



**SUSTAINABLE  
FLEET  
TECHNOLOGY**

**VIRTUAL CONFERENCE 2020**

**Session #11: Renewable Fuels, Lubricants &  
Other Biobased Products**

**October 21, 2020**



<https://www.sustainablefleetexpo.com/>

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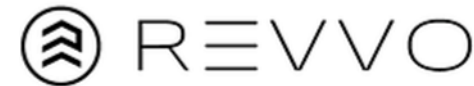
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## Next Series Dates & Topics:

**November 04:** Resiliency Considerations With Alternative Fuels & Transportation Technology

**November 10:** Sustainable Fleet Analytical Tools & Information

**November 18:** Potential Impacts of Connectivity/Automation Technology



# Format

- Q&A at the end
- Submit questions and comments to “Panelists”
- Scheduled for 2:00p-3:30p
- Handout
- Recording



Rick Sapienza

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Phone: 919-515-2788

- **Clean Transportation Program Director NC Clean Energy Technology Center at NC State University**
- **8 years with NC State**
- **30+ years experience including General Motors, Draper Lab and Great Lakes Pulp & Fibre in both engineering and business management roles**



**Renewable Fuels, Lubricants  
& Other Biobased Products  
October 21, 2020**

- 2:00-2:05 **Rick Sapienza, NCCETC**--Welcome & Introduction
- 2:05-2:12 **Karen Coble Edwards, United Soybean Board**--Soy Based Products
- 2:10-2:19 **Matt Herman, National Biodiesel Board**--Biodiesel Basics
- 2:19-2:26 **Jon Scharingson, Renewable Energy Group, Inc.**--Overview of Renewable Diesel
- 2:26-2:32 **Steve Whaley, PERC**--Renewable Propane Overview & Applications
- 2:32-2:38 **Ed Hoffman, Alliance AutoGas**--How to Source Renewable Propane
- 2:38-2:50 **Patrick Campbell, Cummins Westport**—RNG Overview & Applications
- 2:50-2:55 **Dave Woolf, TeleSwivel**—Biodegradable Lubricants
- 2:55-3:05 **Tim Fitzgerald, DC Water**—Fleet Application Story
- 3:05-3:15 **Philip Saunders, City of Seattle WA**—Fleet Application Story







Karen Coble Edwards  
Karen@kcegroup.com

- Principal of KCE Public Affairs Associates
- Almost 20 years experience in renewable and biobased products for fleets, facilities and roads
- Consultant to the United Soybean Board & National Biodiesel Board
- Serves on Board of Directors for Transportation Energy Partners, an umbrella Organization for the DOE Clean Cities
- Prior to opening KCE, assistant vice president at an international agriculture development organization with offices in more than 30 developing countries





**JOIN FLEETS ACROSS THE NATION  
GO BIOBASED!**

***Karen Coble Edwards***  
***USB Biobased Consultant***





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# SOY A NATURAL CHOICE FOR CLEANING SUPPLIES





# AMERICAN LUNG ASSOCIATION RECOGNIZES SOY-BACKED DOOR MATS FOR INDOOR AIR QUALITY



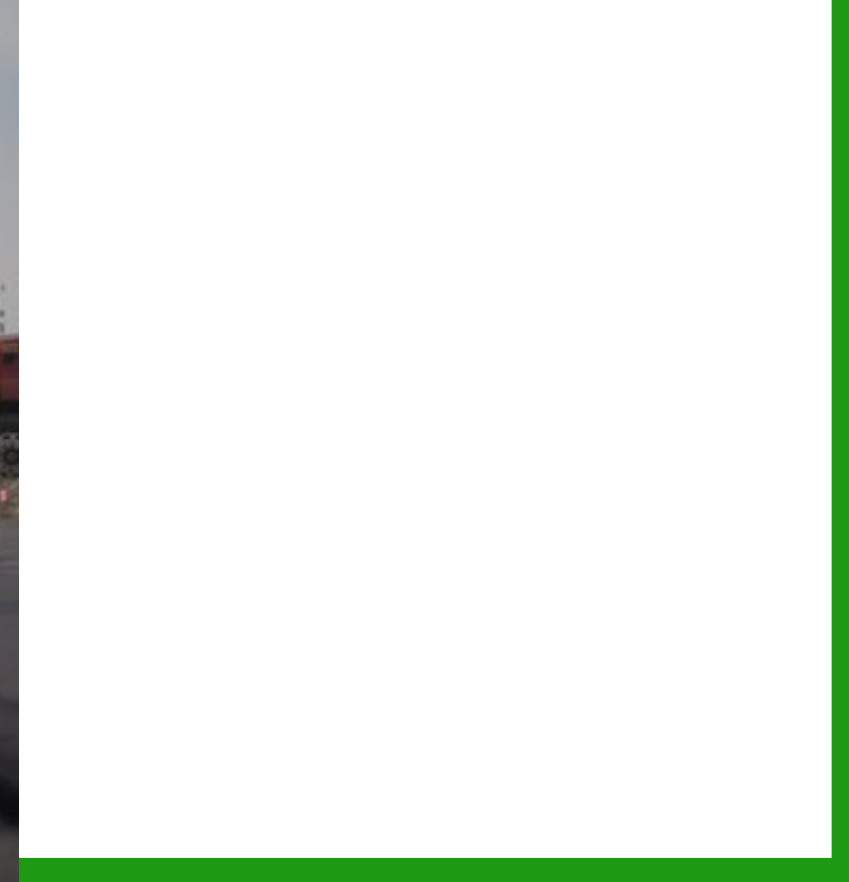


# SOY INSIDE PLYWOOD ELIMINATES FORMALDEHYDE



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# SOY-BACKED GRASS





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***Together, we can improve air quality .***

***Together, we can reduce carbon emissions.***

***Together , we can improve the health and safety of your employees.***

***Together, we can reduce our environmental footprint***





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**WWW.SOYBIOBASED.ORG**

**Karen Coble Edwards**

**[karen@kcegroup.com](mailto:karen@kcegroup.com)**





Matt Herman

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319-215-0833

- Director of Environmental Science for the National Biodiesel Board
- Works closely with NBB's advocacy team and the membership to ensure that laws and regulations properly reflect the sustainable nature of the fuels our members produce
- Deep experience using life cycle assessment to measure the environmental attributes of biodiesel, renewable diesel, and the supply chains which support their production





# Sustainable Fleet Technology Conference Series

**Matt Herman**

Director of Environmental Science





# AGENDA

- Biodiesel and Renewable Diesel 101
- Biodiesel and Renewable Diesel's Sustainability Story
- Helping You Achieve Your Sustainability Goals

# WHAT IS BIODIESEL AND RENEWABLE DIESEL

## ■ Biodiesel

- A fuel comprised of mono-alkyl esters of long chain fatty acids derived from vegetable oils or animal fats, designated B100, and meeting the requirements of ASTM D6751
- Commonly used in unmodified engines up to 20%, can easily be used at 100% with limited vehicle modification
- Produced using a low energy, highly sustainable process
- Less intense process conditions results in a lower carbon intensity when compared to renewable diesel

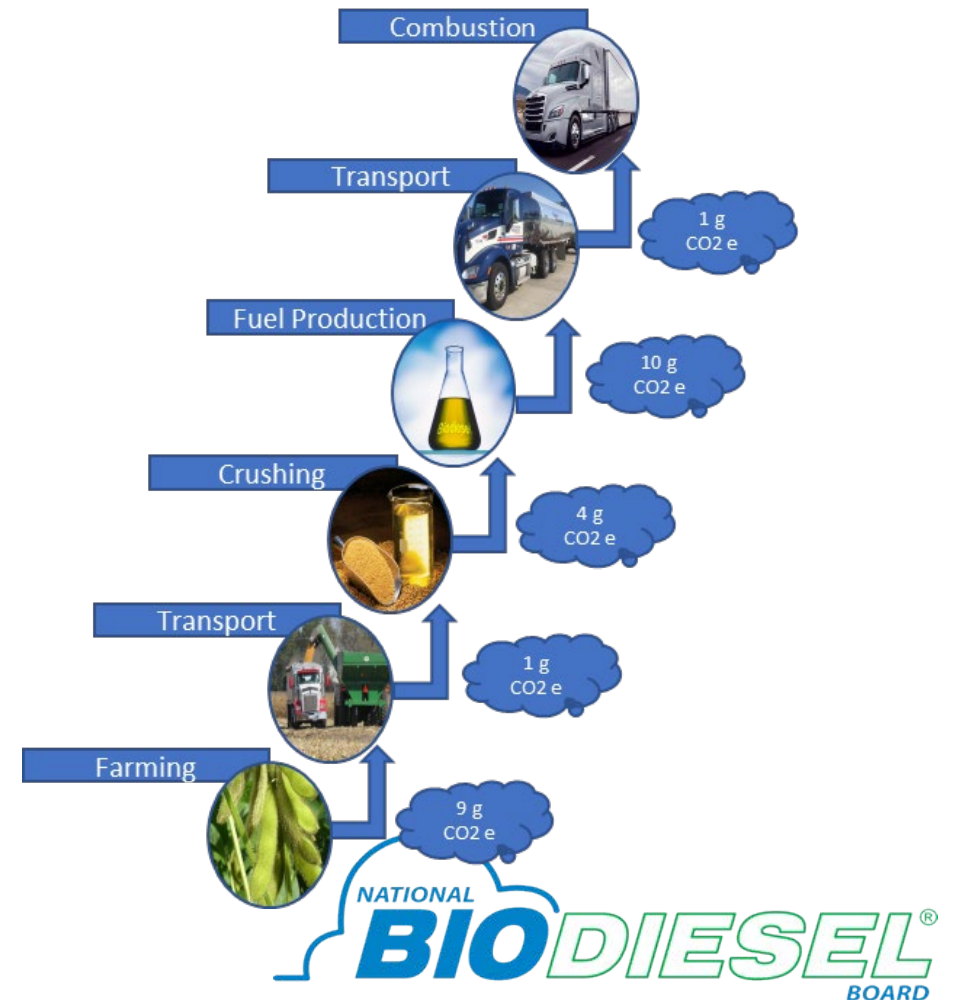
## ■ Renewable Diesel

- A fuel comprised of straight chain and branched paraffins derived from vegetable oils or animal fats, chemically similar to traditional hydrocarbon diesel, meets the requirements of ASTM D975
- Can be used in engines up to 100% without modification, using biodiesel in conjunction with renewable diesel can increase lubricity and help maintain seal swell
- Produced using a high energy, high pressure process akin to traditional petroleum refining
- More intense process conditions results in a higher carbon intensity when compared to biodiesel

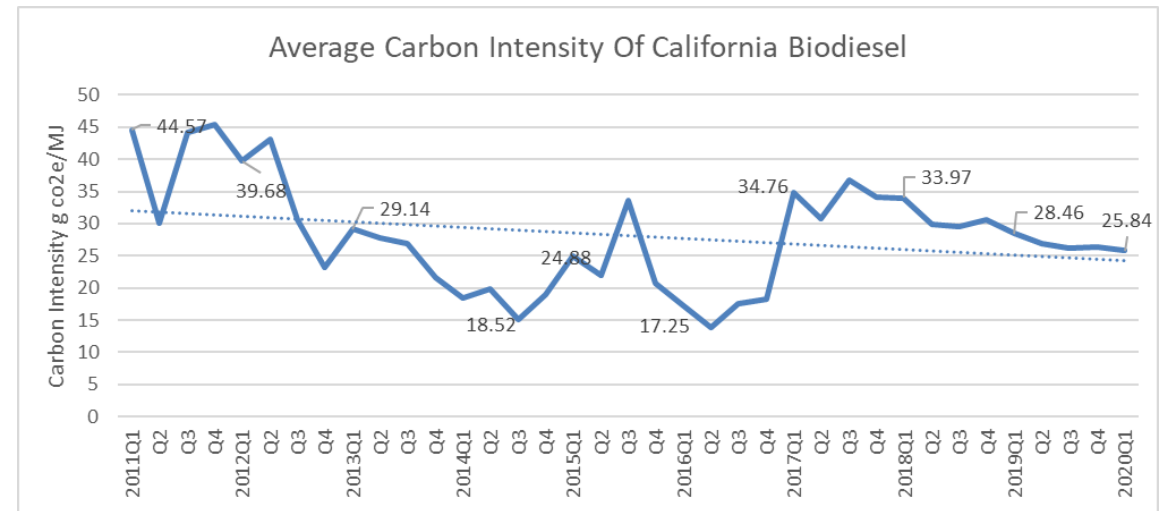
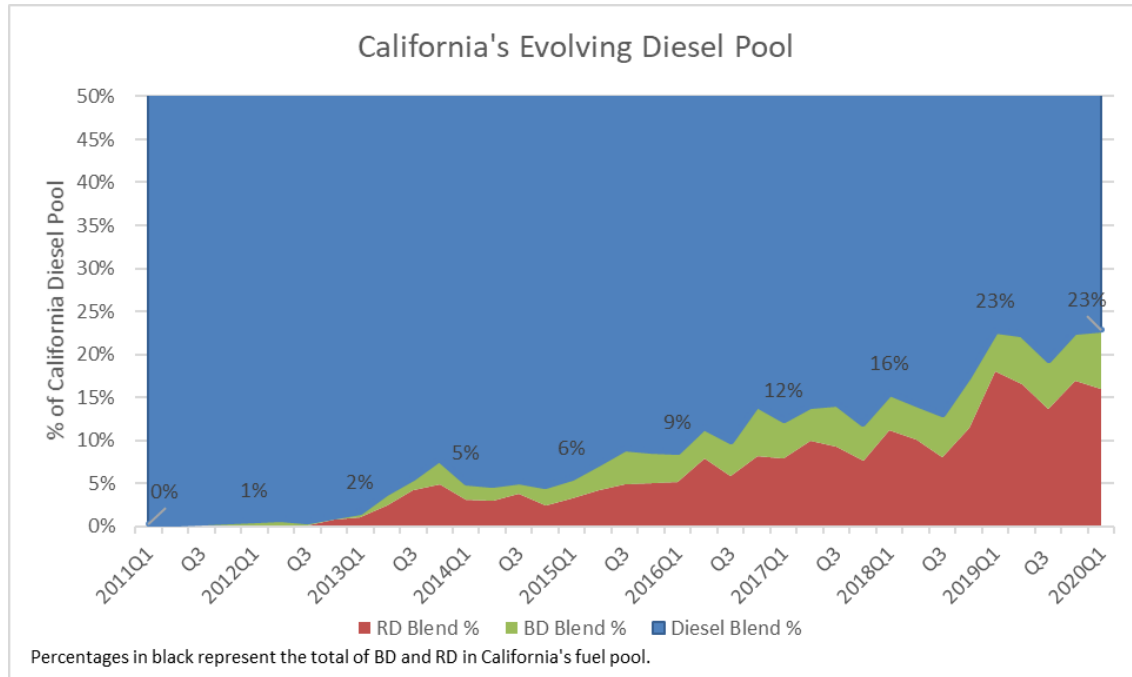


# BIODIESEL'S SUSTAINABILITY STORY

- Biodiesel and renewable diesel are among the most sustainable, commercially available fuels when measured using lifecycle carbon intensity
- Produced from a variety of feedstocks it can reduce life cycle GHG emissions by up to 86%
  - Life cycle accounting is different than scope accounting, which is common for corporations and fleets
  - Life cycle emissions is much like accounting for Scope 1,2,3 all together
- Programs which track the life cycle emissions of alternative fuels have seen biodiesel and renewable diesel become less carbon intensive over time
  - Producers and supply chains getting more efficient
  - Modeling techniques are advancing

