

Virtual B100 Biodiesel Technology Showcase

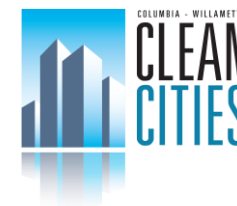
October 21, 2021

Ira H. Dorfman
Executive Director



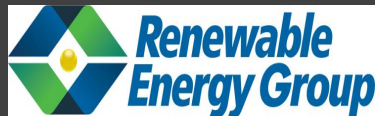
Thanks to Our Program Participants and Showcase Supporters

October 21, 2021



Virtual B100 Biodiesel Technology Showcase Agenda

October 21, 2021



AGENDA

- 1:00 EDT Welcome/Introductions
- 1:10 Benefits of B100 Implementation
Jon Scharingson, Executive Director, Sales & Marketing - REG
- 1:25 B100 Technology Overview
Colin Huwyler, Chief Executive Officer – Optimus Technologies
- 1:40 DC Water's B100 Commitment
Tim Fitzgerald, Director, Fleet Management – DC Water
- 1:55 Funding B100 Projects through Federal Grants
Jill Hamilton, National Biodiesel Foundation
- 2:10 B100 Snow Plow Deployment during a Polar Vortex
Rich Iverson, Fleet Manager – City of Ames, Iowa
- 2:20 Questions for Panelists (through Chat Box)
- 2:30 Wrap Up

The Successful Deployment and Growth of B100 in the DC Department of Public Works Fleet

October 21, 2021



District of Columbia DPW B100 Milestones

- Deployed **6** B100 garbage packers in 2019
- **17** more added and are operational
- This fall – **37** six-wheel B100 dump trucks
- Early 2022 – delivery of **16** fourteen-yard garbage packers
- Additional **21** sixteen-yard garbage packers scheduled for order and delivery = **97 total**
- Despite pandemic, consumed 125,000 gallons of biodiesel in 2020 – resulting in *reduction of 920 tons of greenhouse gas emissions* (EPA Quantifier)



Thanks for Participating!

Please type your questions into the chat box. We will answer as many of them as we can at the end of the presentations.

Ira H. Dorfman

Executive Director

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October 21, 2021

Right Place, Right Time

Accelerating the Transition to Clean Energy

Jon Scharingson, Exec. Director Strategic Initiatives



A Leader with International Reach

11 Bio-Based Diesel Plants

651⁽¹⁾ Million Gallons Sold in 2020

REG 2020 Sales were made in:

41 US States

7 Canadian Provinces

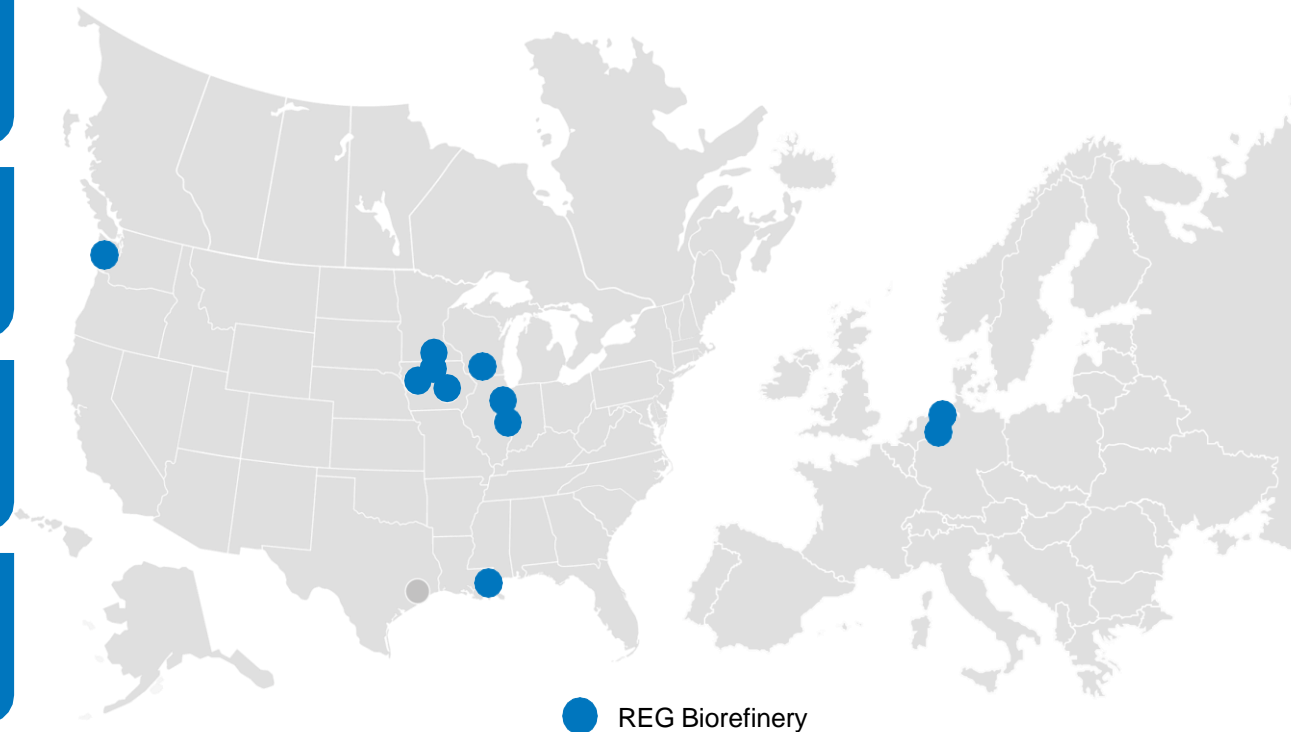
14 Countries

Global reach with diversified end-market exposure

Integrated model with optimized feedstock and distribution networks

Flexibility and sales optimization to incentivized markets

Proven access to diversified feedstocks

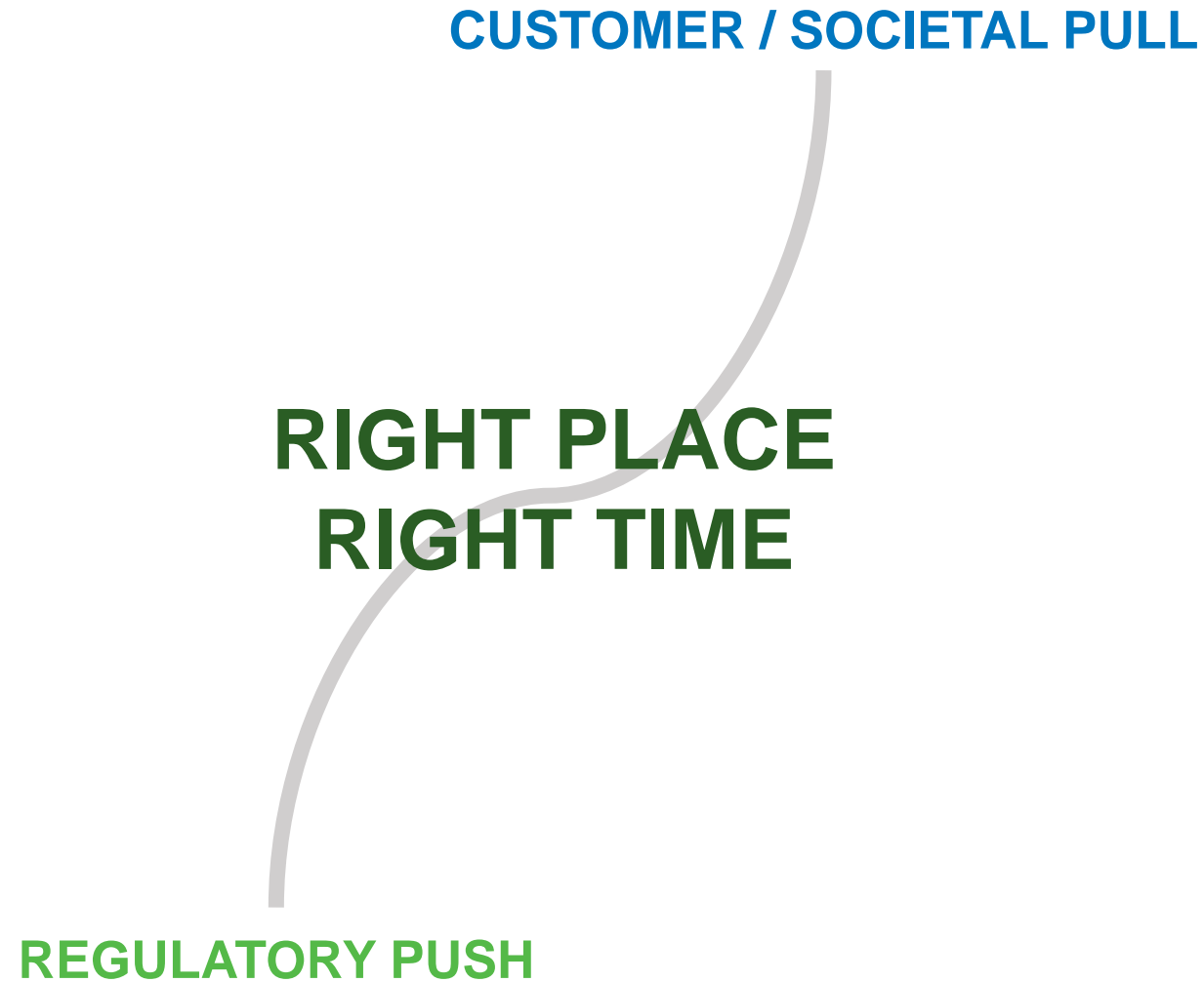


Source: Company

(1) Includes self-produced and third-party bio-based diesel and petroleum-based diesel.



Energy Transition: An Inflection Point



Low Carbon Solutions Available at Scale Now

Providing Cleaner Fuel Solutions for Over Two Decades



**WASTE AND
BYPRODUCT FATS
AND OILS**

*Renewable Low Carbon
Feedstock*



**5.5X
ENERGY
RETURN RATIO¹**

*Proprietary Refining
Technology*



**95 - 100%
LOWER CARBON
EMISSIONS²**

*Biodiesel (BD) &
Renewable Diesel (RD)*



**DOWNSTREAM
DISTRIBUTION**

*Growing Distribution
Network*

Assessing The Impact Of GHG Emissions

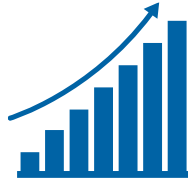
- Many environmental scientists consider 2030 to be a critical year for climate change mitigation
 - Experts often discuss 2030 as a deadline, but some organizations still treat it like a starting line
 - We don't typically apply a climate action deadline to the beneficial impacts of reducing GHG emissions sooner, but we should...



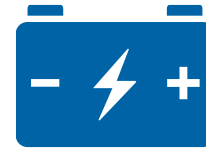
A Simple Step Today For A Better Tomorrow



Transportation is
a top contributor
to GHG emissions



Emissions
accumulate in the
atmosphere



Waiting for future
technology is
doing harm

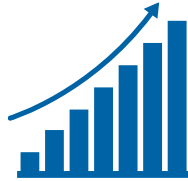


Bio-based diesel:
A simple step to
reduce GHG
