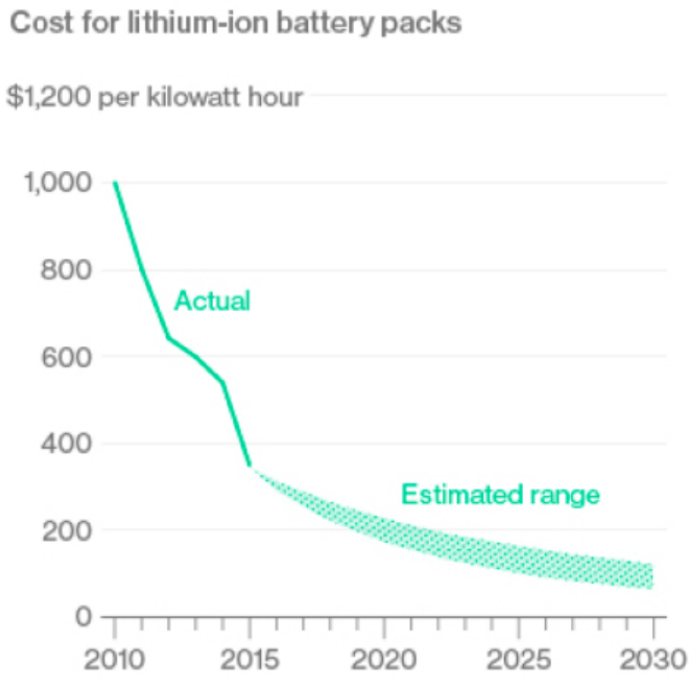
Advantages

1. Zero Emissions – public health; global warming
2. Operational Savings – $10,000-25,000 per year
3. Driver/Community Comfort – quiet, smooth ride, no smells