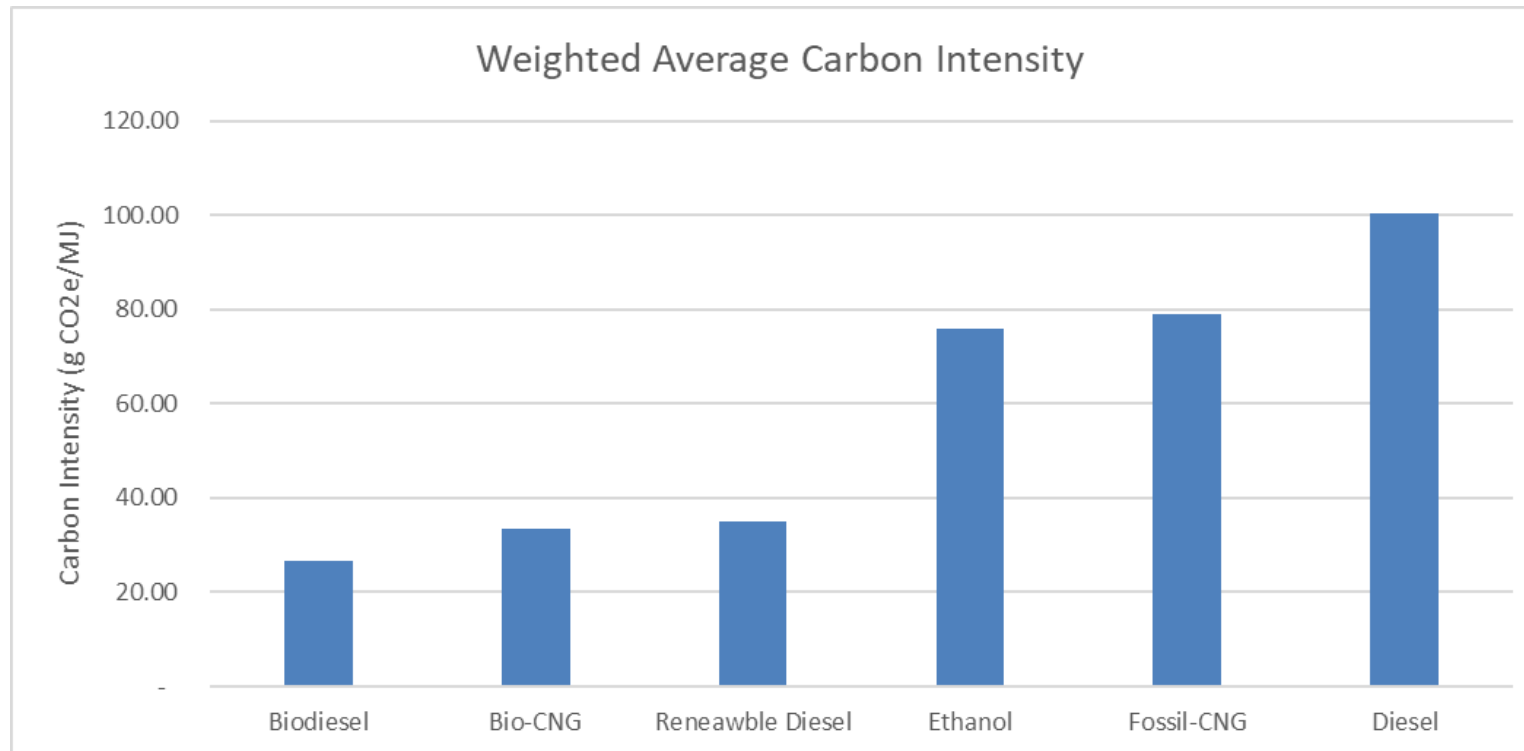


# BIODIESEL AND RENEWABLE DIESEL: GROWING VOLUMES, LOWERING EMISSIONS



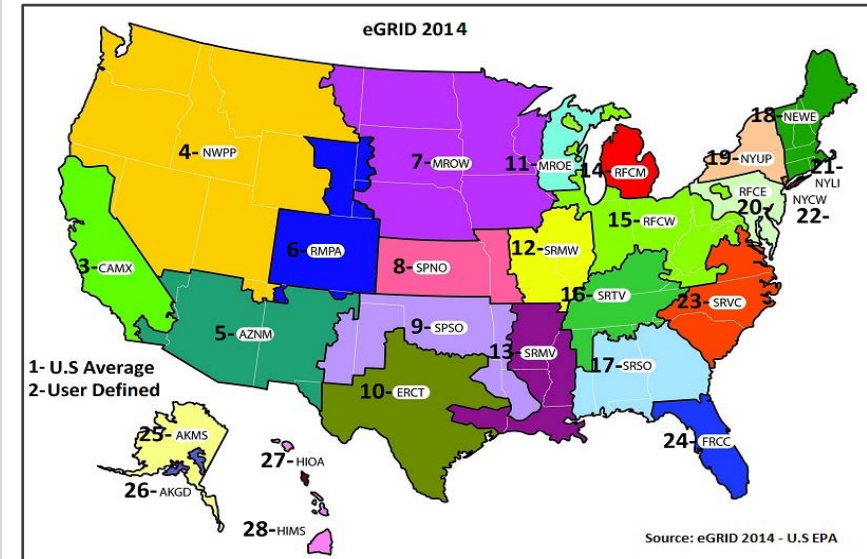
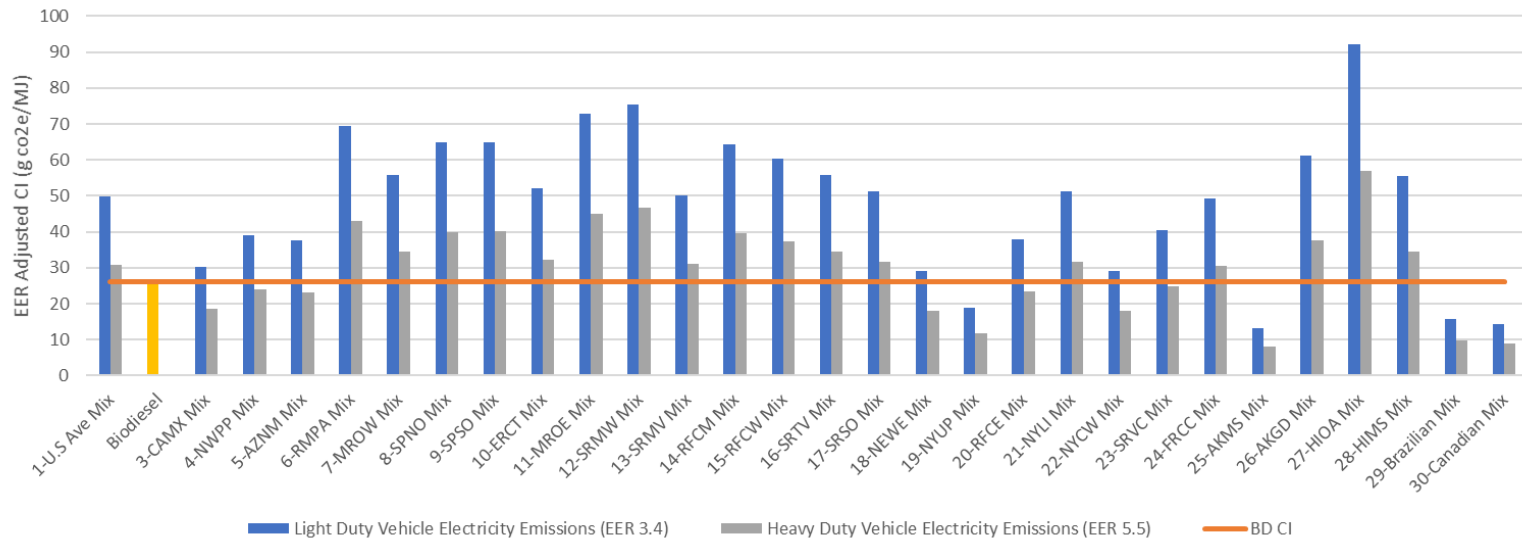


# BIODIESEL AND RENEWABLE DIESEL AMONG THE LOWEST CARBON INTENSITY FUELS IN THE MARKET TODAY



# ACHIEVING PARITY OR EXCEEDING ELECTRICITY IN MOST MARKETS

Carbon Intensity of Biodiesel and EER Adjusted Electricity Grids





# IN CONTEXT: YOUR SUSTAINABILITY GOALS

- Biodiesel and renewable diesel are highly sustainable solutions that available to reduce GHG emissions and criteria pollution NOW!
  - Can be used with no modifications, no upgrades to existing infrastructure
- Advances by producers and the supply chain are reducing emissions across the supply chain
- No matter where you are on your journey to sustainability, biodiesel and renewable diesel can help you achieve your goals
- It is important that you work with your sustainability team and auditor when deciding what renewable fuel to use and how to account for it
- While biodiesel and renewable diesel producers normally discuss GHG reductions in terms of life cycle, scope accounting operates differently
  - Combustion of biofuels is generally accounted as a zero in scope 1 emissions

# SET YOUR GOAL, PICK YOUR BLEND







Jon Scharingson

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515-239-8042

- Executive Director of Sales & Marketing at Renewable Energy Group
- Oversees the company's marketing activities and responsible for business development within the sales organization
- Previous experience several senior management roles in business strategy, business development and marketing in the seeds, crop protection and the agriculture biotechnology industries with Imperial Chemical Industries, AstraZeneca and Syngenta
- BBA in Management and an MBA in Marketing from Iowa State University



RENEWABLE ENERGY GROUP

# Low Carbon Fuel Solutions

Jon Scharingson, Executive Director, Sales & Marketing

10/21/2020



RENEWABLE ENERGY GROUP



# Safe Harbor Statement

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This presentation contains certain forward-looking statements within the meaning of the Private Securities Litigation Reform Act of 1995, as amended, including statements regarding the REG's future growth and value creation. These forward-looking statements are based on current expectations, estimates, assumptions and projections that are subject to change, and actual results may differ materially from the forward-looking statements. Factors that could cause actual results to differ materially include, but are not limited to: potential changes in governmental programs and policies requiring or encouraging the use of biofuels, including RFS2; availability of federal and state governmental tax incentives; unanticipated changes in the biomass-based diesel market; competition in the markets in which we operate; technological advances or new methods of production or the development of energy alternatives to biomass-based diesel; our ability to generate revenue from the sale of fuels on a commercial scale and at a competitive cost, and customer acceptance of the products produced; unanticipated construction constraints; and other risks and uncertainties described in REG's annual report on Form 10-K for the year ended December 31, 2018, Form 10-Q for the quarter ended June 30, 2019 and other reports subsequently filed with the SEC. All forward-looking statements are made as of the date of this presentation and REG does not undertake to update any forward-looking statements based on new developments or changes in our expectations.

# REG At A Glance

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20+

YEARS

of biodiesel  
industry  
leadership

505

MMGY

Nameplate  
capacity



FUEL LINEUP

Biodiesel,  
renewable diesel,  
ULSD, blended  
fuel, more



DEDICATED  
SERVICE

and technical  
support





# REG Environmental Stewardship

A CLEANER EARTH WITH REG FUELS

 **495** MILLION  
GALLONS  
OF BIOFUELS PRODUCED IN 2019

GENERATES

 **4.2** MILLION  
METRIC TONS  
OF CARBON REDUCTION<sup>3</sup>

EQUIVALENT TO



GHG EMISSIONS FROM

**10.4** BILLION  
MILES

DRIVEN BY AN AVERAGE  
PASSENGER VEHICLE



CO<sub>2</sub> EMISSIONS FROM

**4.6** BILLION  
POUNDS

OF COAL BURNED



CO<sub>2</sub> SEQUESTERED BY

**5.5** MILLION  
ACRES

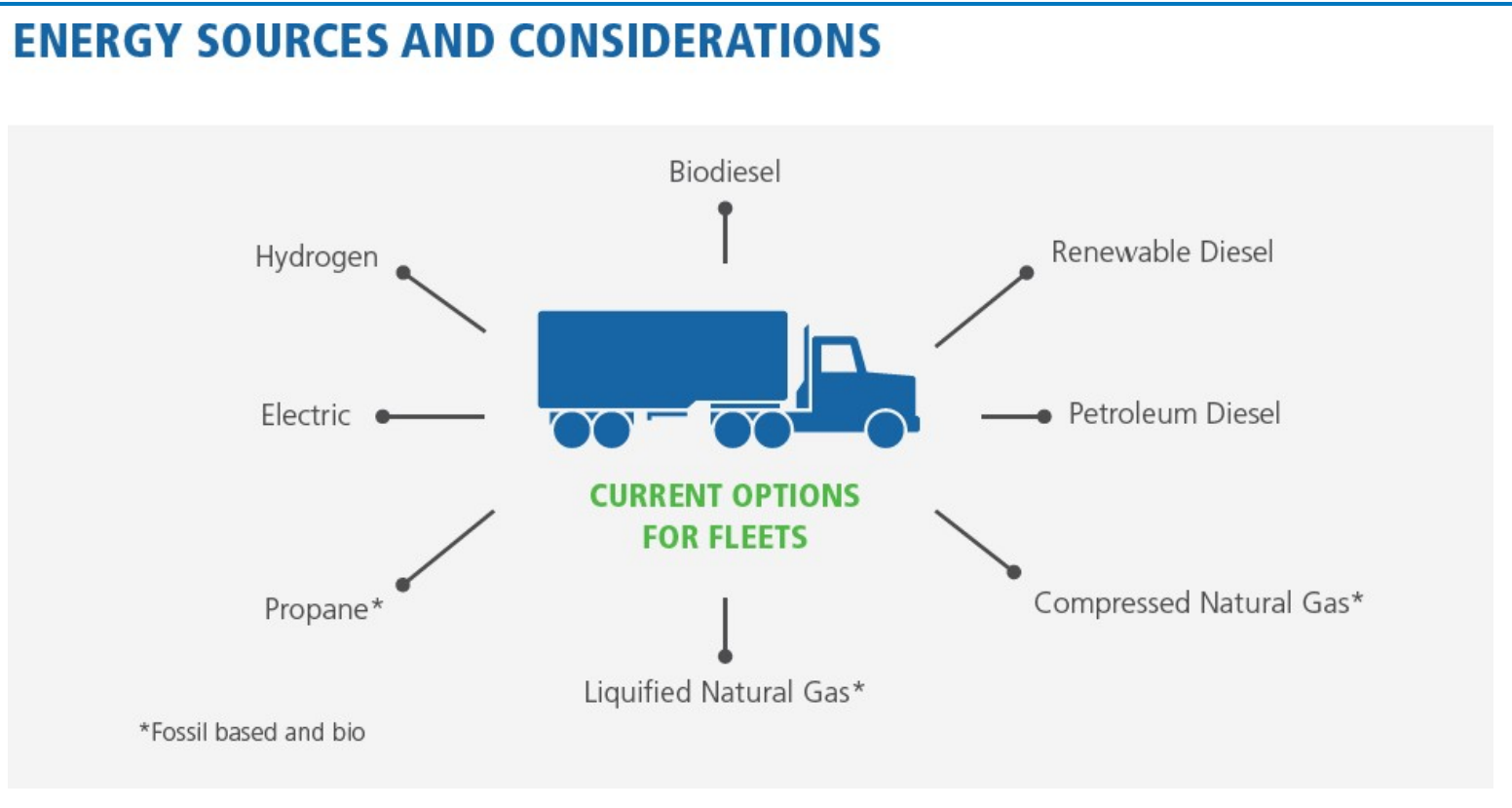
OF U.S. FORESTS  
IN ONE YEAR

Corporate Knights named REG to its 2020 Clean200 list of publically traded firms generating revenue from products and services that provide solutions for the planet



# Low Carbon Fuel Solution Options

- A comprehensive strategy in which fleet managers consider all available fuel sources and adopt all options that best meet their needs.



## Benefits



### Timeline For Success

- Transition away from fossil fuels now



### Sustainability Goals

- Achieve goals now with compounding affect



### Energy Diversification

- Fleets are less susceptible to energy source disruption





# Carbon Reduction Now

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## ➤ In less than a decade ...

- Biodiesel has reduced the carbon footprint in the United States transportation sector by 116.6 million metric tons<sup>1</sup>
  - Equivalent to:
    - CO<sub>2</sub> emissions from 128.5 billion pounds of coal burned
    - Carbon sequestered in one year by 152.3 million acres of U.S. forests
- Biodiesel and renewable diesel have reduced the carbon footprint in California's transportation sector by 25 million metric tons<sup>2</sup>
  - Equivalent to:
    - CO<sub>2</sub> emissions from 27.5 billion pounds of coal burned
    - Carbon sequestered in one year by 32.6 million acres of U.S. forests

## Benefits



### Timeline For Success

- Transition away from fossil fuels now



### Sustainability Goals

- Achieve goals now with compounding affect

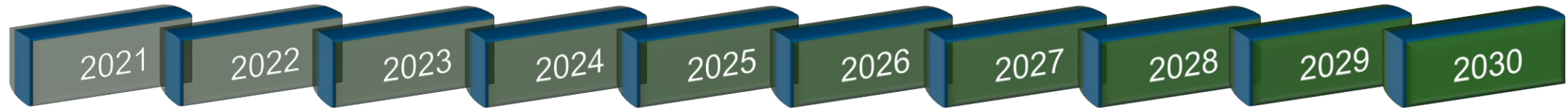
## ➤ The transportation sector is achieving significant reductions in greenhouse gas emissions!

<sup>1</sup>Source: eia.gov for gallons biodiesel consumed with metric ton conversion based upon on a biodiesel CI score of 34 gCO<sub>2</sub>e/MJ relative to a diesel CI score of 100.45 gCO<sub>2</sub>e/MJ which was sourced from the CA LCFS regulation on 9/8/2020

<sup>2</sup>Source: CARB, LCFS Quarterly Data Spreadsheet, July 31,2020

# Carbon Reduction Now

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## ➤ During the next decade ...

- In 2018, greenhouse gas emissions from fossil fuel combustion in the transportation industry was 1.8 billion metric tons<sup>1</sup>
  - Fleets and municipalities must continue to act now to reduce greenhouse gas emissions
- Biomass based diesel plays a key role in reducing greenhouse gas emissions and improving air quality
  - Technology available now – high quality with coast to coast distribution
  - No engine modifications and infrastructure build
  - Diversifies fuel sources for fleets
- Reducing emissions now has a cumulative effect, leading to greater reductions over time
  - “A stitch in time saves nine”, 1732

<sup>1</sup>Source: [www.epa.gov/sites/production/files/2020-04/documents/us-ghg-inventory-2020-main-text.pdf](http://www.epa.gov/sites/production/files/2020-04/documents/us-ghg-inventory-2020-main-text.pdf)



# REG Biomass Based Diesel Products

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## REG-9000 Biodiesel

REG-9000 Biodiesel is a premium biofuel setting the standard for biodiesel performance while significantly reducing emissions.

## REG Ultra Clean®

REG Ultra Clean blends biodiesel and renewable diesel to create one of the lowest carbon intensity fuels available.



# The Case For Biomass Based Diesel

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## ➤ Performance

- “B20 performed very similar to #2 ULSD in terms of fuel economy, fuel properties, engine oil samples, operation and maintenance issues.” **Purdue University**

## ➤ Reduced Emissions

- Carbon Intensity Scores<sup>1</sup>: Biodiesel = 27, Renewable Diesel = 34.6, Petroleum Diesel = 100.5

## ➤ Meets stringent ASTM quality specifications

## ➤ Ease of Use

## ➤ Customer Experience

- ✓ Joe Siadak, Diesel Technician
- ✓ Florida Power & Light
- ✓ Ruan Transportation
- ✓ G & D Integrated
- ✓ California Fuels & Lubricants
- ✓ Central Iowa Towing
- ✓ City of Ames, IA

- ✓ Scott Balding, Diesel Equipment Instructor
- ✓ Iowa DOT
- ✓ Washington D.C. Public Works
- ✓ Fontana Truck Stop Center
- ✓ Harvard University
- ✓ S.K. Davison, Inc
- ✓ Kum & Go Convenience Stores

<sup>1</sup>Source: Average biodiesel and renewable diesel CI scores in 2019: <https://ww3.arb.ca.gov/fuels/lcfs/lrtqsummaries.htm>.

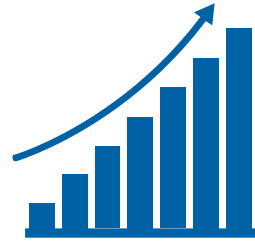


# A Simple Step Today For Cleaner Air Tomorrow

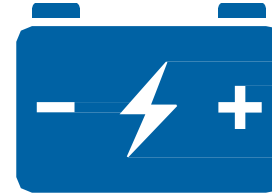
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Transportation  
top contributor to  
GHG emissions



Emissions  
accumulate in the  
atmosphere



Waiting for future  
technology is  
doing harm



Biomass based  
diesel – A  
simple step to  
reduce  
emissions right  
now

# GHG Emissions Increase Per Gallon vs REG B100<sup>1</sup>

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580%

Petroleum diesel

430%

Compressed natural  
gas

190%

Electric vehicle with  
natural gas-derived  
electricity

<sup>1</sup>REG calculations based on CA-GREET Model. Based on REG produced biodiesel using used cooking oil

# Optimus Company Overview

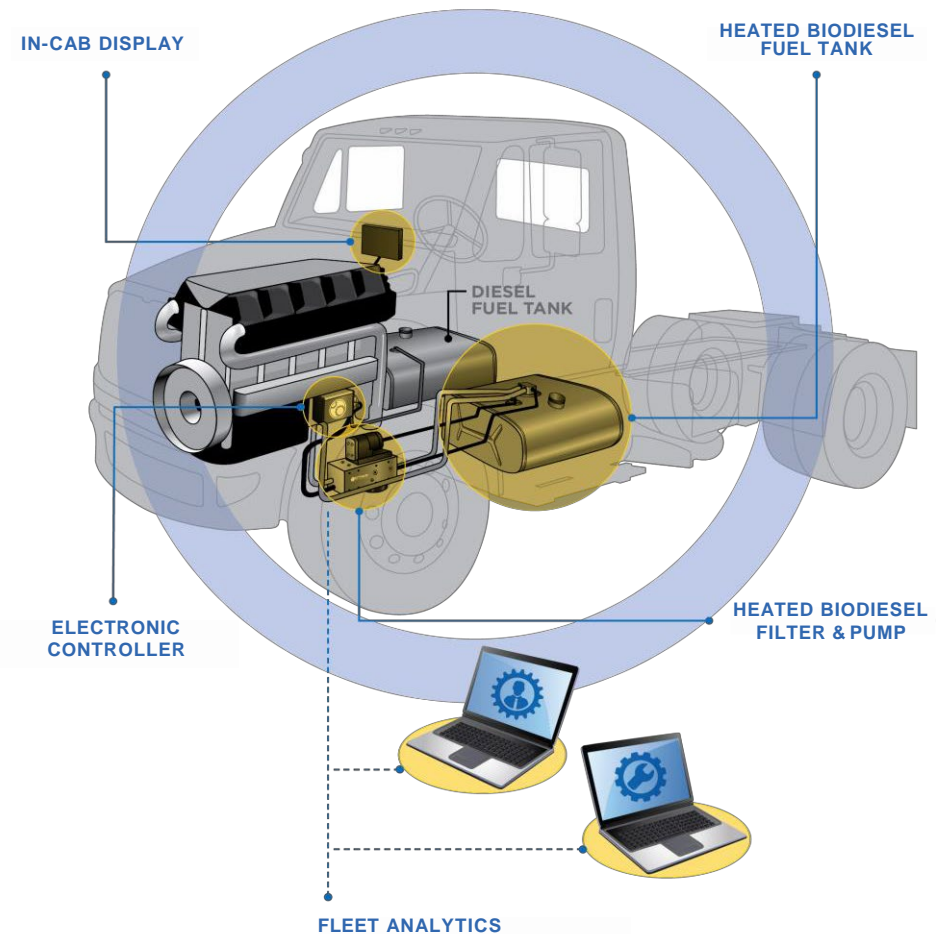
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- Technology company based in Pittsburgh, PA – founded in 2010. Manufacturer of biodiesel fuel system technology to enable any existing diesel engine to operate on 100% biodiesel - including DPF and SCR equipped engines - focused on MD/HD applications.
- Fuel system technology cost of \$13-15k installed.
- Available as retrofit for existing engines or ship-through select channels.
- Enables use of B100 providing up to 85% greenhouse gas emission reduction compared to baseline of diesel fuel.
- REG and Optimus have strategic marketing agreement to jointly develop and implement technology with fleets in public and private sector.