emissions today

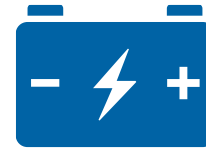
A Simple Step Today For A Better Tomorrow



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Bio-based diesel:
A simple step to
reduce GHG
emissions today

While we plan for the long-term, we must also ask: “What can we do now?”

Years of Successful Use of Higher BD Blends

- Many travel centers sell B20 to all customers
 - All major travel centers in Texas, Iowa, & Illinois from March – November
 - Large majority of travel centers in California and Oregon year 'round
- All diesel in Minnesota and most diesel in Iowa has been B20 for the last two years (April – September +)
- Higher blends (> B20) have been used by many on-road fleets
 - REG has supplied hundreds of PNW vehicles with B50/R50 for two years
 - REG has multiple fleet customers in the Midwest and Texas using B35 – B50 this year
- B100 being commercialized throughout the United States.
- Underground mining sector has used B50 – B100 in larger engines for years
 - 15 years of successful experience
- Indonesia is in their 2nd year of a B30 mandate (after 2 years of mandatory B20)
 - Considering a B40 mandate next

Lowest Cost Carbon Reduction Available Now

- 95-100% reduction in Scope 1 and 2 GHG emissions compared to fossil fuel carbon.
- Minimal investment needed to engine to allow B100 adoption.
- Most cases existing bulk fuel infrastructure can be utilized.
- Grant funding available at Federal and State level to support adoption and implementation.
- Biodiesel is readily available.
- Biodiesel is cost competitive with diesel economics.
- Carbon reduction starts today!