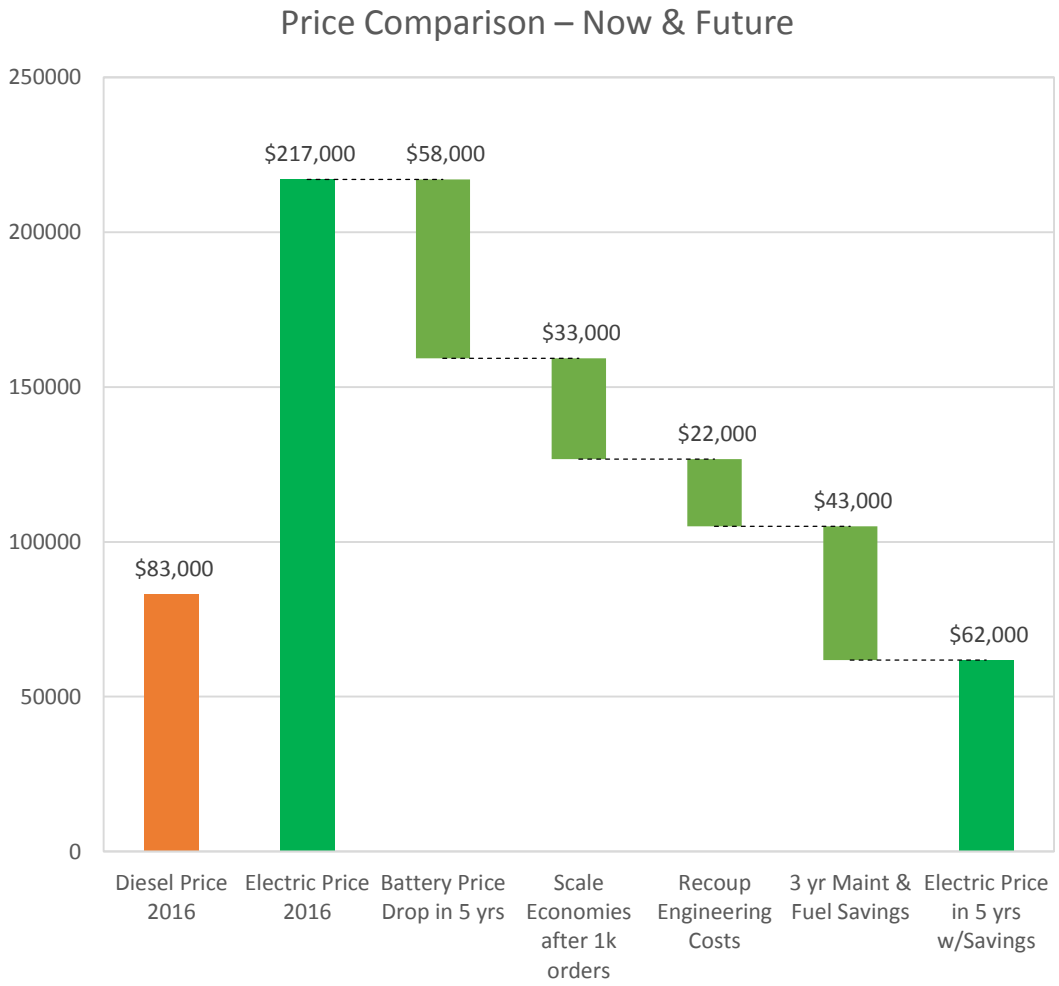
Disadvantages

1. Higher Capital Cost – 2/3x conventional
2. Range Limitations – can't address all trucking markets with current technology
3. Early Stage Technology – not as mature as conventional