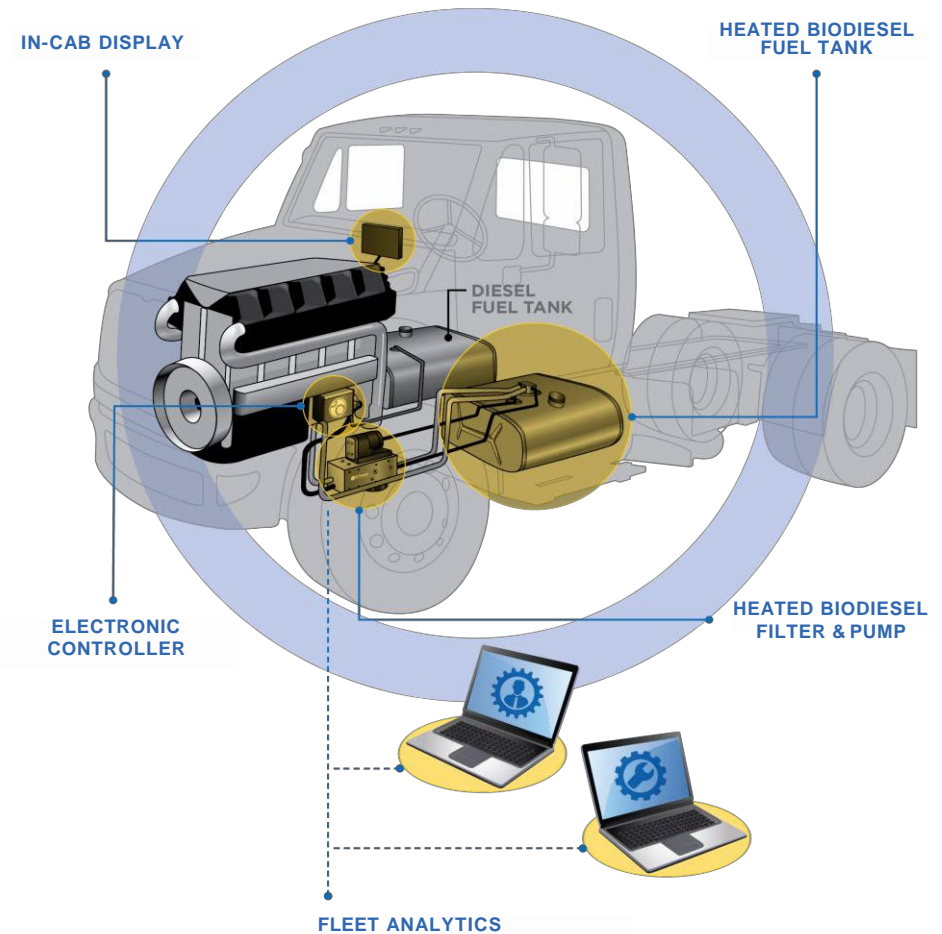
# B100 System Technical Overview

- Vector system integrates w/supply side system – always defaults to diesel system in the event of malfunction or biodiesel system operating outside of defined conditions
- System comprised of:
  - 2<sup>nd</sup> heated fuel tank (configurable to application)
    - 2 tanks or 1 dual-chamber tank
  - Heated fuel filter & pump module
    - Filter spec to engine
  - Fuel selector valves
    - Independent operation for supply and return fuel system
  - ECU
    - Fully automated controls, no driver interaction
  - In-cab display
    - Primarily functions as biodiesel fuel gauge
    - Alerts of service condition or malfunction



# B100 System Technical Overview

- System operation is bi-fuel
  - Either diesel or biodiesel operation – never blended
  - Independent supply and return system valves inhibit cross contamination between systems
  - Isolated fuel filters provides default to diesel for continued engine operation
- Startup and shutdown always occurs on diesel
  - Key removal triggers engine flush
  - Temperature compensated (60-300 seconds)



# Who else is utilizing B100 technology?

- **Washington DC Department of Public Works**

- Refuse Trucks

- **City of Chicago Parks District**

- Refuse Trucks

- **Renewable Energy Group**

- Semi / Jobber Delivery Trucks

- **City of Ames**

- Snowplows

- **IOWA DOT**

- Snowplows

- **DC Water**

- Dump/Service Trucks

- **ADM**

- Semi Trucks

- **Star Oil**

- Combination Trucks Jobber w/Tankers





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# Thank You!

**Jon Scharingson | Executive Director, Sales & Marketing**  
**Renewable Energy Group | [regi.com](http://regi.com)**  
**[jon.scharingson@REGI.com](mailto:jon.scharingson@REGI.com)**





Steve Whaley  
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- Director of Autogas Business Development for the Propane Education & Research Council
- More 25 years experience working with both natural gas and propane solutions for public and private fleets
- Previous experience with Whaley Clean Transportations Consulting, Agility Fuel Systems, Roush Clean Tech and Blossman Propane



# Renewable Fuels & Biobased Products

SFTCS – October 21, 2020<sup>th</sup>

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**Stephen Whaley**

Director of Autogas Business Development  
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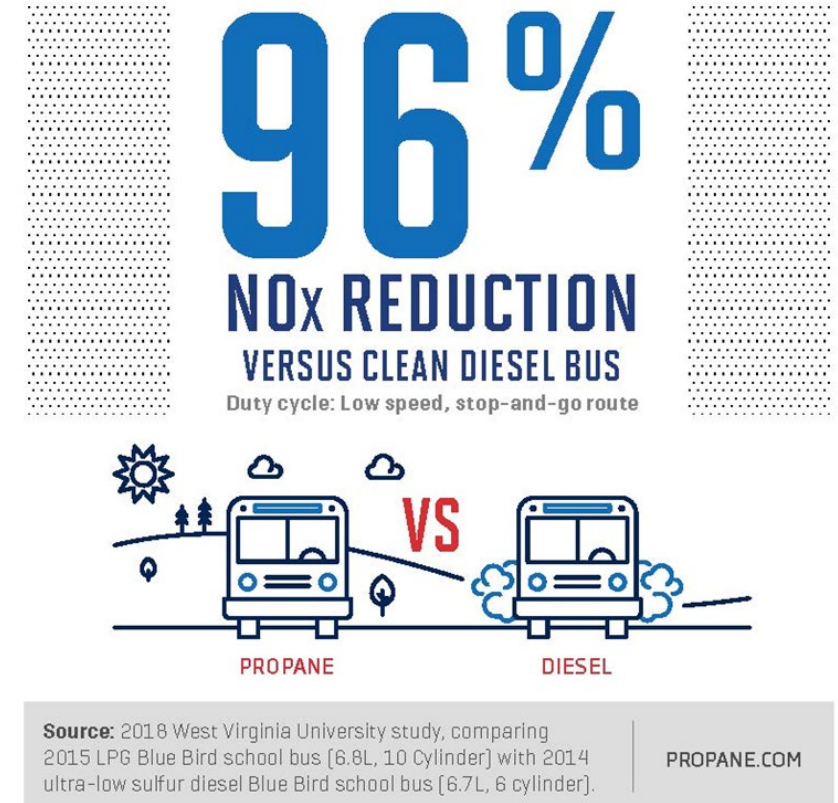
Propane comes from organic as well as renewable sources.

It's nontoxic, meaning it does not contaminate air, soil, or water resources.



# Path to Zero Emissions

- Particulate Matter
  - Virtually zero
  - Zero with renewable propane
- NOX
  - 96% reduction from best in class diesel
  - Certifying to .02, operating at 0.01, full duty cycle
- GHG
  - New technologies 25% reduction from next best technology





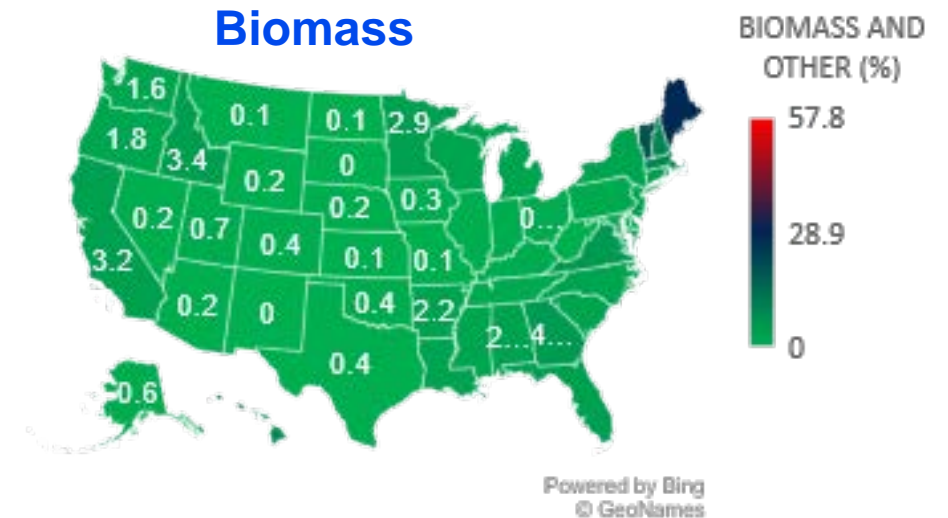
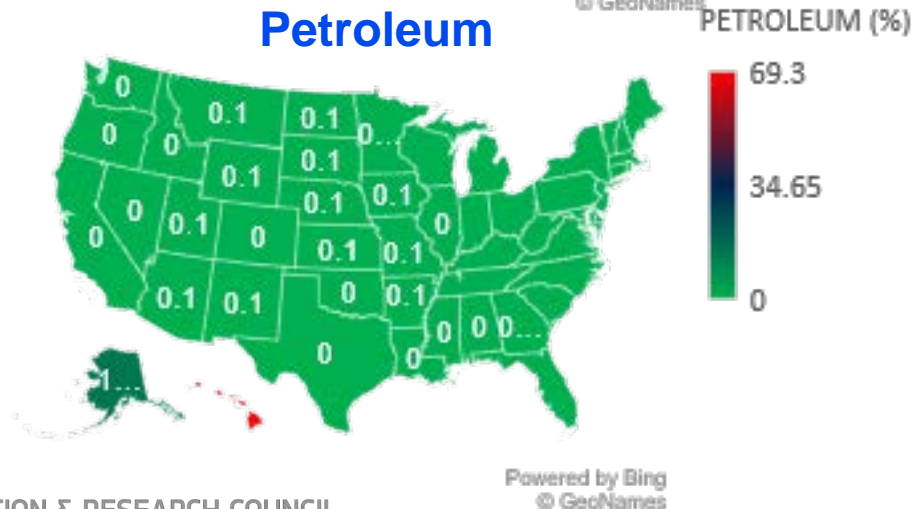
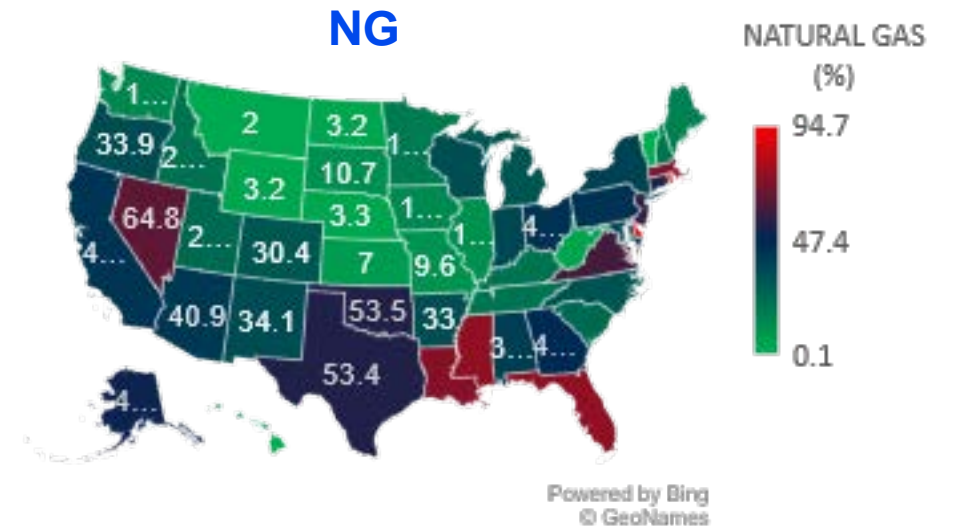
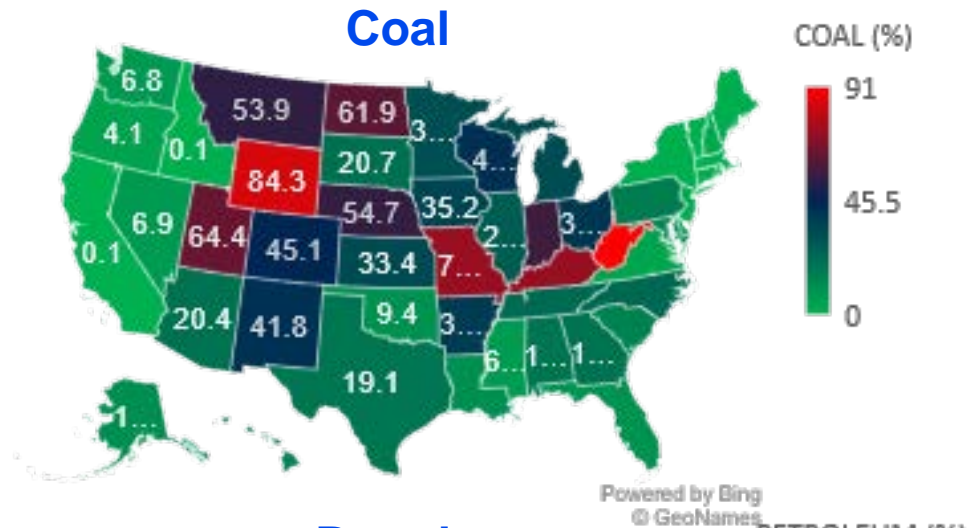
# The Future of Propane Autogas - Renewable

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# Current Renewable Propane Sources



# 2019 Electrical Grid Source Energy Mix – Fossil and Biomass

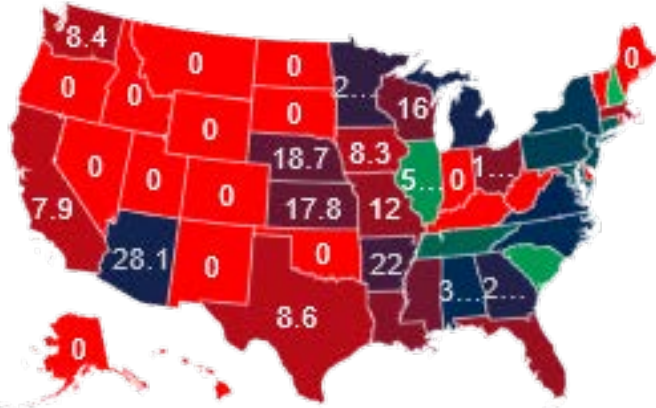




# 2019 Electrical Grid Source Energy Mix – Renewables and Nuclear

### Nuclear

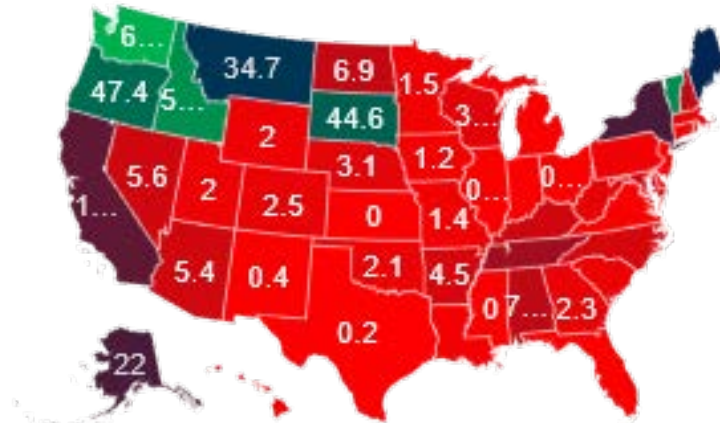
NUCLEAR (%)



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### Hydro

HYDRO (%)



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### Geothermal

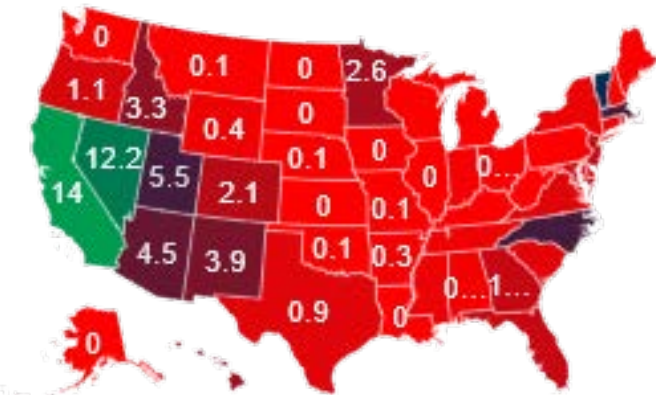
GEOETHER... (%)



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### Solar

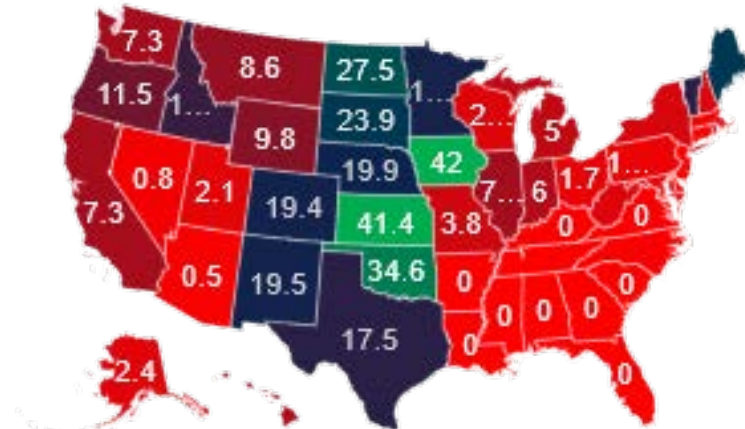
SOLAR - PV (%)