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OPTIMUS[®]
TECHNOLOGIES



Carbon Reduction Technology for Heavy-Duty Fleets

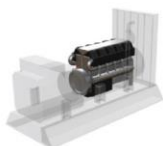
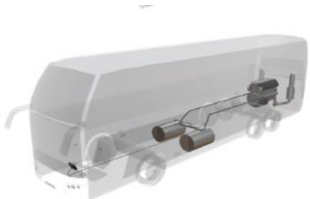
Virtual Biodiesel Technology Showcase

October 2021 || Colin Huwyler, CEO || c.huwyler@optimustec.com

OPTIMUS COMPANY OVERVIEW



- Technology company based in Pittsburgh, PA – founded in 2010. Manufacturer of advanced fuel system technology to enable any existing diesel engine to operate on 100% biodiesel. Focused on medium- and heavy-duty applications equipped with DPF and SCR systems.
- 100% biodiesel enables fleets to achieve near-zero carbon emissions due to the biogenic sources that biodiesel is derived from.
- Advanced fuel system technology is available as retrofit to upgrade existing engines or built into new vehicles via select ship-through channels. **Available at scale... Today!**



**Heavy-duty trucks consume
one-quarter of all the fuel we use**

25%



yet account for only 7% of vehicles on the road

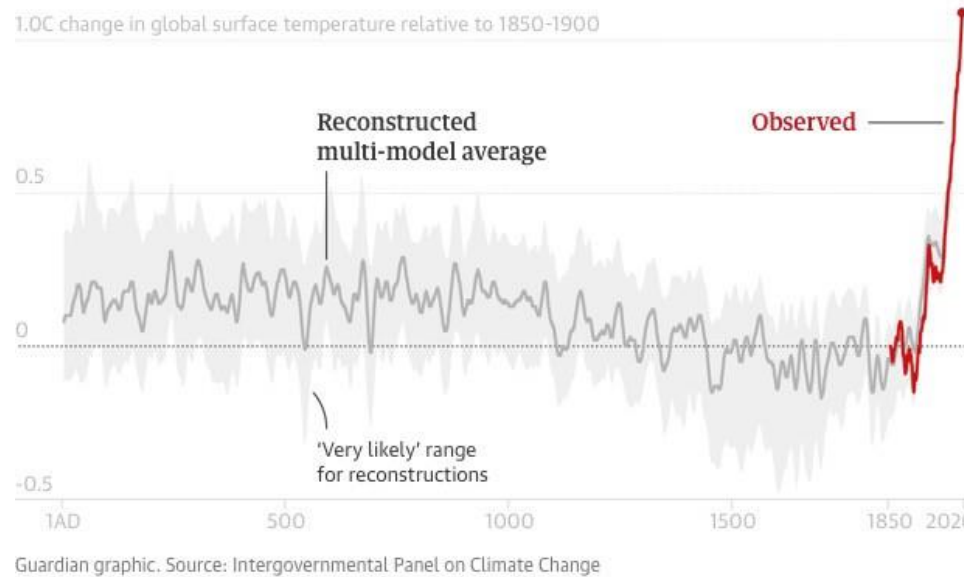
The diverse needs of heavy-duty fleets present challenges to electrification, hydrogen, or natural gas technology platforms.



- Biodiesel offers the **lowest cost, near-zero carbon** option applicable for **all fleet assets** both existing and new.

“Most recent IPCC Report warns temperatures likely to rise by more than 1.5C bringing widespread extreme weather”¹

Human influence has warmed the climate at a rate unprecedented in at least the past 2000 years



Carbon emissions are cumulative.

Reductions today are more impactful than larger reductions tomorrow (think net present value in economics)

¹ <https://www.theguardian.com/science/2013/aug/09/humans-have-caused-unprecedented-and-reversible-change-to-climate-scientists-warn>



Lowest Emissions

- Near-zero carbon emissions
- 50% less particulate matter

Renewable/Sustainable

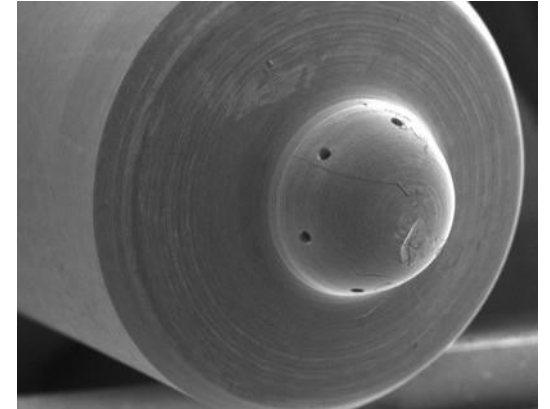
- Derived from renewable, industrial, and agricultural byproducts
- Solar energy (photosynthesis vs. photovoltaics)

Lowest Cost

- Competitive pricing to petroleum diesel
- Significantly lower cost than renewable diesel, electrification, hydrogen, etc.