Capital Cost Comparison



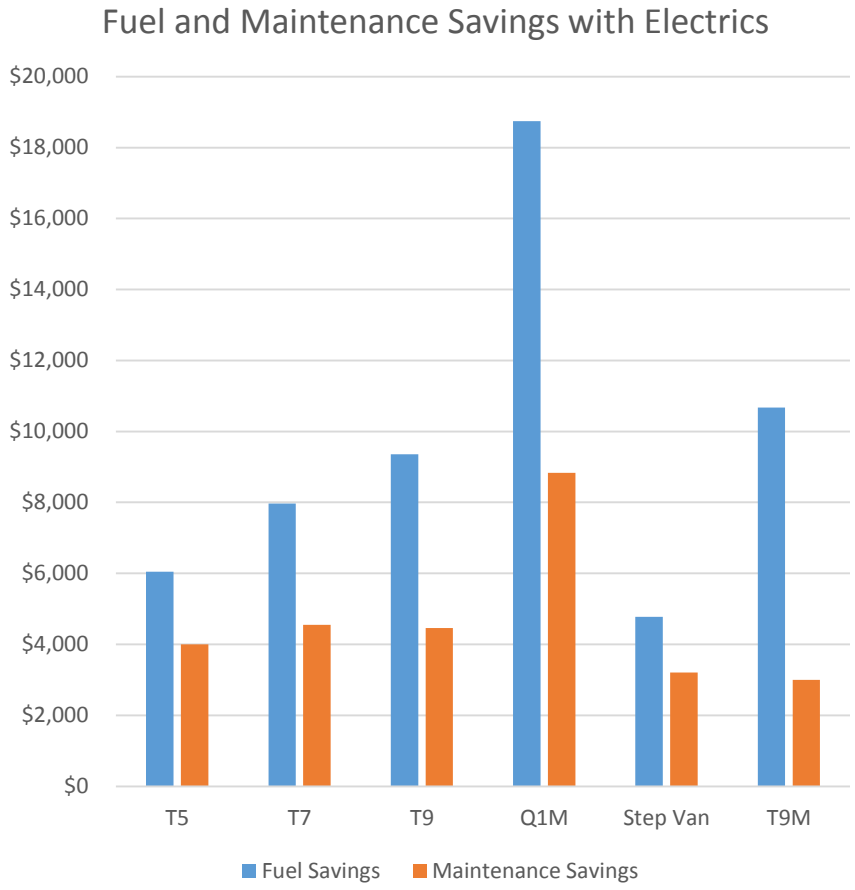
Source: Bloomberg New Energy Finance



Operating Cost Comparison

Fuel Savings
- Electric Motor Efficiency – 90%
- Diesel Engine Efficiency – 30%

Lower Maintenance Costs – 50-80% savings:
- Regenerative braking extends brake life
- Fewer Parts: transmission built onto motor, driveshaft, exhaust system, spark plugs, pumps, belts
- Less Fluids: oil, transmission



$8,000-$28,000/yr Annual Savings

The End

Transportation Electrified

Where are we at with Electric Vehicles (EV)?

SacEV.org

EAA

Thomas Hall

Treasure Sacramento EV
Member of Electric Auto Association

Nissan LEAF
Chevy Volt
Tesla Model S, X

Agenda – Some Personal Thoughts

- Where we were - Our Roots
- Market Now
- Break out 2017 - 2018
- Break out 2020 - 2025

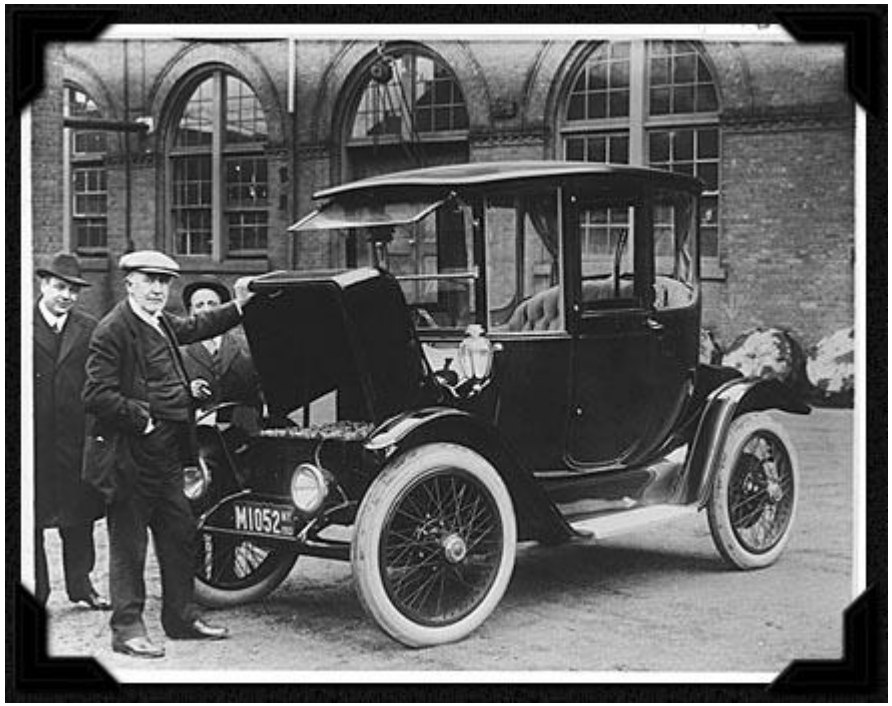
12 miles per hour in 8 mile per hour zone down Lexington Street

First speeding citation

Our Roots

"Electricity is the thing. There are no whirring and grinding gears with their numerous levers to confuse. There is not that almost terrifying uncertain throb and whirr of the powerful combustion engine. There is no water circulating system to get out of order – no dangerous and evil-smelling gasoline and no noise."