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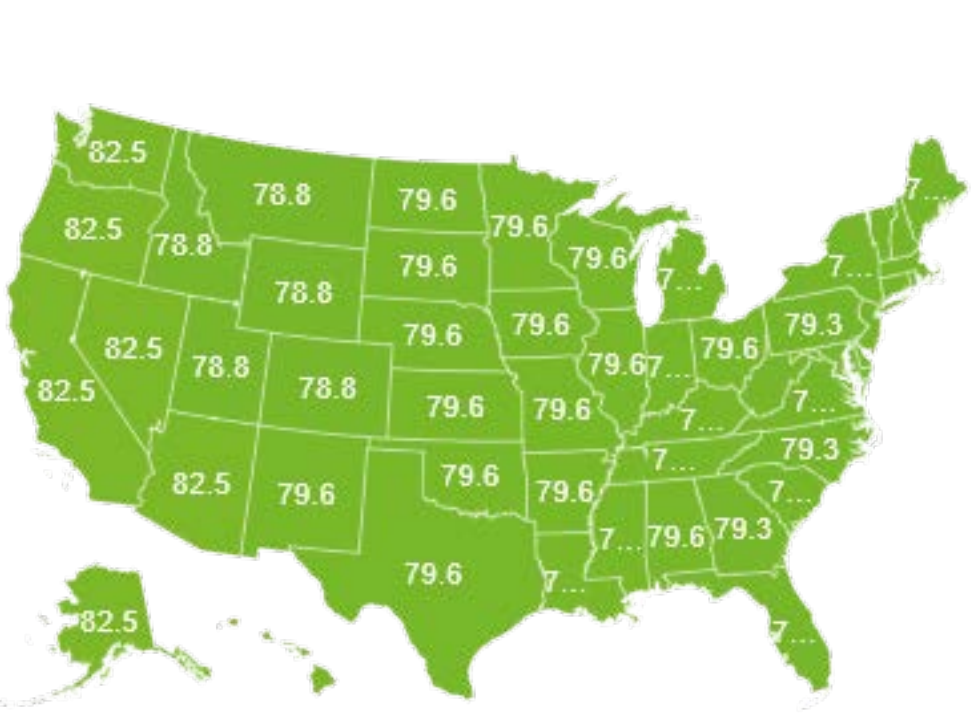
### Wind

WIND (%)



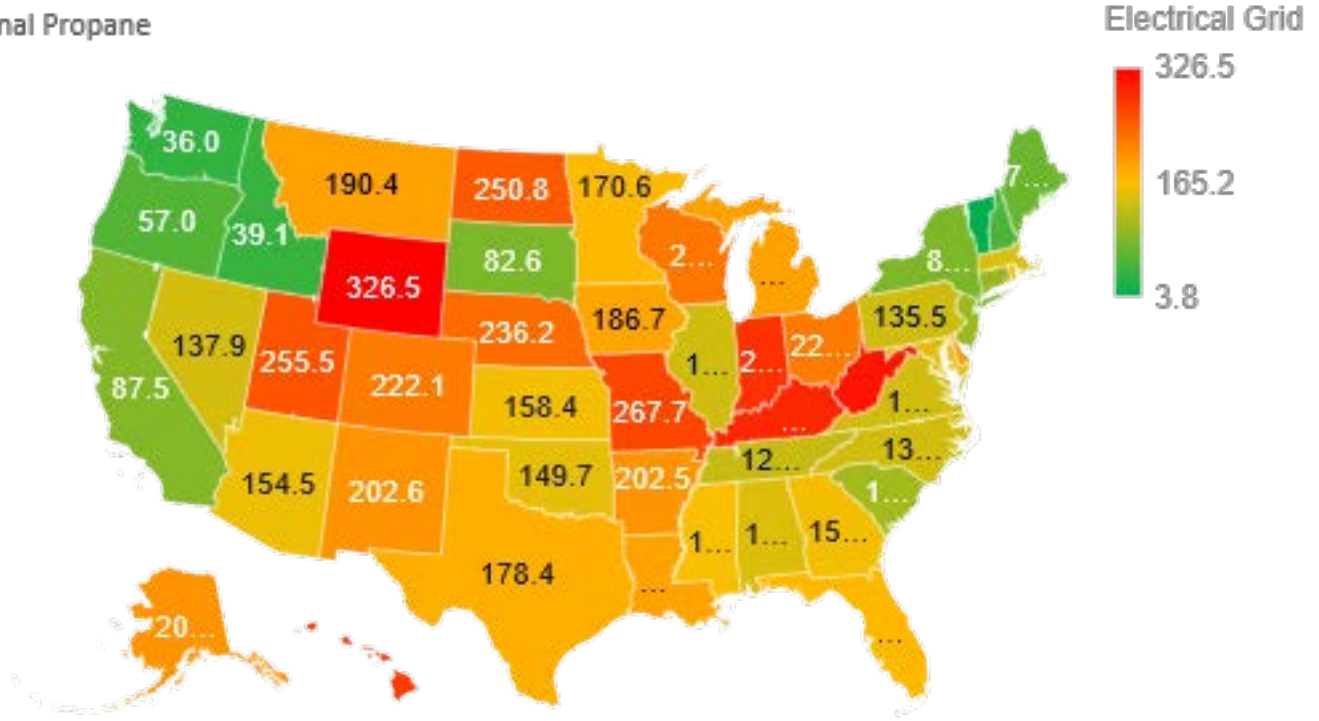
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# Well-to-Wheels Carbon Intensity Comparisons of “Fuel” (gCO<sub>2</sub><sub>eq</sub>/MJ)



**Propane**

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© GeoNames



**Today's Grid Electricity**

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# Simulated Cases

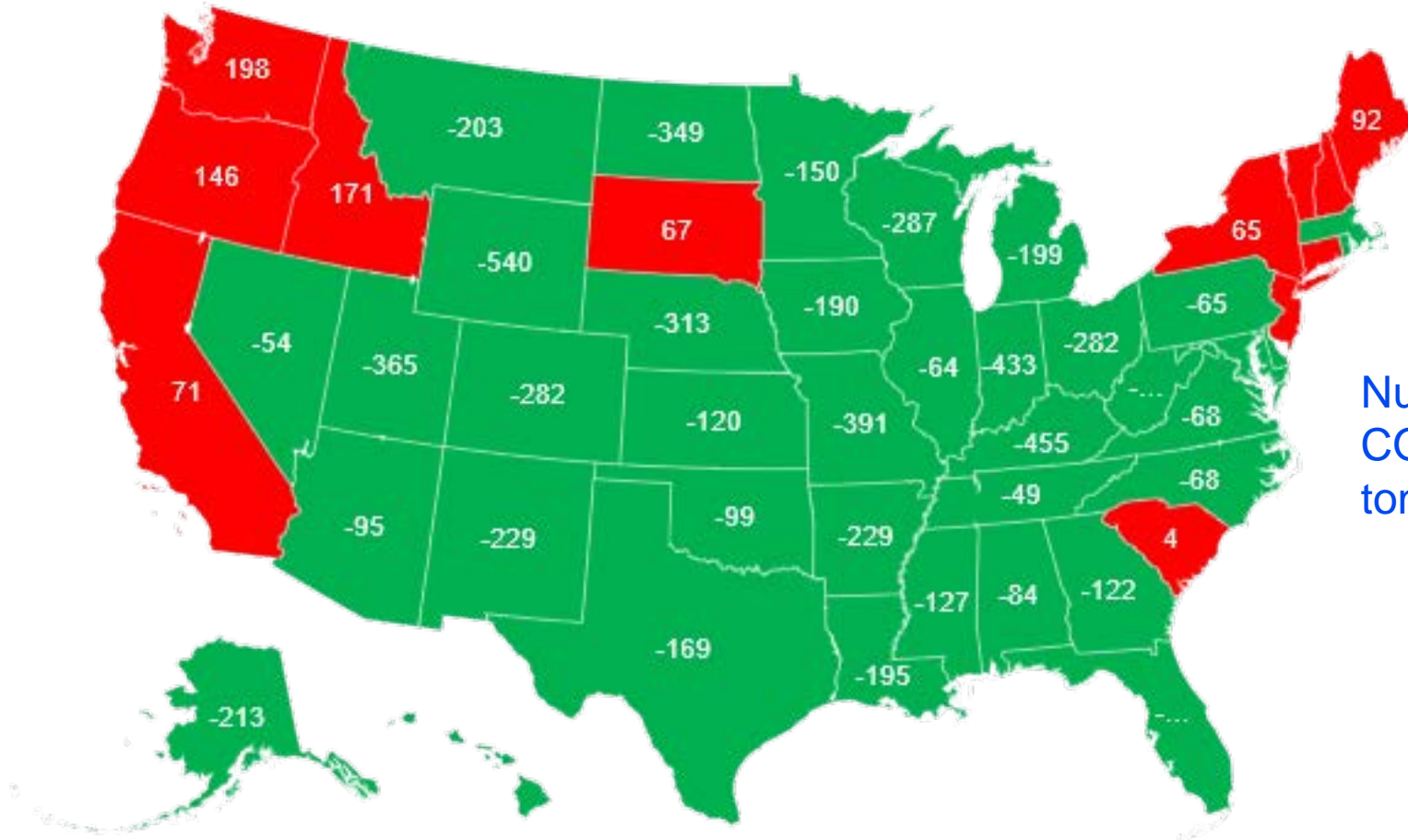
Case	Detail
Case I	Comparison of conventional propane vehicle vs. MDEV
Case II	Comparison of renewable propane vehicle vs. MDEV
Case III	Comparison of propane/renewable DME blend (80%-20% by mass) vehicle vs. MDEV
Case IV	Comparison of renewable propane/renewable DME blend (80%-20% by mass) vehicle vs. MDEV
Case V	Comparison of renewable propane/renewable DME blend (80%-20% by mass) vehicle vs. MDEV ( <b>Decarbonized electric grid scenario</b> )

- Renewable fuel and components production CIs assumed the same as status-quo even under decarbonized electric grid scenario. In reality, the CI of renewable fuels and production CIs will be lower due to cleaner electricity. Calculation of these are out-of-scope
- Propane vehicle fuel economy has been kept the same as status-quo even under decarbonized electric grid scenario. In reality, the fuel economy will improve significantly due to evolution of engine technologies (~25 years from now)



# Case-I: $\Delta\text{CO}_2_{\text{eq}}$ for One Truck:

**Green - Propane is Better, Red – MDEV is better**



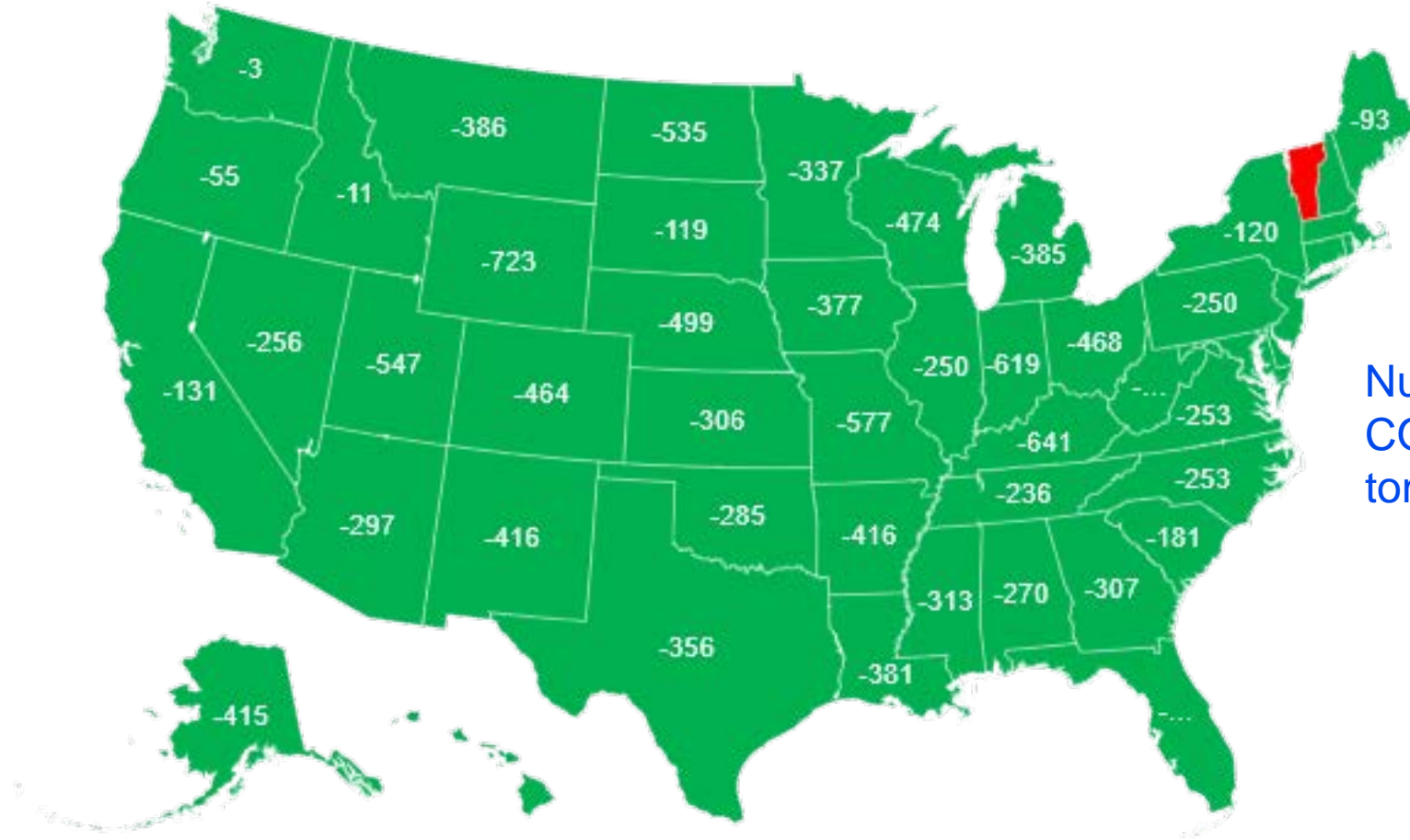
Numbers represent  $\Delta\text{LC}$  CO2 emissions in US tons per MD vehicle

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**Today, Propane is a cleaner solution for 38 states and DC**

# Case-II: $\Delta\text{CO}_2_{\text{eq}}$ for One Truck:

**Green – R-Propane is Better, Red – MDEV is better**



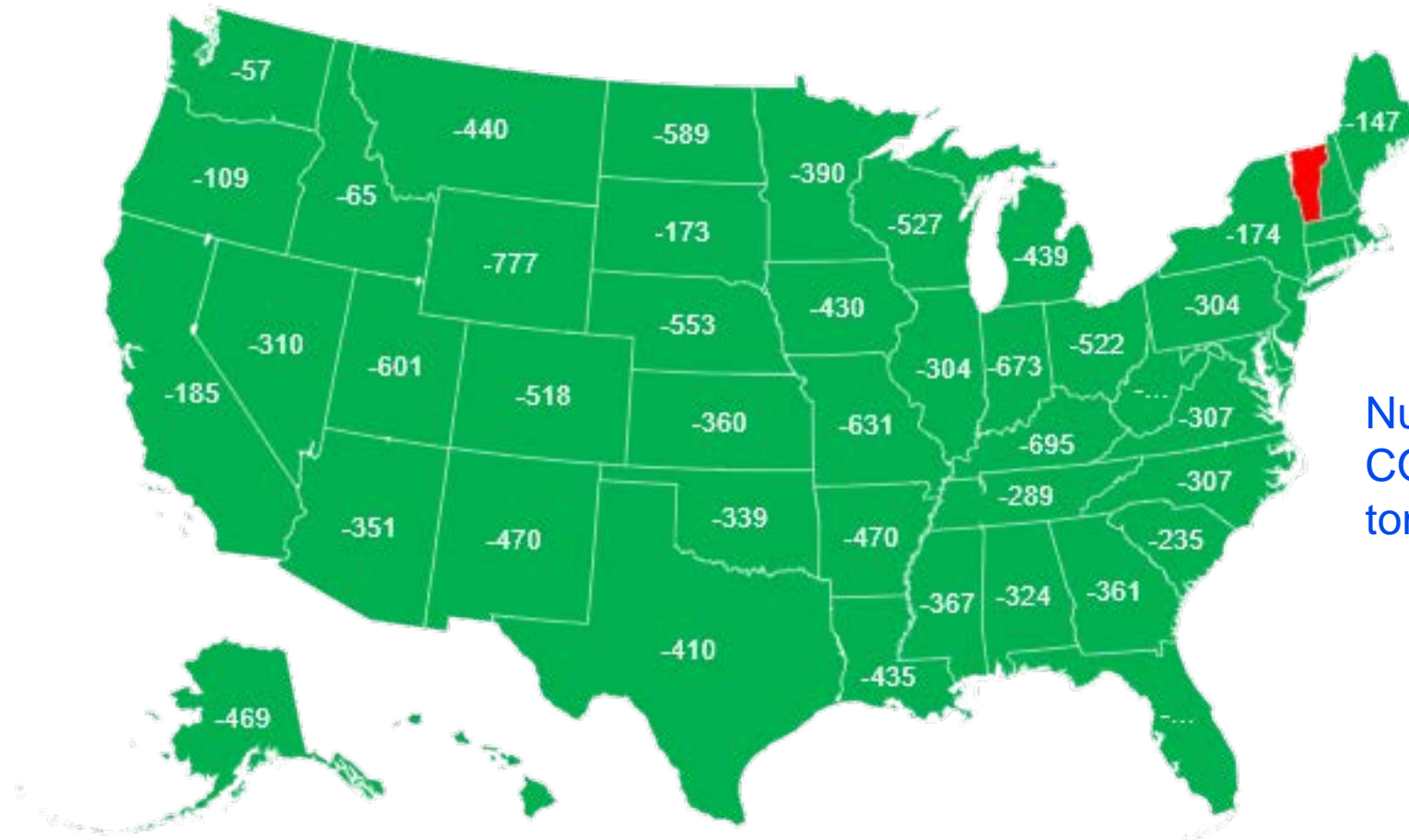
Numbers represent  $\Delta\text{LC CO}_2$  emissions in US tons per MD vehicle

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**Today, Renewable Propane is a cleaner solution for all states (and DC) but Vermont**

# Case-III: $\Delta\text{CO}_2_{\text{eq}}$ for One Truck:

Green – Propane/R-DME is Better, Red – MDEV is better



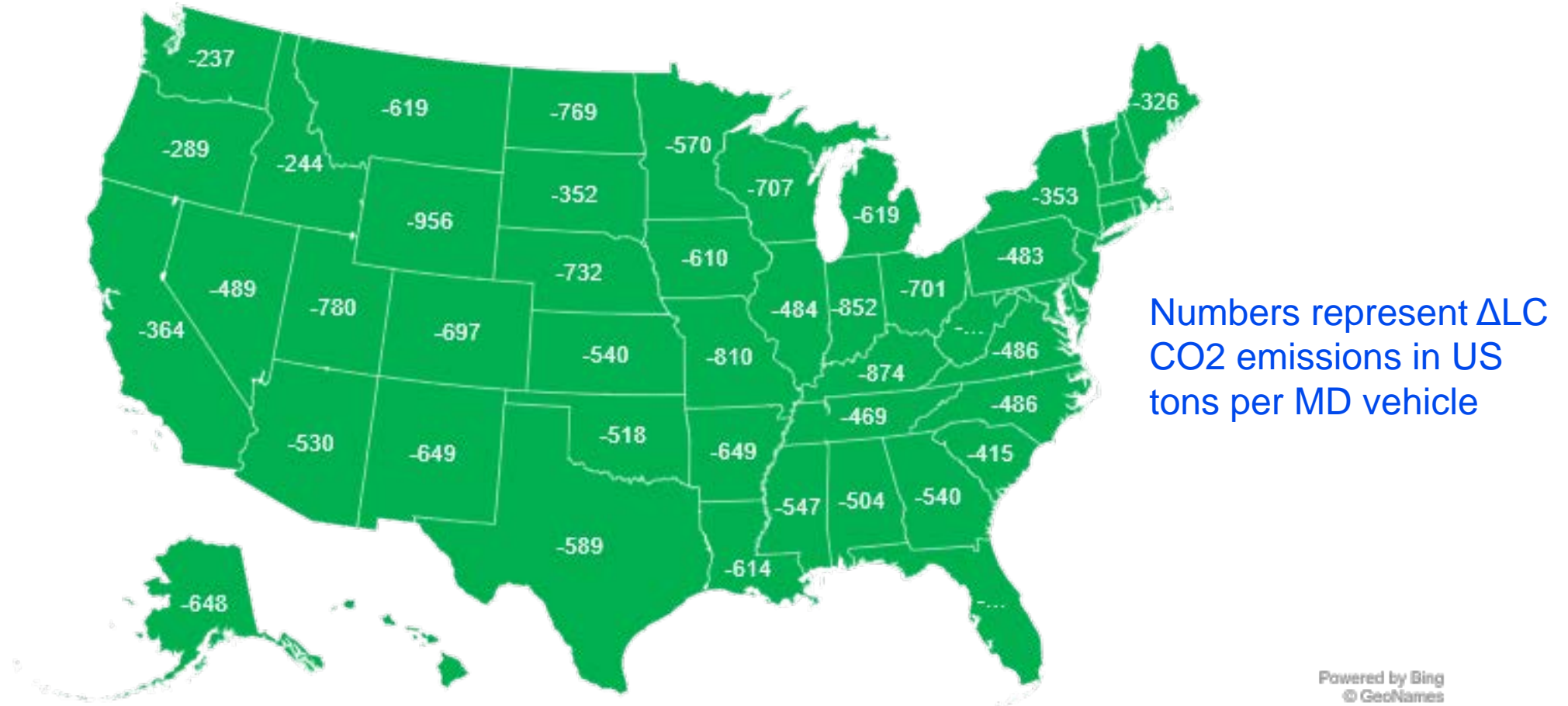
Numbers represent  $\Delta\text{LC CO}_2$  emissions in US tons per MD vehicle

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Today, Propane/R-DME blend is a cleaner solution for all states (and DC) but Vermont



# Case-IV: $\Delta\text{CO}_2_{\text{eq}}$ for One Truck: Green – R-Propane/R-DME is Better



**Today, R-Propane/R-DME blend is a cleaner solution for all states and DC**

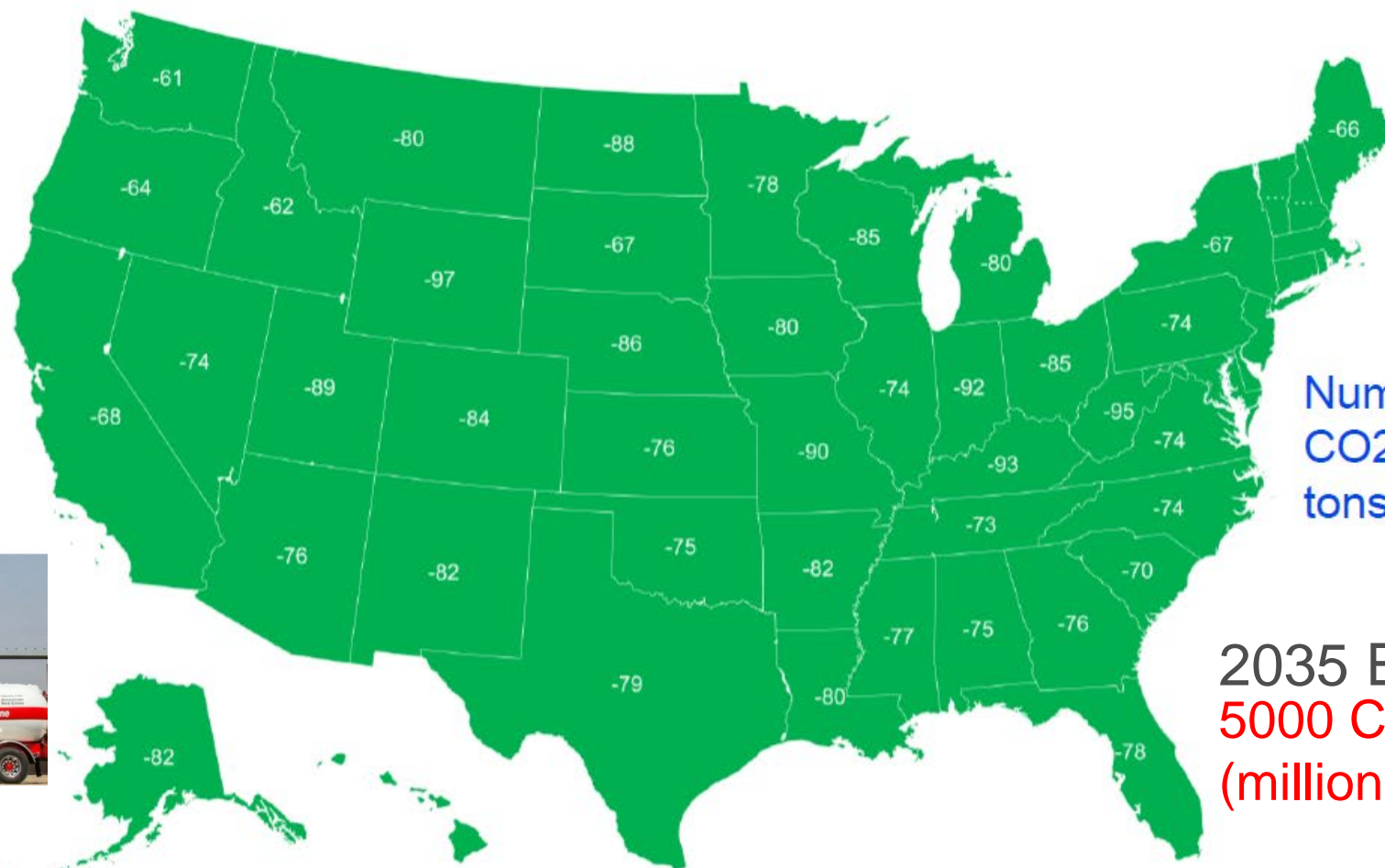
# RENEWABLE PROPANE/RENEWABLE DME BLEND VS. FULL ELECTRIC

## Case-V – Utopian Future - $\Delta\text{CO}_2_{\text{eq}}$ for One Truck:

### Green – R-Propane/R-DME is Better



OBERON + SUBURBAN: MOVING RDME TOWARDS COMMERCIALIZATION



Numbers represent  $\Delta\text{LC CO}_2$  emissions in US tons per MD vehicle

2035 Electric Grid  
5000 Cycles  
(million-mile battery)

Powered by Bing  
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Even with decarbonized electric grid, renewable propane/renewable DME blend vehicle is a cleaner solution than MDEV for all states and DC

# Benefits of Propane/Renewable Propane

- Cost Effectiveness
  - MD Propane averages 15% of vehicle cost
  - MD EV averages 300% of vehicle cost
- Payload
  - MD Propane –no loss of payload
  - MD EV – heavy battery weight diminishes payload capacity
- CO2 Greenhouse Gas
  - MD Propane produces less carbon in 38 states than EV today
  - MD Renewable Propane best blend produces less carbon in all states than EV's best grid in 2035







# Renewable Propane

- Low carbon intensity.
- Inexpensive feedstock.
- Abundant feedstock.
- Low energy conversion.
- Final product competitively priced.

# References

- <https://www.nei.org/resources/statistics/state-electricity-generation-fuel-shares>
- <https://ww2.arb.ca.gov/resources/documents/lcfs-pathway-certified-carbon-intensities>
- GREET3.0
- [https://www.eia.gov/dnav/pet/pet\\_sum\\_snd\\_d\\_r50\\_mbbbl\\_a\\_cur-3.htm](https://www.eia.gov/dnav/pet/pet_sum_snd_d_r50_mbbbl_a_cur-3.htm)
- <https://www.eia.gov/electricity/state/unitedstates/>
- [https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/comments/tier2/elec\\_update.pdf](https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/comments/tier2/elec_update.pdf)
- [https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/comments/tier2/rpane\\_temp.pdf](https://ww2.arb.ca.gov/sites/default/files/classic/fuels/lcfs/fuelpathways/comments/tier2/rpane_temp.pdf)
- [https://batteryuniversity.com/learn/article/bu\\_1003a\\_battery\\_aging\\_in\\_an\\_electric\\_vehicle\\_ev](https://batteryuniversity.com/learn/article/bu_1003a_battery_aging_in_an_electric_vehicle_ev)
- Kawamoto et al. (2019). Estimation of CO<sub>2</sub>eq Emissions of Internal Combustion Engine Vehicle and Battery Electric Vehicle Using LCA, Sustainability, 2019
- Hawkins et al. (2012). Comparative Environmental Life Cycle Assessment of Conventional and Electric Vehicles, Journal of Industrial Ecology
- Effects of battery manufacturing on electric vehicle life-cycle greenhouse gas emissions, ICCT Briefing (2018)
- Rengarajan, Saradhi, et al. LPG Direct Injection Engine for Medium Duty Trucks. No. 2020-01-5008. SAE Technical Paper, 2020.
- Medium- and Heavy Duty Vehicle Electrification, An Assessment of Technology and Knowledge Gaps (2019): ORNL/SPR-2020/7

**STEVE WHALEY**

***DIRECTOR OF AUTOGAS BUSINESS DEVELOPMENT***

**PROPANE EDUCATION & RESEARCH COUNCIL**

***STEPHEN.WHALEY@PROPANE.COM***

***864-606-2290***





Ed Hoffman

[ehoffman@blossmanservices.com](mailto:ehoffman@blossmanservices.com)

828-232-0910

- President of Blossman Services, the distribution partner for Alliance AutoGas
- More than 25 years experience industry experience
- Previous experience includes positions with Keystone Automotive, XTRA Lease, Ryder Sytems, Penske Truck Leasing and CarMax Auto Superstores
- BS in Management & Industrial Relations from Wilkes University and an MBA in Operations Management from University of Scranton



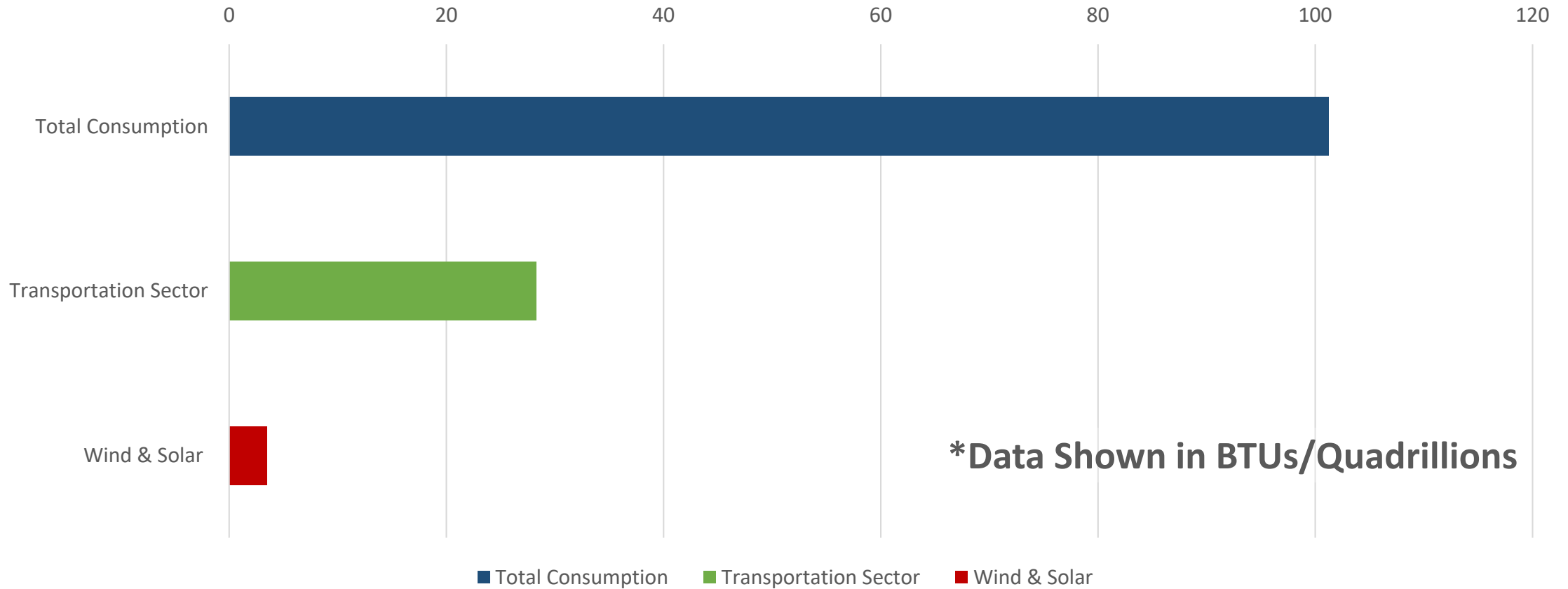


# Renewable Propane & Why It Matters

*Why Renewable Propane is a Fuel of the Future*

Ed Hoffman- President Blossman Services

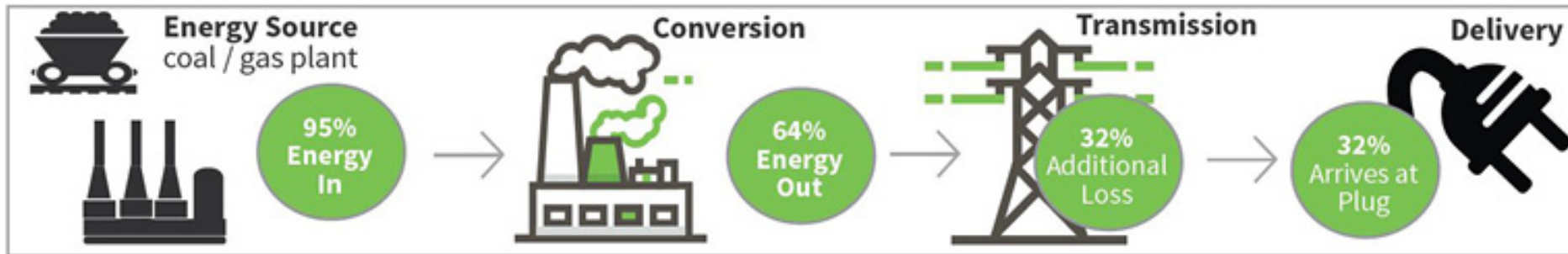
# Energy Consumption in the US





# From Plant to Plug

## ENERGY LOST DURING ELECTRICITY GENERATION



[www.allianceautogas.com](http://www.allianceautogas.com)

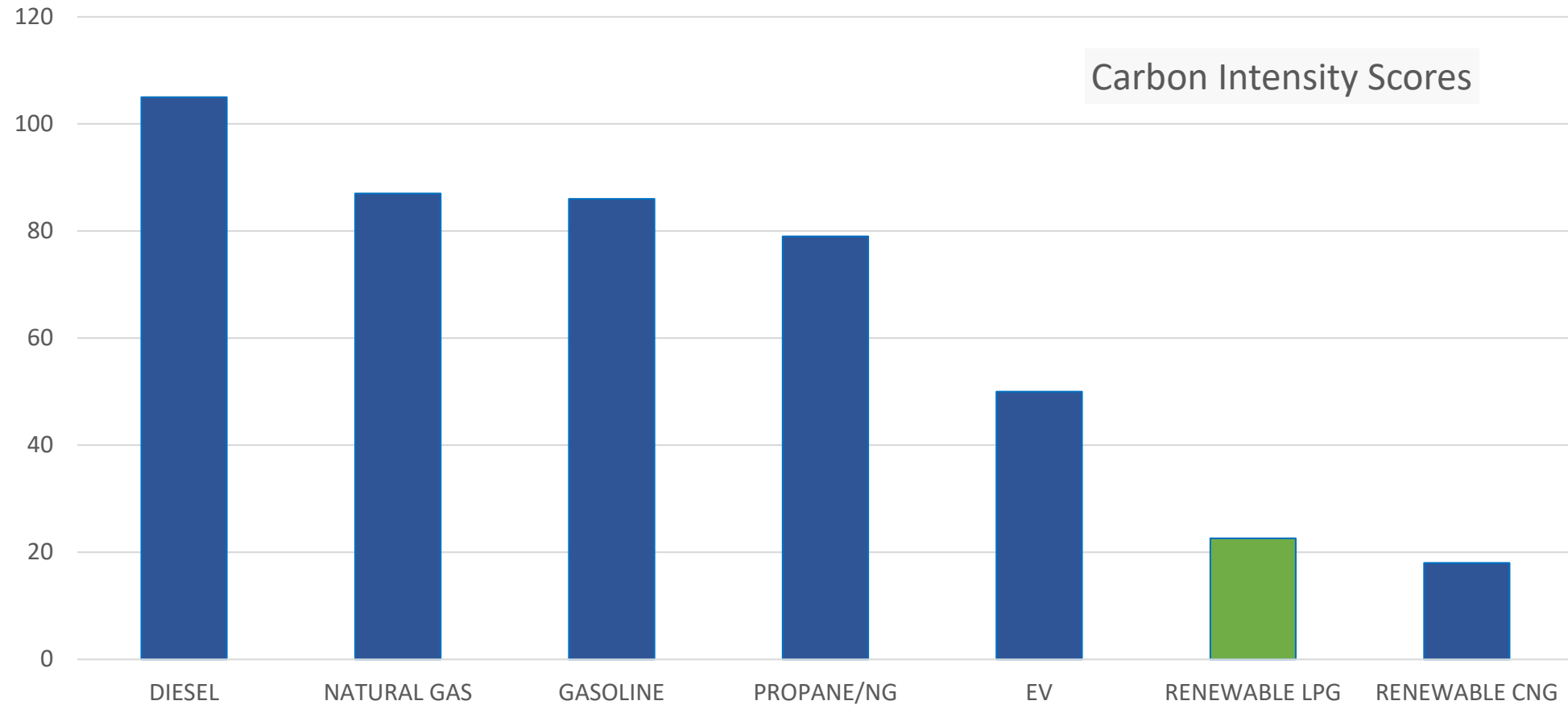


[Information@allianceautogas.com](mailto:Information@allianceautogas.com)

# Renewable Liquid Fuels

- Available today as a “Drop In” Fuel
- Renewable Propane at close to price parity with Fossil version
- Have large supply of environmentally responsible feedstock (s)