- *Thomas Edison*



Thomas Edison with an electric car, 1913

Henry Ford

“The problem so far has been to build a storage battery of light weight which would operate for long distances without recharging. Mr. Edison has been experimenting with such a battery for some time.” 1/11/1914

Most Recent US Sales (August)

EV Type	August 2016	M / M	Year to Date
All EVs	12,715	Up 20%	Up 22%
- BEVs	6,990	Up 13%	Up 7%
- PHEVs	5,725	Up 30%	Up 45%

August experienced lowest gas prices since 2004

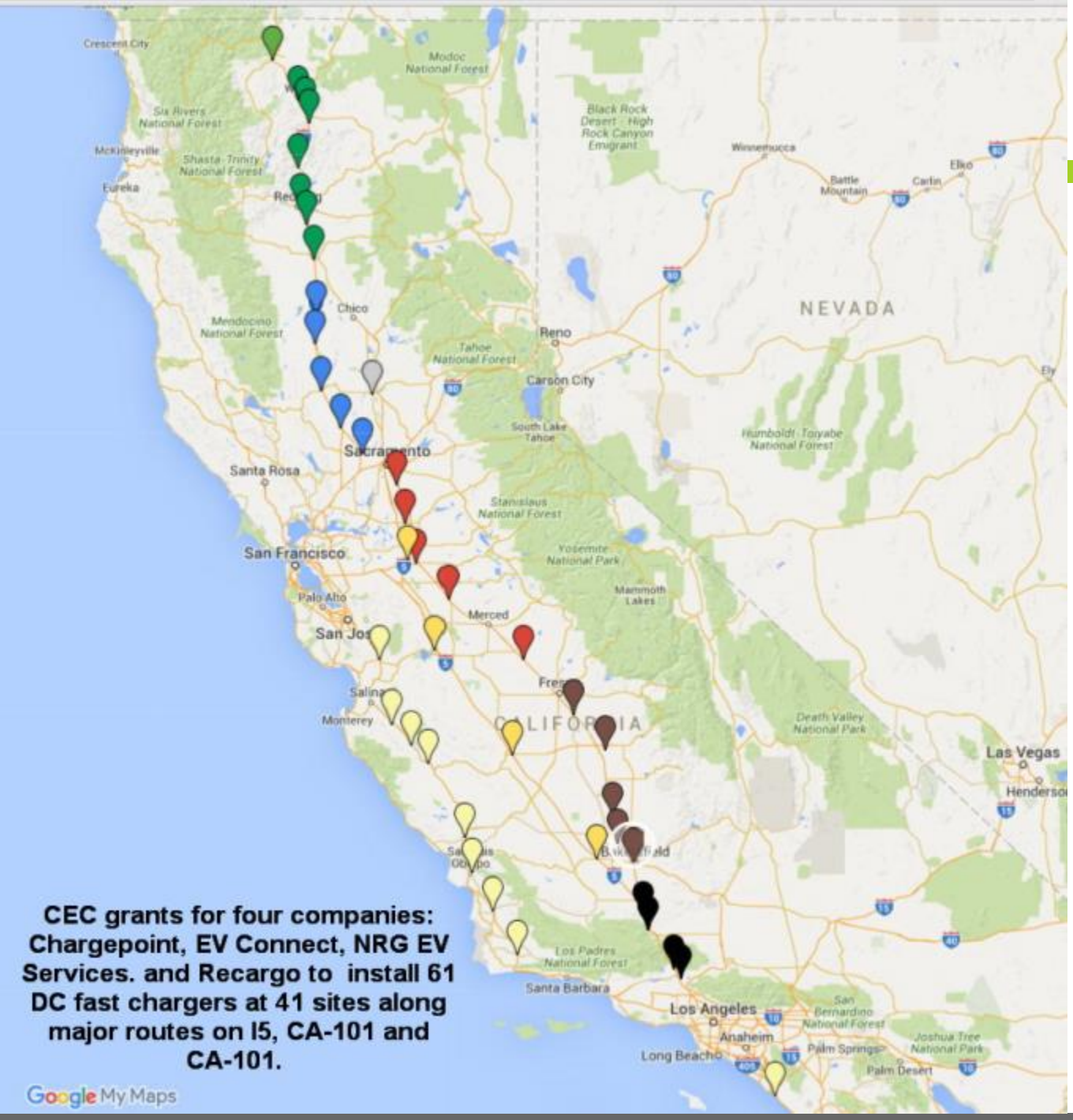
Breakout 2017 – 2018 Requirements

Wide Deployment of DC Fast Chargers

Affordable 200+ mile range cars

Wide Selection of PHEVs

2017



CEC Grants for: 61 Fast Chargers at 41 Sites along major Corridors

PG&E has requested permission to install 100 Fast Chargers in the North State

2018 Deployments

CEC Grants for Fast Charging along Secondary Corridors

200 Mile+ Vehicles 2017 / 2018

Others Joining include: LEAF, Ford, BMW

Breakout 2020 - 2025

Three Drivers

- Dispatchable Transportation (E.g. Uber)
- Low operating costs of EVs
- Autonomous Driving

=> Major disruption in transportation

Autonomous Driving

Major Investments

- GM Will Pay $1B For Cruise Automation startup
- Ford $75M in a maker of LIDAR sensors
- Volvo's partnering with Uber

> In 5 or 6 years "… you could literally get in the car, go to sleep and wake up at your destination".
> - Elon Musk

Predictions:

- Ford: will produce self-driving cars in **high volume by 2021**.
- Mobileye + Delphi are aiming for 2019.
- Tesla CEO Elon Musk recently said this future was coming a "**hell of a lot faster**" than you think.

Pilots already started:

- Public self-driving taxi rides in Singapore
- Public able to summon self-driving cars from phones in downtown Pittsburgh
- Delphi sent an AV Audi SQ5 SUV on a coast-to-coast drive in March 2015.

Low operational cost, dispatchable on demand

What are the impacts on:

- Personal Car Ownership
- Freight Operations
- Delivery Services
- Insurance

Dutch EZ-10 Autonomous Shuttle

ClipperCreek, Inc.

Charging Ahead – Plug in vehicle charging for medium to heavy duty fleets

Presented By:

Will Barrett

Director of Sales – ClipperCreek, Inc.

ClipperCreek,Inc

About ClipperCreek, Inc.

- Incorporated in 2006
- ClipperCreek founder, Jason France has been in the industry since the early 90s
  - Developed, manufactured, and sold first EVSE in 1994
- Products are proudly manufactured in Auburn, CA USA
  - Recognized as the Gold Standard in the industry

ClipperCreek / CS-40
Squaw Valley
2013

ClipperCreek,Inc

Key Markets

- Fleet / High Power
- Direct to OEM
- Residential
- Commercial / Public

ClipperCreek / CS-100 – 3 Phase
Frito Lay
2011

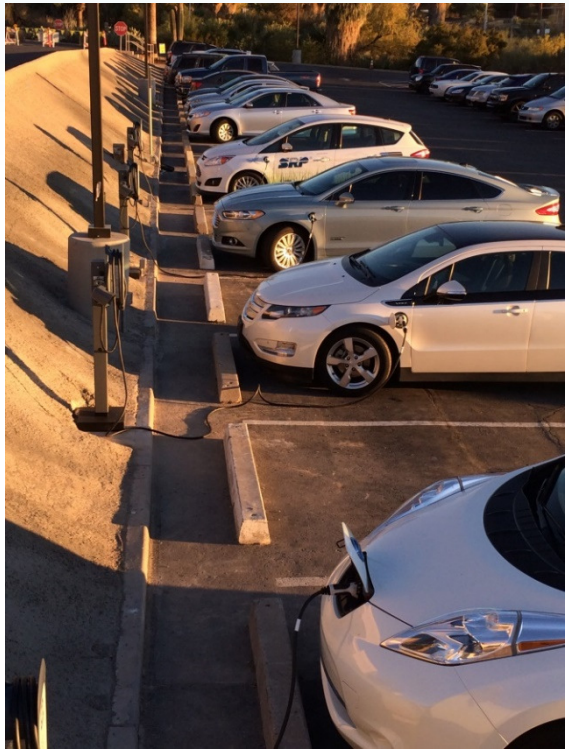
Access controlled CS-40
San Diego Gas & Electric

ClipperCreek,Inc

Many Medium/Heavy duty Fleet products available today

What to look for?