# Carbon Intensity





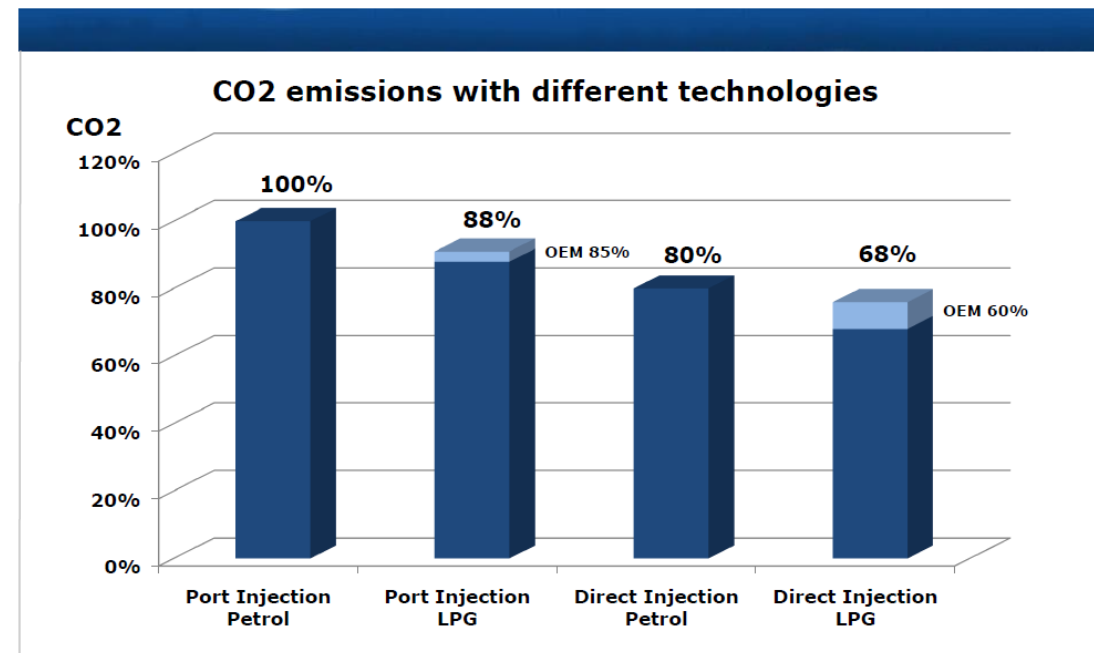
# No Compromise – Work Ready Vehicles

- Class 1- Class 6 Current Market Chassis and Vehicle Options
- All Manufacturers and Up fits
- Less than 200 pound impact on payload
- No range anxiety
- No capital investment in infrastructure
- Don't need incentives/grants

# Emissions Reductions



- CO2 + Particulate Matter emissions reductions
- Reduces non-regulated emissions significantly such as aromatic hydrocarbons, benzene, SO2, and more
- Renewable propane has molecular structure identical to fossil propane





Patrick Campbell  
patrick.j.campbell@cummins.com  
303.229.7713

- Regional Sales Manager for the Cummins Westport Southern Region On-Highway and Transit
- More than 20 years with Cummins
- Had to opportunity to service customers in territories from coast to coast in the US







# RNG Overview & Applications

**Patrick Campbell**  
Regional Sales Manager

---

**Cummins Westport**

Mobile: 303.229.7713

Email: [Patrick.J.Campbell@Cummins.com](mailto:Patrick.J.Campbell@Cummins.com)

October 2020

# Renewable Natural Gas & Applications

## So why Renewable Natural Gas and Why Cummins

- Vehicles powered by Cummins Near Zero engines, fueled with Renewable Natural gas are the cleanest, lowest cost and least disruptive of all other goods movement alternatives technologies available in the market place today
- 3 main drivers



**Environmental**



**Abundance**



**Economics**

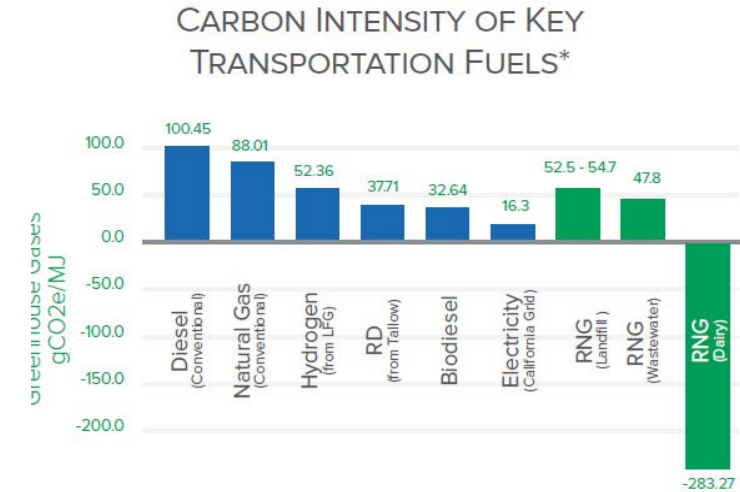


# What is Renewable Natural Gas (RNG)



## Environmental

- Renewable Natural Gas (RNG) is pipeline compatible gaseous fuel derived from biogenic or other renewable sources that has lower lifecycle CO<sub>2</sub> emissions than geologic natural gas
- RNG is a nearly pure methane gas emitted by landfills, waste water treatment and animal waste can be 40 times more potent as a greenhouse gas than carbon dioxide
- That methane, or the renewable natural gas would normally be discharged to atmosphere or simply burned off or flared
- Instead we're capturing and consuming that methane to power a truck or bus
- By capturing more greenhouses gases than it emits, RNG is actually considered carbon-negative!



\* CALIFORNIA AIR RESOURCES BOARD LCFS CERTIFIED PATHWAYS (2019); ADJUSTED FOR HEAVY-DUTY TRUCK APPLICATIONS



# Renewable Natural Gas



## Abundance

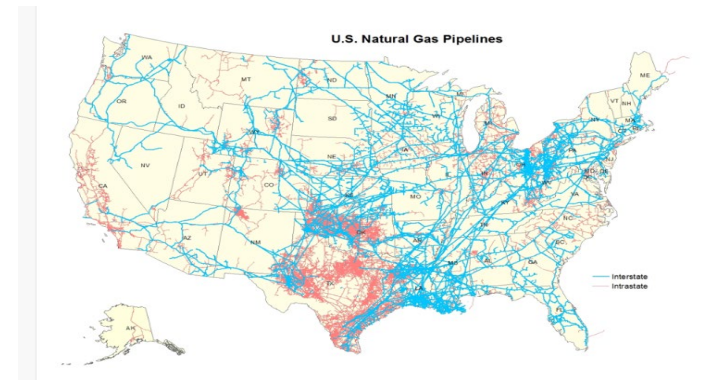
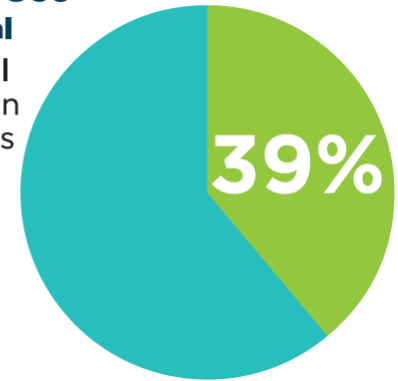
- Near limitless domestic **renewable** natural gas availability
- Produced from a variety of renewable sources including wastewater treatment plants, food and green waste, landfills, dairies, and farms
- RNG use as a transportation fuel has increased **291%** over the last 5 years
- Established Fueling Infrastructure. There are more than 1,600 public CNG stations in the US, 2000+ total stations
- More than 2.5 million miles of pipeline distributes natural gas from coast to coast.

### 2019 NGV Fuel Use

717 Million GGE Total

In 2019, **39%**, of all on-road fuel used in natural gas vehicles was RNG

- Conventional Natural Gas  
**440 Million GGE**
- Renewable Natural Gas  
**277 Million GGE**



# Renewable Natural Gas & Cummins



## Economics

- Natural Gas Vehicles are readily available right now!
  - 175K+ Total NG vehicles in service, across all weight classes and applications
  - 90K+ CWI engines in service since 2007
- Many high profile fleet operators including:



## Natural Gas Engine Applications



## NGV popularity continues to build



# Renewable Natural Gas & Cummins



## Economics

- CWI powered CNG are available today from 10 different major truck manufacturers including Freightliner, Volvo, Kenworth, Mack, Peterbilt, and others
- OEM dealer sales and service networks in place to support MD & HD NGVs
  - (200) Cummins, Inc locations
  - 3500 OEM locations

### OEM Availability

 ISX12N	 KENWORTH	 Peterbilt	 FREIGHTLINER	 MCI
 VOLVO	 MACK	 AUTOCAR		
 LSN	 FREIGHTLINER	 Peterbilt	 AUTOCAR	 GILLIG
	 MACK	 KENWORTH	 DELL-BELL	 NEW FLYER
 B6.7N	 Thomas	 ARBOC	 FREIGHTLINER	 Custom Chassis





# Why Cummins Renewable Natural Gas Engines



## Economics

- Historically on BTU basis significantly lower cost fuel: At the pump, average natural gas prices are typically \$0.75 to \$2 lower than diesel and much more stable.
- Federal natural gas rebates have been and are available at .50 per gallon
- Overall maintenance costs on par with diesel counterparts

# Cummins Natural Gas Engine Line-up

# ISX12N™

## ■ Key Product Attributes:

- Displacement – 11.9 Liters (762.2 CU IN)
- Peak rating 400 hp / 1,450 lb-ft torque
- Recommended use up to 80,000 lb. GVW
- **Certified** 90% below EPA emission level, CARB certified at 0.02g Near Zero NOx Standard
- Maintenance and fluid free Exhaust treatment system
- The 12L platform has been in service since 2013
- Utilizes Cummins diesel engine block and major part hardware set designed for extended service life





# L9N™

## ■ Key Product Attributes:

- Displacement – 8.9 Liters (540 CU IN)
- Peak rating 320 hp / 1,000 lb-ft torque
- Recommended use up to 66,000 lb. GVW
- **Certified** 90% below EPA emission level, CARB certified at 0.02g Near Zero NOx Standard
- Maintenance-free exhaust aftertreatment system
- The L9N platform has been in service since 2007
- Utilizes Cummins diesel engine block and major part hardware set designed for extended service life



# B6.7N™

## ■ Key Product Attributes:

- Displacement – 6.7 Liters (540 CU IN)
- Peak rating 240 hp / 560 lb-ft torque
- Recommended use up to 33,000 lb. GVW
- **Currently Certified 90%** below EPA emission level at 0.02 g NOx Standard
- Maintenance-free and fluid free Exhaust Treatment System
- The B6.7N engine platform has been in service since 2016
- Utilizes Cummins diesel engine block and major hardware set designed for extended service life



# Why Cummins Natural Gas Engine Technology?

- Available today, lowest cost of operation, lowest lifetime cost per year of operation (8 - 12 years)
  - Least disruptive of all alternatives available today
  - Fits current transportation / people & goods movement models
    - No need for radical changes in vehicle technology
- Fits current community models
  - No need for radical changes in transportation infrastructure
  - No need for radical changes in support infrastructure
- Meets US Energy Sources Goals
  - Delivers on Energy Independence Initiatives
  - Delivers Fossil Fuel Reduction Initiatives with RNG

Q+A







David Woolf

[dwoolf@teleswivel.com](mailto:dwoolf@teleswivel.com)

Phone: 919-623-2031

- **President TeleSwivel**
- **20 years sales, marketing and technology leadership**
- **Co-founder of three start-ups**
- **14 year US Army Veteran**
- **Instructor at US Military Academy at West Point**
- **BS from US Military Academy and MS from Johns Hopkins School of Advanced International Studies**



# NC CLEAN ENERGY TECHNOLOGY CENTER

Sustainable Fleet Technology Virtual Conference 2020

## Environmentally Acceptable Lubricants

Dave Woolf

[dwoolf@teleswivel.com](mailto:dwoolf@teleswivel.com)

919-623-2031

October 21, 2020

- Founded 2009
- 4 NSN products
- 14 patents
- GSA Contract: 47QSWA18D007A
- SBIR Phase 1 Technology Development Award
- SDVOSB

*Our mission is to develop and sell technology solutions to improve fleet safety, effectiveness, and sustainability*



U S E P A V G P D E F I N I T I O N

## WHAT IS AN EAL?

Environmentally Acceptable Lubricant



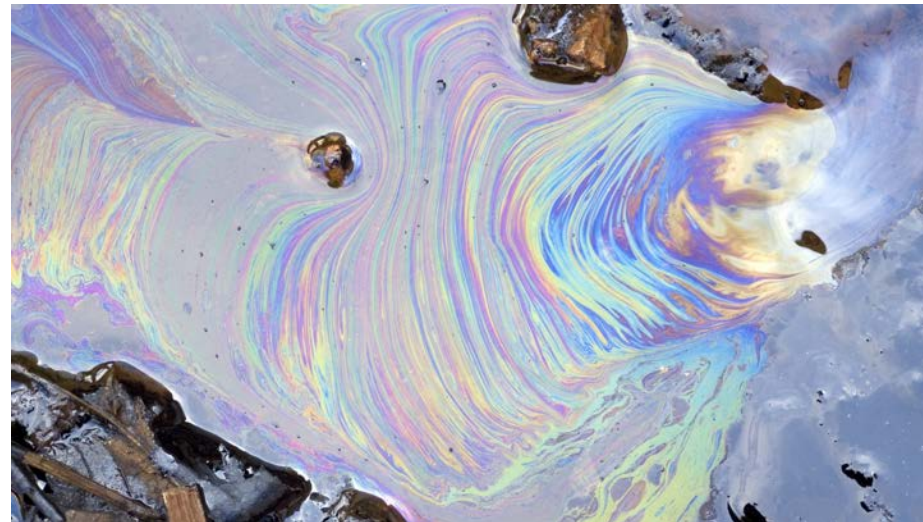
- ✓ **READILY BIODEGRADABLE**  
> 60% in 28 Days
- ✓ **MINIMALLY TOXIC**
- ✓ **NOT BIOACCUMULATIVE**

### ADDITIONAL THINGS TO CONSIDER

Beyond what the EPA defines as an EAL, we also consider renewability, or biobased carbon content, Non-sheening characteristics and overall safety for workplace environment.

EPA Vessel General Permit: The **VGP** is a Clean Water Act National Pollutant Discharge Elimination System (NPDES) permit that authorizes, on a nationwide basis, discharges incidental to the normal operation of commercial vessels.

- Demonstrate continuous improvement in your green program
- Provide better/safer working conditions for your team
- Mitigate liability in accidents (leakage and spills)
- Better performance = longer fluid life and less downtime
- Reduce total operating costs



CHEMICAL STRUCTURE

## NOT ALL EALS ARE THE SAME

Each type of base oil imparts key performance properties to the lubricant




BASE OIL TYPE	HYDRAULIC FLUID TYPE	OXIDATION RESISTANCE	WATER RESISTANCE	SUPERIOR LUBRICITY	BROAD SEAL COMPATIBILITY
TRIGLYCERIDE	HETG	★☆☆☆☆	★☆☆☆☆	★★★★★	★★☆☆☆
POLYALKYLENE GLYCOL	HEPG	★☆☆☆☆	☆☆☆☆☆	★★☆☆☆	★★☆☆☆
SYNTHETIC ESTER	HEES	★★☆☆☆	★★☆☆☆	★★★★★	★★☆☆☆
PAO & SYNTHETIC HYDROCARBON	HEPR	★★★★★	★★★★★	★★★★★	★★★★★

---

### Industry-leading EALs from our partners at RSC Bio

- Wide range of grades/viscosities
- Fully EAL compliant-VGP and Eco Label approved
- 20+ year track record of no failures
- 100+ OEM approvals
- 5 or 10 year warranty
- Widest range of seal compatibility
- Leader HEPR manufacturer
- DROP-IN REPLACEMENT FOR MINERAL OILS



Type	Name	Description	Grades
 <b>Hydraulic Fluids</b>	FUTERRA™ HF Series EnviroLogic® HF Series	Ecolabel Certified High Performance Hydraulic Fluid	ISO Viscosity Grades 32 □ 46 □ 68 □ 100
 <b>Gear Oils</b>	EnviroLogic® GO Series	Readily Biodegradable Synthetic Gear Oils	ISO Viscosity Grades 68 □ 100 □ 150 □ 220
 <b>Greases</b>	EnviroLogic® Greases	Biodegradable Lithium Complex Greases	Biodegradable Complex Lithium Grease



## FUTERRA™ HF

FEATURES	BENEFITS
NON-SHEENING	Doesn't leave oil sheen on surface of water
US EPA VESSEL GENERAL PERMIT (VGP)	Global compliance
DROP-IN REPLACEMENT FOR MINERAL OIL	Enables easy conversions / compatible with standard seals
EXTREME VERSATILITY	Fewer skus across many applications
EXCELLENT OXIDATIVE + HYDROLYTIC STABILITY	Lasts longer than other EALs and conventional oils
OEM TESTED WITH A WIDE RANGE OF CONDITIONS	Broad seal compatibility
SUPERIOR CORROSION RESISTANCE	Reduced equipment maintenance
HIGH TEMPERATURE STABILITY	Longer performance
DEMULSABILITY	Allows for water separation from system, reducing change-outs
NEAR ZERO FOAM	Longer pump life / more efficient lubrication than conventional oils
LOW POUR POINT	Operational ease / shippable in + through arctic conditions
FLUORESCENT DYE OPTION	Assists with leak detection + risk mitigation

Time to consider EALs—total cost, performance, and risk mitigation make them a viable option for a wide range of applications



See the difference here:

<https://www.teleswivel.com/manufacturers>

[https://www.gsaadvantage.gov/advantage/ws/search/advantage\\_search?q=0:2teleswivel%20rsc&db=0](https://www.gsaadvantage.gov/advantage/ws/search/advantage_search?q=0:2teleswivel%20rsc&db=0)

Stay tuned for news on biodegradable engine oil pilot tests!



## City of Seattle



Philip Saunders

[philip.saunders@seattle.gov](mailto:philip.saunders@seattle.gov)

206-684-0137

- Deputy Division Director Logistics and Emergency Management with oversight of the Green Fleet Program
- Green Ambassador for City of Seattle
- #4 Green Fleet 2019
- Authored 2019 City of Seattle Green Fleet Action Plan
- Received Governor Award for Leadership in Management
- Western Washington Clean Cities Coalition Committee Chair and member National Institute of Governmental Purchasing
- BS in Business Administration, Lean Six Sigma Black Belt Certified
- Retired US Army Warrant Office 20 years as logistician and contract officer





# Sustainable Fleet Technology Series

City of Seattle Fleet Renewable Fuels,  
Lubricants & Other Biobased Products

10/21/2020



City of Seattle

# Agenda

- How The City of Seattle Uses Renewables
- Renewable Fuel Plan Strategies
- City's Cost to Use Renewable Fuels
- Fueling the City with Renewables
- Questions





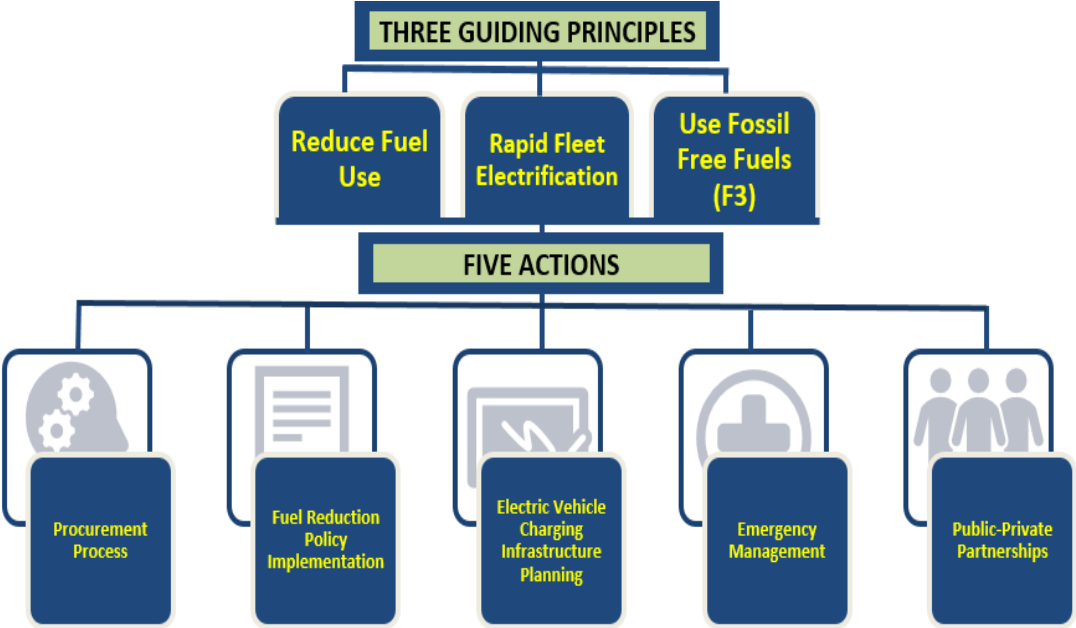


# How The City of Seattle Uses Renewables

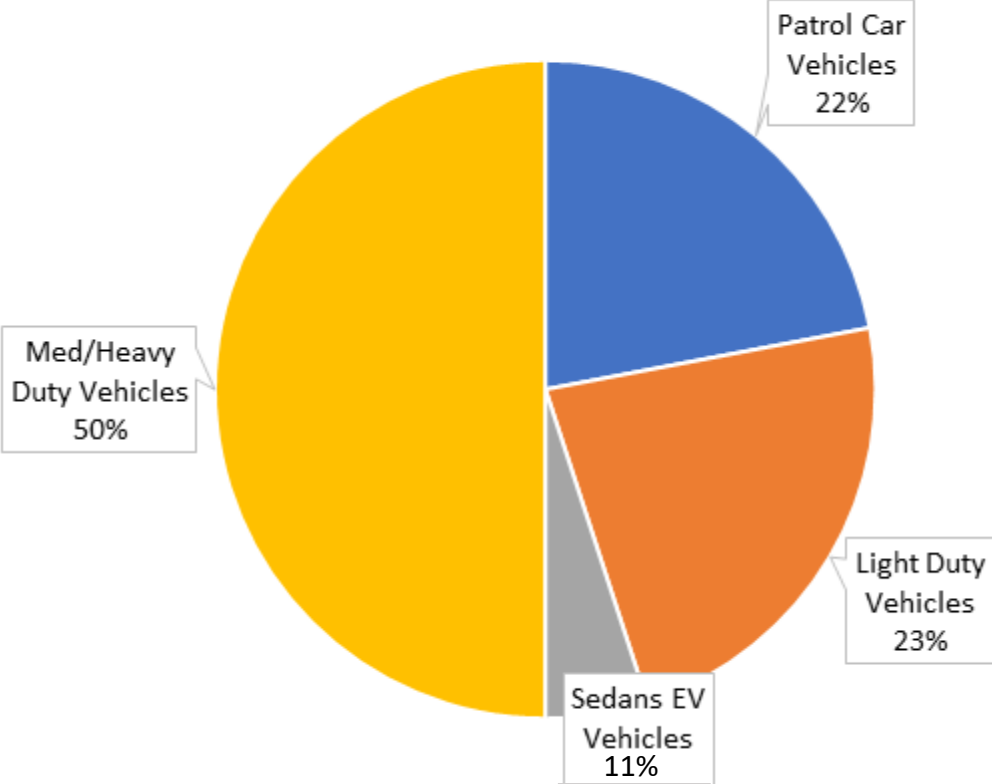


# Renewable Plan Strategies

City of Seattle-Green Fleet Action Plan



City Fleet Composition Overview



Based on 4,100 City Fleet Vehicles



**100%**  
**SYNTHETIC**

**25%**  
**PLANT-BASED**

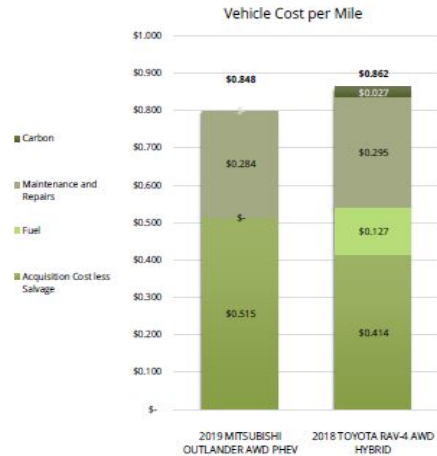


## Renewable Plan Strategies cont'd

- Fuels (Biodiesel, Renewable Diesel R80 Blend, Renewable Propane, Electricity)
- Lubricants (Bio based Oils, Hydraulic Fluids etc.)
- Tires (Soy Tires)



# City's Cost to Use Renewable Fuels



	OUTLANDER AWD PHEV (Baseline)	AWD HYBRID (Comparison)
Number of Vehicles Procured	1	1
Years of Use/Ownership	10	10
Miles Procured	55,000	55,000
Acquisition Cost \$	(33,295)	(28,439)
Fuel \$	-	(6,971)
Electricity \$	(2,675)	-
Maintenance and Repairs \$	(15,645)	(16,226)
Carbon \$	-	(1,458)
<b>Vehicle Total Cost \$</b>	<b>(51,615)</b>	<b>(53,093)</b>
Charging Infrastructure \$	-	-
Estimated Salvage \$	4,994	5,688
<b>Total Cost of Ownership \$</b>	<b>(46,621)</b>	<b>(47,406)</b>
Total Cost / Mile \$	(0.848)	(0.862)

The greenest option (baseline) vehicle is 2% less expensive than the alternative (comparison) vehicle

Battery Electric Vehicles (BEV)

Plug-In Hybrid Electric Vehicle (PHEV)

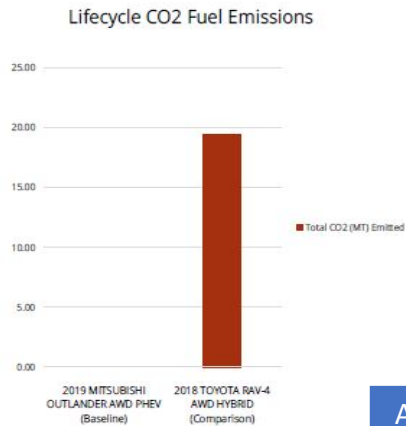
Hybrid Electric Vehicle (HEV)

Fossil Fuel Free (F3) Liquid Fuel (Renewable/Bio Diesel/Gas) Vehicles

Electric Retrofits

50% GHG Reduction by 2025

## Societal Benefit Summary



2019 MITSUBISHI OUTLANDER AWD PHEV (Baseline)	VS	2018 TOYOTA RAV-4 AWD HYBRID (Comparison)
0 gallons		1,719 gallons

The greenest option (baseline) vehicle uses 1,719 fewer gallons of gasoline than the alternative option (comparison) vehicle

Acquisition + Life Maintenance + Life Fuel + Cost of Carbon (\$75 per MTCO2e) – Salvage Cost =

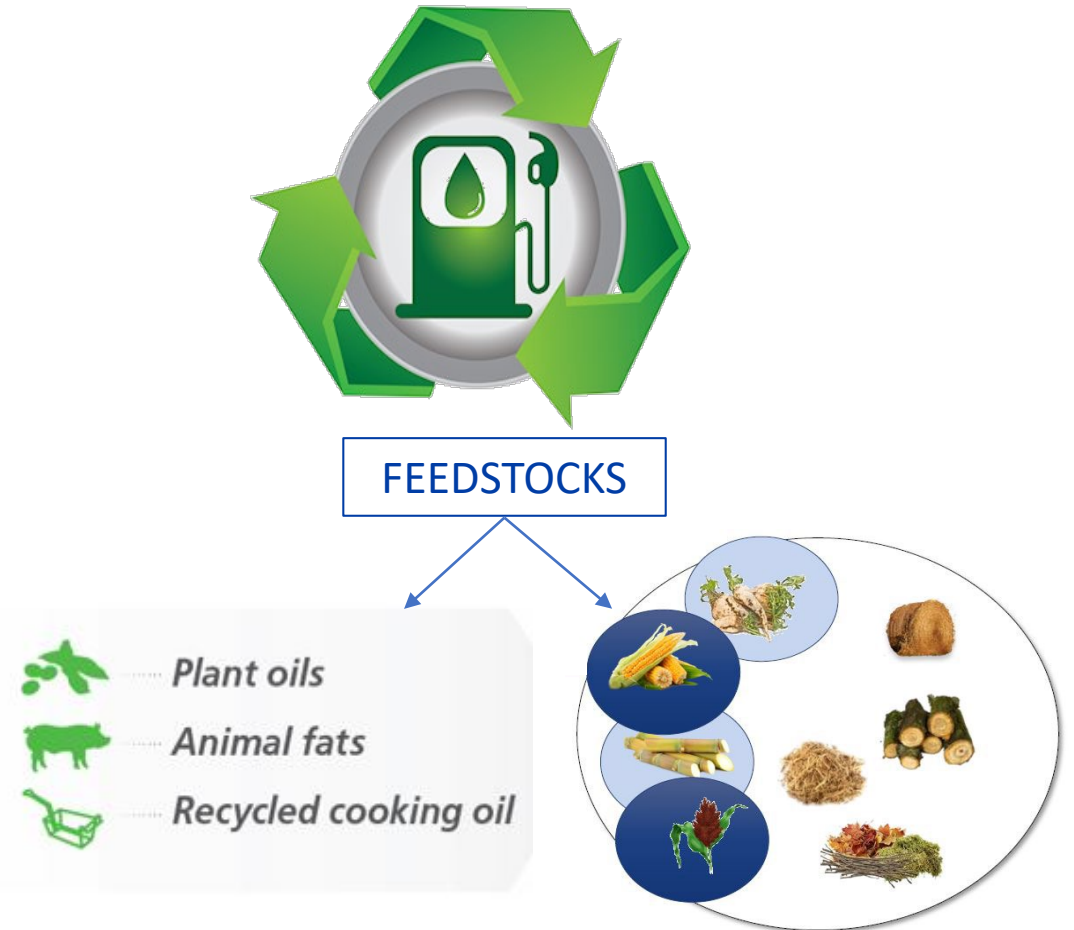
# Fueling the City with Renewables

If all electrification options are exhausted, FAS will purchase fossil-fuel-free (F3) liquid fuels that are renewable hydrocarbon biofuels (also called "green" hydrocarbons, biohydrocarbons, drop-in biofuels and sustainable or advanced hydrocarbon biofuels) when a sustainable supply of a preferred fuel is available and recognized by California Air Resource Board (CARB).

## Renewable Fuels

- Renewable Diesel ([City Contract-Christensen INC #4900](#))
  - Currently Using R90 Fleetwide
- Renewable Gasoline ([City Contract-Scooter J Logistics LLC #4946](#))
  - Currently Using (availability)
- Renewable Propane ([WA State Contract #02318](#))
  - Currently Using
- Hydrogen
  - Feasibility Study
- Telematics ([Sourcewell Contract #022217](#))
  - Currently Using

Note: In accordance with EO 2018-02, any construction of new fossil fuel infrastructure for the City's fleet is prohibited.



(No Palm Oil or Any Derivatives)

# Fueling the City with Renewable Fuel

## cont'd

- Types of renewable hydrocarbon biofuels that will be purchased and used in City fleets include:
  - Renewable diesel (R99) – Also called "green" diesel, renewable diesel is a biomass-derived transportation fuel suitable for use in diesel engines. It meets the ASTM D975 specification in the United States.
  - Biodiesel (B99) – Biodiesel is a renewable, biodegradable fuel manufactured domestically from vegetable oils, animal fats or recycled restaurant grease. It meets the ASTM D6751 specification in the United States.
    - All renewable fuels will be considered when available but currently are not factored into the reduction goal (**Renewable Gasoline, Renewable Propane and Hydrogen**).
- City's Actions:
  - 1) Purchase R99 or R99 blended with 20 percent used cooking oil biodiesel (B99) by 2019 (requires product transfer document-PTD) with certified pathways verification and no palm oils.
  - 2) Continue to purchase used cooking oil B99.
  - 3) Conduct a request for proposals for F3 starting in 2019 (**Complete**).



No LCFS



# Questions





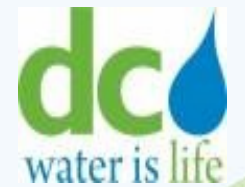
Tim Fitzgerald  
[timothy.fitzgerald@dcwater.com](mailto:timothy.fitzgerald@dcwater.com)  
202-264-3805

- Director, Fleet Management for the DC Water and Sewer Authority
- Oversees procurement, maintenance and repair for 575 vehicles and more than 1,300 pieces of equipment
- Experience in management, IT and fleet services
- Previous position as President of Future LLC involved in QUAD strategic modeling for Facilities, Fleet/Utilities, Transportation and Construction for commercial and government

A stylized landscape illustration featuring rolling green hills, a blue sky with wavy bands, a red bird, a green tree, and purple and orange flowers.

# BIO Strategies

*The Smart Use of Bio Technologies  
In Fleet*



# *A Commitment to Excellence*

- The Bio Current Product Line*
- The Bio Product Usage*
- The Environmental Advantage*







*It's all about  
them!*

*What legacy are we leaving?*

# The Current Product Line



9609 Jackson Street • Mentor, Ohio 44060 • (440) 639-8633 • (440) 639-4414 FAX

## EnviroLogic® 440 Biodegradable Two Cycle Engine Oil

### Description

EnviroLogic® 440 is a biodegradable and non-toxic two cycle engine oil for use in air-cooled engines requiring ISO L-EGD and licensed JASO FD performance. The product addresses the concern for biodegradability of oils incidentally released to the air, land, or water. This product conforms to all current legislation regarding air, land, and water pollution.

EnviroLogic® 440 demonstrates excellent low temperature viscometric properties for applications such as logging and construction. EnviroLogic® 440 contains a unique biodegradable, non-toxic base fluid technology suitable for two stroke engine uses such as chain saws, weed trimmers, and lawnmowers.

EnviroLogic® 440 can be used in all two cycle engines that are air cooled. The unique base fluid technology used in the product allows for a wide range of two cycle engine applications. EnviroLogic® 440 is designed to be used at fuel to oil dilution of 50:1 to 100:1. For most applications, the original equipment manufacturer's recommendation should be followed. This product contains a fuel stabilizer.

### Typical Properties

JASO M345 Registration #		001-TTL-002
Flash Point, °F	ASTM D-92	> 270
Specific Gravity, 60°F	ASTM D-4052	0.85
Viscosity @ 100°C, cSt	ASTM D-445	6.5 min.
Pour Point, °F	ASTM D97	< -27
Biodegradability	ASTM D5864, % in 28 days	> 50

## SoyGrease™ EP Premium Biodegradable Extreme Pressure Grease

<b>DESCRIPTION</b>	ELM SoyGrease™ EP Premium grease is a premium quality biodegradable, water resistant, Biotechbased™ grease formulated with OptiBase™ Oils, lithium-based thickener and extreme pressure additives for maximum performance. It meets NLGI's GC-LB specifications for fretting wear protection, oxidation & thermal stability, resistance for wear, rust & corrosion and compatibility with commonly used elastomers.		
<b>APPLICATIONS</b>	<ul style="list-style-type: none"> <li>■ Suitable for Automotive, Chassis, Wheel Bearings &amp; Fifth Wheel</li> <li>■ Recommended for fleet, farm, household and industrial applications</li> <li>■ Ideal for heavy load applications</li> <li>■ Designed for extreme pressure applications</li> <li>■ Recommended for environmentally sensitive areas near waterways</li> </ul>		
<b>BENEFITS</b>	<ul style="list-style-type: none"> <li>■ Extreme pressure additives minimize friction and wear</li> <li>■ High film strength of vegetable oil provides superior lubricity</li> <li>■ Excellent oxidative and high-temperature stability</li> <li>■ Higher flash point than petroleum greases for increased safety</li> <li>■ Meets EPA's Environmental Preferable Purchasing (EPP) criteria</li> <li>■ Meets USDA's proposed Biobased product definition for EO 13101</li> <li>■ Manufactured from renewable USA-grown crop base oils</li> <li>■ Complies with State of Iowa SF 2249 – Purchasing Preference for Biobased Lubricants</li> </ul>		
<b>TYPICAL PROPERTIES</b>	NLGI Grade	2	3
	Appearance	Red	Red
	Cone Penetration, Worked 60 Strokes	260-290	220-250
	Four Ball Wear Scar (mm)	0.47	0.47
	Four Ball Weld Load (kg)	500	500
	Water Resistance @80°C (% Loss)	11.6%	11.6%
	Base Oil Viscosity at 40°C (cSt)	86	86
	Base Oil Viscosity at 100°C (cSt)	16	16
	Base Oil Flash Point, °C (°F)	326 (619)	326 (619)
	Base Oil Biodegradability	Pass	Pass
	Base Oil Aquatic Toxicity	Non-toxic	Non-toxic
<b>PACKAGING</b>	120 lb Kegs 400 lb Drums 35 lb Pails 14 Ounce Cartridges		

# The Product Line Cont'd



**Renewable Lubricants, Inc.**  
476 Griggy Rd., P.O. Box 474  
Hartsville, Ohio 44632-0474  
Voice: 330.877.9982 Fax 330.877.2266  
Web: www.renewablelube.com

## **Bio-Soy Orange™ All-Purpose Degreaser/Cleaner** STABILIZED™ Renewable Lubricants

### *"Biobased Lubricants that Perform Like Synthetics"*

An excellent biobased, biodegradable degreaser/cleaner that is a safe improvement over petroleum solvents. Bio-Soy Orange™ is a highly concentrated industrial degreaser that removes and cleans surfaces of stubborn stains, greases, and oily grimy dirt fast. Nothing cleans better than Bio-Soy Orange™. A super all-purpose product for degreasing and cleaning warehouses and shop walls, oily floors, parts, tools, engines, and equipment. Unbelievable cleaning ability on RV camper and motor-home black streaks. Excellent for cleaning road grime and tar from tires and vehicles. This non-foaming product is great for cleaning and lifting cooked on grease and fats off of stoves and grills. Also excellent for cleaning boats, decks, and around marine areas. EPA, OSHA, and Workers Acceptance is high with Biobased Products.