- Various Power Levels
  - 8A to 80A Charging
  - Single/Split or 3 phase power
    - Up to 33 kW for charging
  - Plan for now and the future
  - Power/Circuit sharing available
    - Maximize charging within given power budget
  - Match power to current/future vehicle needs
- Consider Required Features
  - Basic plug and charge
  - Access controlled
  - Energy/user tracking
  - Payment acceptance
- Planned Utilization
  - Shared or dedicated
- Location Sourcing
  - As close to power as possible
- Infrastructure Rebates
  - IRS 8911 Tax Credit – 30% up to $30K
  - Local Government and Utility incentives/rebates



ClipperCreek / HCS-40
Salt River Project
2015

ClipperCreek,Inc

CLIPPERCREEK, INC

11850 Kemper Road
Auburn, CA 95603
(530) 887-1674
www.clippercreek.com

Managing the Electric Vehicle Ecosystem

Charge Forward

Steve Bloch

VP of Partnership Development

sbloch@evconnect.com

818-318-9715

evconnect

A Cohesive Platform

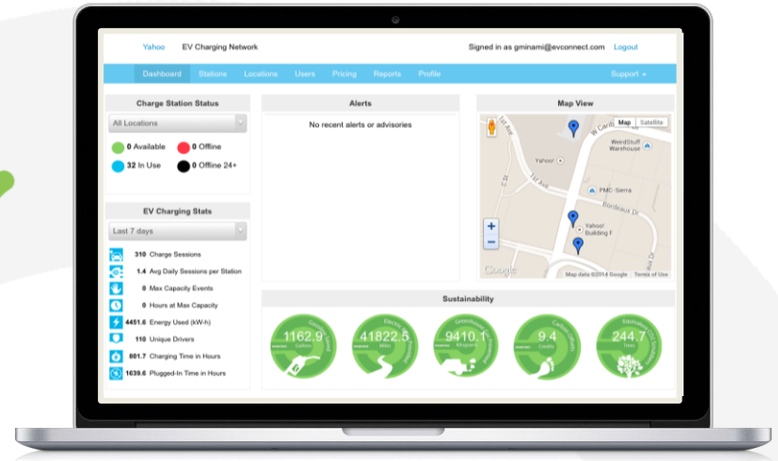
Remember when you carried a PC,
a PDA, and a cell phone? Innovation by Apple
and Android changed all of that.

Similarly, this market needs to create a great experience for drivers, site owners, and utilities

evconnect mission

Provide the world's most *open* and *flexible* cloud platform for managing the EV ecosystem

evconnect



Operator Portal

Best Driver Experience

Efficient & Robust Charge Station Management

Charge Station Partners

Benefits of Smart Charging

- Collect payment from drivers
- Control who and how long stations used
- Know real-time status of station availability
- Driver communications via text or email (station available, charging complete, move your car, etc.)
- Peak load management
- Provide data analytics (e.g. GHG reduction, kWh usage, etc.)

Maximize Station Utilization

ROI of Smart Charging

Benefits	5 year ROI per Port
Driver billings for non-fleet employees at $1/hour	$5,200
1 cent drop in electricity charges at night	$350
$5/kW drop in electricity demand charges at night	$2,160
Program scheduling of charging to reduce peak load	> $2,160
Carbon credits in California	$2,000
Maximize station utilization (access control, communicate station availability, queuing, etc.)	$2,200

* Stations used 20 hours/week

Thank You

Steve Bloch, VP of Partnership Development
sbloch@Evconnect.com
818-318-9715