This fresh citrus scented nonflammable biobased product is specially formulated with soy and orange solvents to provide an environmentally safe improvement in removing:

Dirt	Oil	Asphalt	Tree Sap
Grease	Tar	Glue	Tiremarks
Scum	Wax	Mildew	Scuffmarks

**Applications:** –Military –Industrial –Transportation –Marine –Agricultural –Home Use  
wood, vinyl, steel, and aluminum siding, tires, wheels, grills, decks, walls, floors, tile and grout, bathroom sinks, tubs, toilets, counter tops, cabinets, hood and exhaust vents, showers, fireplaces, etc.

**Directions:** Apply to area to be cleaned using a paper towel, rag or cloth and rinse with water. For tough cleaning jobs, apply concentrated Bio-Soy Orange™ directly on surface to be cleaned, scrub with a brush or rub with a cloth. If a clean dry surface is required, wipe clean with a wet cloth and then wipe with a dry cloth. Spot test before applying to surfaces. Test on inconspicuous area for discoloration and surface compatibility before using on plastics, fabrics, and painted surfaces. Never allow concentrated Bio-Soy Orange™ to stay on surfaces longer than necessary to clean. Rinse or wipe immediately with water. For large jobs a pressure washer or garden hose may be used for rinsing. For all purpose general cleaning, product may be diluted 1 part Bio-Soy Orange™ to 10 parts water. For light cleaning, product may be diluted 1 part Bio-Soy Orange™ to 30 parts water.

## Product Data

Revised 9/25/2012

### ICKEE STICKEE UNSTUCK®

Adhesive Remover

*Gets It ALL Off!*

#### Product Description

Remove spray adhesives, vinyl adhesives, and tape adhesive residues from any hard surface quickly and easily. Ickee Stickee Unstuck is 100% Biodegradable, will not contribute to global warming, and is safe to use anywhere! Its easy application and disposal, fast working time, and low cost make it a very attractive substitute for traditional petro-based chemicals that are hazardous to people and the environment.

#### Applications

Spray Ickee Stickee Unstuck® on the surface. Let sit for 1-2 minutes. Heavy build-ups may require longer times or more Ickee Stickee Unstuck®. Wipe clean with a damp cloth or Franmar's d-Grease™.

Caution: Ickee Stickee Unstuck® may begin to remove paint from painted surfaces.

*Newly formulated to meet California and OTC Standards*

#### Properties

- Flash Point: 149°F
- pH Level: 5.4 pH of 1/10 wt/wt solution in soft water.
- VOC: <20%, 183.36 g/L, 1.53 lbs/gal.
- Vapor Pressure: N/A
- Odor: Citrus Odor
- Conditions to avoid: Extreme Heat
- Health Hazards: None known
- Packaged: Quart, Gallon, Five Gallon, 55 Gal. Drum



#### Common Uses

- Remove residue from tapes and other adhesives

**Precautions:** Dispose of waste according to local regulations. Remember to properly dispose of rags containing solvent to prevent the possibility of combustion. Used rags should always be stored in UL listed (or equivalent approved) covered containers. Keep out of reach of children. Avoid eye contact. Gloves are recommended for sensitive skin.



**FRANMAR**  
Chemical®



# The Product Line Cont'd



## Renewable Lubricants, Inc.

476 Griggy Rd., P.O. Box 474  
Hartville, Ohio 44632-0474  
Voice: 330.877.9982 Fax: 330.877.2266  
Web: www.renewablelube.com

### Bio-Parts Cleaner/Degreaser™ (Soy Based)



*"Biobased Lubricants that Perform Like Synthetics"*

A specially formulated, ultimately biodegradable Soy Cleaner/Degreaser that is a safe improvement over petroleum solvents for cleaning parts and equipment. This safe, nonflammable biobased product contains no hazardous Volatile Organic Compounds (VOCs), and has been formulated with anti-oxidants for improved stability. It provides a direct replacement for mineral spirits and stoddard solvents (excellent electrical insulating value @ 47KV). This all-purpose product removes oily grimy dirt on used parts for maintenance and repairs and is excellent for cleaning engines, transmissions, differentials, electric motors, and machinery parts before rebuilding. Exceptional for cleaning road grime, pine sap, and tar on vehicles. EPA, OSHA, Workers Acceptance is high with Biobased Products.

Applications for: -Military -Industrial -Transportation -Marine -Agricultural -Mining  
Non-flammable cleaning of: Jacks, Bearings, Bolts, Linkage Cables, Dies,  
Wire Ropes, Chains, Tracks, Slides, Shafts, Assembly Parts, Hand Tools,  
Firearms, Air Tools, Machine Tools, etc.

#### TYPICAL TEST DATA:

ASTM D-445 3.9 cSt @ 40°C	ASTM D-2500 Cloud Point -5.5°C
ASTM D-92 Flash Point 149 °C	ASTM D-97 Pour Point -12°C
Pound Per Gallon 7.16	ASTM D-130 Copper Corrosion 1a
ASTM D-877 Dielectric Strength >40KV	ASTM D-1160 Distillation Temp 355°C
Emulsification with Water- None	

### Bio-Cleaner/Degreaser (plus Corrosion Protection) (Soy Based)

*This product is the same as above (Bio-Parts Cleaner Degreaser) with a corrosion inhibitor.*

A specially formulated, ultimately biodegradable Soy Cleaner/Degreaser that can be used to replace petroleum solvents for cleaning parts and equipment. This safe, nonflammable product contains no hazardous Volatile Organic Compounds (VOCs), and has been formulated with anti-oxidants and corrosion inhibitors for improved stability. Excellent cleaning of assembly parts and new unfinished metal to provide short term storage.

#### TYPICAL TEST DATA:

(Same as Bio-Parts Cleaner Degreaser Data)

STABILIZED by Renewable Lubricants™ is RLI's trademark on their proprietary and patented anti-oxidant, anti-wear, and cold flow technology. High Oleic Base Stock (HOBS) are agricultural vegetable oils. This Stabilized technology allows the HOBS to perform as a high performance formula in high and low temperature applications, reducing oil thickening and deposits.

<sup>1</sup> Ultimate Biodegradation (Pw1) within 28 days in ASTM D-5864 Aerobic Aquatic Biodegradation of Lubricants

Proprietary Formula

\* Trademark of Renewable Lubricants, Inc.  
Copyright 2002 Renewable Lubricants, Inc.

Availability F.O.B. :Hartville, Ohio, USA 1 Gallon 5 Gallon Pails Drums Bulk  
Item # 86633 86634 86636

## SoyGrease™ EP Plus Biodegradable Extreme Pressure Grease

DESCRIPTION	ELM SoyGrease™ EP Plus grease is a premium quality biodegradable, Biotechbased™ grease formulated with OptiBase™ Oils, lithium-based thickener and extreme pressure additives for maximum performance.		
APPLICATIONS	<ul style="list-style-type: none"> <li>■ Recommended for fleet, farm, household and industrial applications</li> <li>■ Suitable as Fifth Wheel Grease</li> <li>■ Ideal for heavy load applications</li> <li>■ Engineered for off-highway equipment</li> <li>■ Designed for extreme pressure applications</li> <li>■ Recommended for environmentally sensitive areas near waterways</li> </ul>		
BENEFITS	<ul style="list-style-type: none"> <li>■ Extreme pressure additives minimize friction and wear</li> <li>■ Biodegradable formula is friendly to the environment</li> <li>■ High film strength of vegetable oil provides superior lubricity</li> <li>■ Excellent oxidative and high-temperature stability</li> <li>■ Higher flash point than petroleum greases for increased safety</li> <li>■ Meets EPA's Environmental Preferable Purchasing (EPP) criteria</li> <li>■ Meets USDA's proposed Biobased product definition for EO 13101</li> <li>■ Manufactured from renewable USA-grown crop base oils</li> <li>■ Complies with State of Iowa SF 2249 – Purchasing Preference for Biobased Lubricants</li> </ul>		
TYPICAL PROPERTIES	NLGI Grade	2	3
	Appearance	Red	Red
	Cone Penetration, Worked 60 Strokes	260-290	220-250
	Four Ball Wear Scar (mm)	0.50	0.50
	Four Ball Weld Load (kg)	600	600
	Base Oil Viscosity at 40°C (cSt)	86	86
	Base Oil Viscosity at 100°C (cSt)	16	16
	Base Oil Flash Point, °C (°F)	326 (619)	326 (619)
	Base Oil Biodegradability	Pass	Pass
	Base Oil Aquatic Toxicity	Non-toxic	Non-toxic
PACKAGING	400 lb Drums 35 lb Pails 14 Ounce Cartridges		



# ICKEE STICKEE



# Bio Parts Cleaner/Degreaser

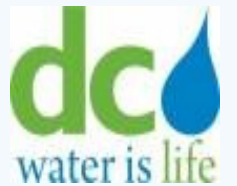




# Envirologic 440

EnviroLogic is a line of readily biodegradable\*, high performance lubricants. These products are formulated and proven to replace petroleum based hydraulic fluids and gear oils, while providing enhanced wear protection and, ultimately, longer equipment life.

Envirologic 440 is a non-toxic two cycle engine oil for use in air cooled engines.



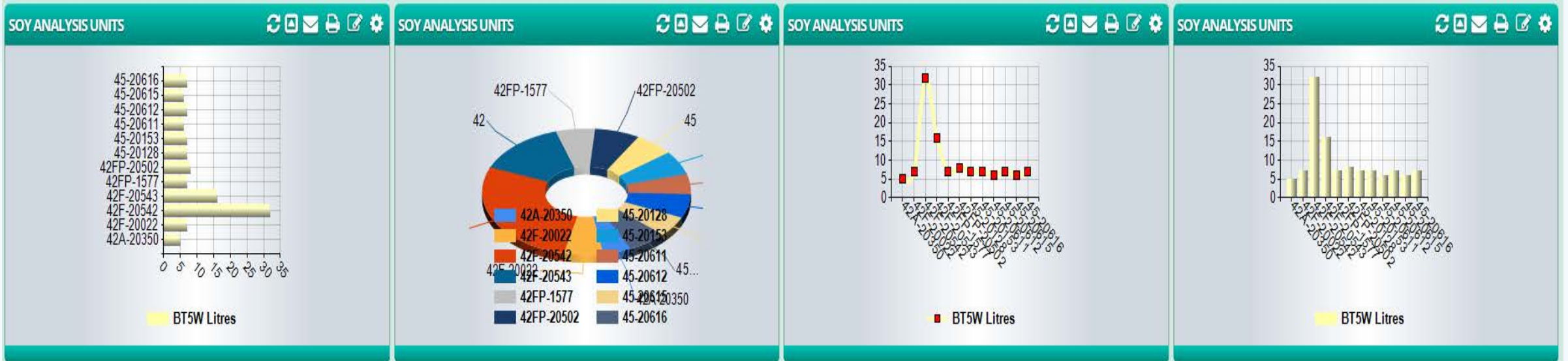


# Bio-Diesel Utilization





# Unit Visibility and Utilization



SOY ANALYSIS UNITS							
	UNIT #	MAKE	MODEL	TYPE	SUB-TYPE1	SOYDATE	
	42A-20350	FORD	FUSION	CAR	SEDAN	12/26/2017	
	42F-20022	CHEVROLET	SILVERADO	TRUCK	PICKUP	12/26/2017	
	42F-20542	FORD	F250	TRUCK	UTILITY LIGHT	5/31/2016	
	42F-20543	FORD	F350	TRUCK	UTILITY LIGHT	6/1/2016	
	42FP-1577	FORD	E350XL	VAN	15 PASSENGER	12/27/2017	
	42FP-20502	FORD	E350XL	VAN	15 PASSENGER	12/26/2017	
	45-20128	CHEVROLET	TRAILBLAZER	SUV	4 DOOR	1/2/2018	
	45-20153	CHEVROLET	EQUINOX	SUV	4 DOOR	12/26/2017	
	45-20611	FORD	F150	TRUCK	PICKUP	12/27/2017	
	45-20612	FORD	F150	TRUCK	PICKUP	12/26/2017	
	45-20615	FORD	F150	TRUCK	PICKUP	12/27/2017	
	45-20616	FORD	F150	TRUCK	PICKUP	12/26/2017	

# The Latest Product Introduction

## BIOSYNTHETIC Technologies





# Motor Oil Certification and Licensing

## Performance and Sustainability

- Top-tier, industry leading Biosynthetic formulations that exceed the most demanding OEM engine specifications and Industry performance and environmental regulatory standards.
- Blending, packaging and distribution available via global contract manufacturing partnerships.
- Biosynthetic PCMO's demonstrate excellent ability to reduce sludge and varnish, resulting in improved fuel economy and longer lasting engines.

**BIO SYNTHETIC™  
BASE OIL**

E F

**3%** CAN YOUR BASE OIL DO THAT?™  
FUEL ECONOMY GAIN\*

THE CLEANEST ENGINE POSSIBLE AND A CLEANER ENVIRONMENT  
\*Based on the Mercedes-Benz Mill fuel economy test using an ILSAC GF-5 certified SAE 5W-30 formulation with 35% Biosynthetic Base Oil.

ENVIRONMENTAL BENEFITS:

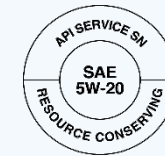
Biosynthetic TECHNOLOGIES biosynthetic.com

INDUSTRY:

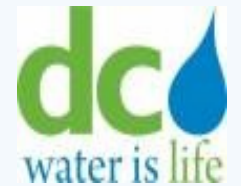
## API License Available for Private Label



AMERICAN PETROLEUM INSTITUTE

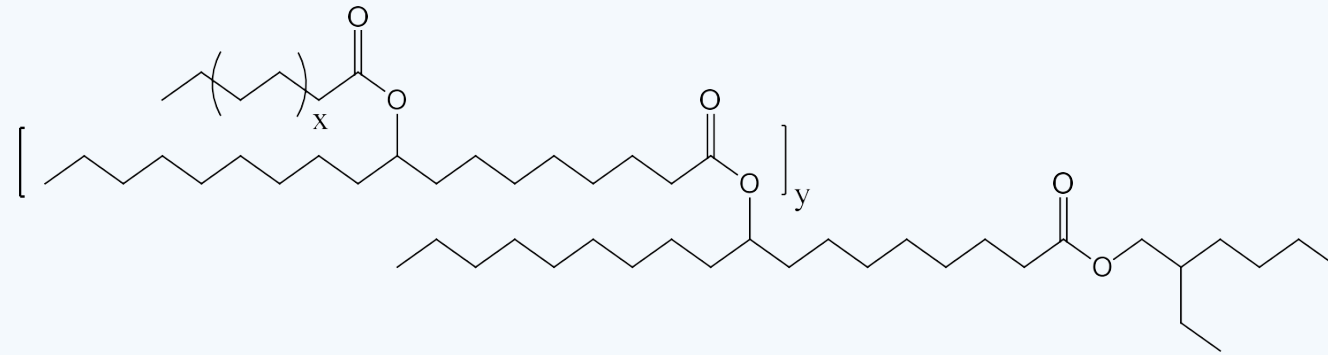


- ✓ Biosynthetic Passenger Car Motor Oil ("PCMO") 5W-20 and 5W-30 viscosity grades are ILSAC GF-5 Resource Conserving and API SN. License to private label is available via API Oil Licensing Program



# Introduction

## Estolide Structure



Estolides are a type of synthetic oil derived from fatty acids. They're also referred to as a "biosynthetic." Estolides are known for their high performance as a lubricant base oil. They are ideal for high environmentally acceptable lubricant (EAL) applications.



# Introduction

## Estolide Benefits

Lubricant Performance	
Oxidative Stability	✓ Increased oil longevity
Low Volatility	✓ Low evaporation rates ✓ Safer in high temperature applications
High Viscosity Index	✓ Minimizes change in viscosity with change in temp ✓ Less viscosity modifier additives required
Excellent Hydrolytic Stability	✓ Increased oil longevity ✓ Good for apps where risk of water contamination is high
Natural Detergency	✓ Keeps equipment looking clean

Environmental Performance	
Biodegradability	✓ Rapidly breaks down once released into the environment
Bioaccumulation	✓ Does not accumulate in the tissues of living organisms
Toxicity	✓ Non-toxic by recognized OECD testing standards
Bio-content	✓ Made from renewable carbon

# SoyBean Tires

**GOODYEAR**  
MORE DRIVEN



## SUSTAINABLE TECHNOLOGIES

### INNOVATION BEYOND THE BUSHEL

Goodyear is committed to delivering innovative products that help change the world of transport and drive a sustainable future for the automotive industry.



**ASSURANCE  
WEATHERREADY®**  
Grand Touring All-Season



**ASSURANCE  
COMFORTDRIVE™**  
Grand Touring All-Season



**EAGLE  
EXHILARATE®**  
Ultra-High Performance All-Season



**EAGLE® ENFORCER  
ALL WEATHER®**  
Pursuit-Rated All-Weather



# SoyBean Benefits

## WHERE THE RUBBER MEETS THE ROW

### COLLABORATION



Build preference for U.S. soybean oil in the food and industrial markets differentiating U.S. Soybean oil through promotion, as well as research

Over 500,000 Farmers - 88M Acres Planted Annually - Only 65% Used in Food Applications - 2<sup>nd</sup> Largest Cash Crop



Goodyear is committed to responsibly sourcing more sustainable materials that deliver best-in-class quality and performance

40M Tires Sold in US/Canada (2019) - 8% Of a Typical Tire Weight is Oil

**STRATEGY** Create and enhance collaborations that increase product performance, value and preference

### BENEFITS

Potentially reduces overall usage of petroleum oil  
Increases manufacturing efficiencies  
Reduces energy consumption and introduces a renewable resource



Soybean oil could improve tire flexibility at low temperatures, helping the rubber to remain pliable in cold weather and enhancing traction in rain and snow simultaneously

### PRODUCTS

#### ASSURANCE WEATHERREADY<sup>®</sup>

OUR BEST ALL-WEATHER TRACTION FOR "MOTHER NATURE'S WORST"

Tread compound contains 100% soybean oil, resulting in a ~60% reduction in petroleum-based compared to its predecessor

Technology featured in polymer and compound enabled 3PMSF symbol without diminishing wet performance

#### ASSURANCE COMFORTDRIVE<sup>™</sup>

OUR SMOOTHEST RIDING TIRE WITH REFINED HANDLING

Tread compound contains 100% soybean oil, resulting in a ~62% reduction in petroleum-based compared to its predecessor

Technology featured in polymer and compound supported the achievement of elevated wet performance without significantly trading off snow performance

#### EAGLE EXHILARATE<sup>®</sup>

OUR OUTSIDE DETAIL-HIGH PERFORMANCE ALL-SEASON TIRE

Soybean oil in tread compound results in a ~42% reduction in petroleum-based compared to its predecessor

Tread compound additive assisted with achieving winter performance targets without sacrificing wet and dry traction

#### EAGLE<sup>®</sup> ENFORCER ALL WEATHER<sup>®</sup>

THE FIRST-EVER PUNISH-TESTED ALL-WEATHER TIRE

Soybean oil in tread compound results in a ~45% reduction in petroleum-based compared to its predecessor

Technology featured in compound permitted 3PMSF symbol without sacrificing handling and wet performance

**ACCOLADES** 2018 Tire Technology International Awards: Environmental Achievement of the Year

### TARGETS



Increase soybean oil consumption by 25% by 2020 and fully replace petroleum-driven oils by 2040



For more information please scan QR code



Questions?





**SUSTAINABLE  
FLEET  
TECHNOLOGY**

**VIRTUAL CONFERENCE 2020**

**Session #11: Renewable Fuels, Lubricants &  
Other Biobased Products**

**October 21, 2020**