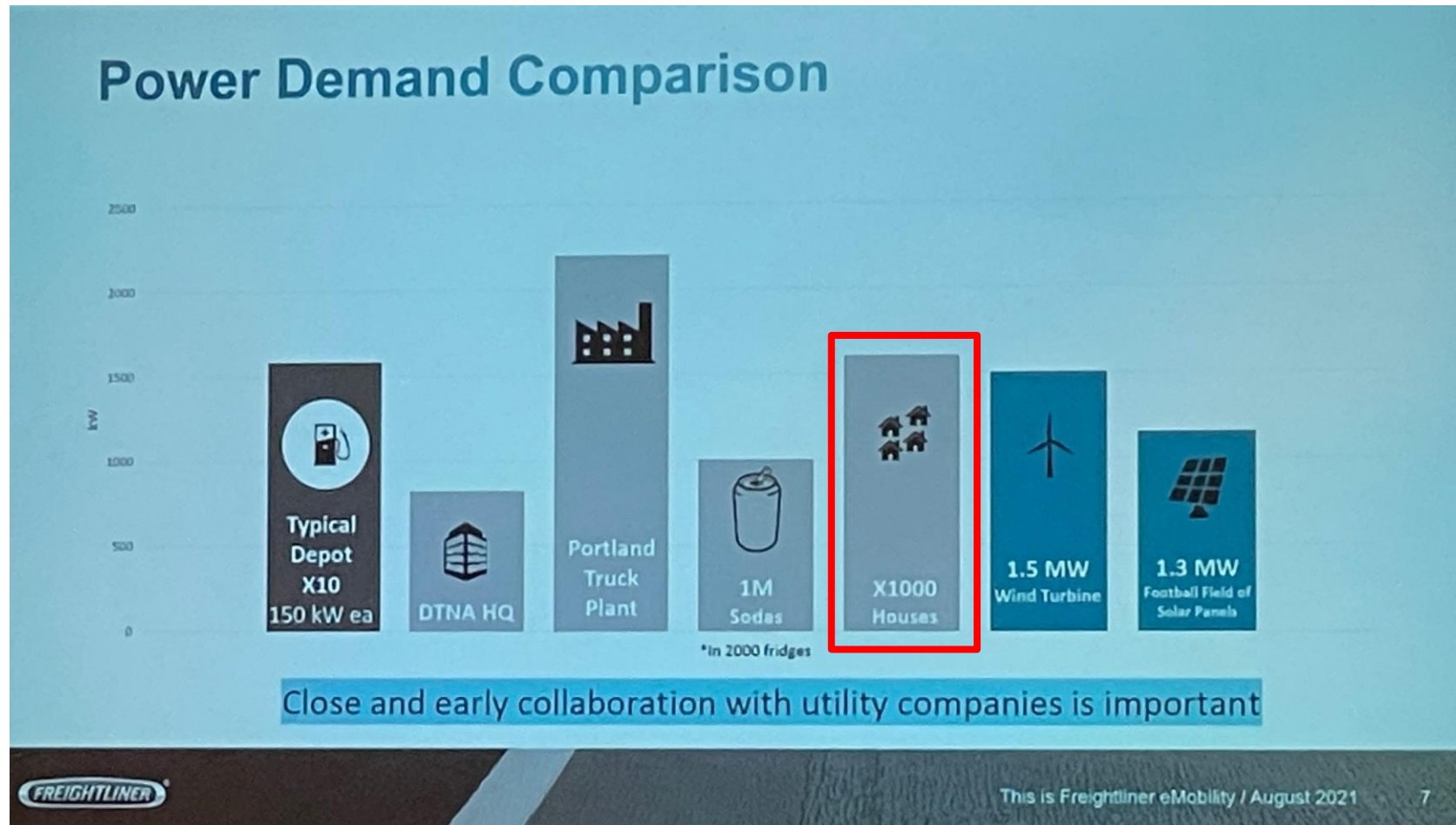
Safer & More Efficient

- Better lubricity, higher flashpoint, biodegradable, etc.



CARBON REDUCTIONS ARE NEEDED TODAY

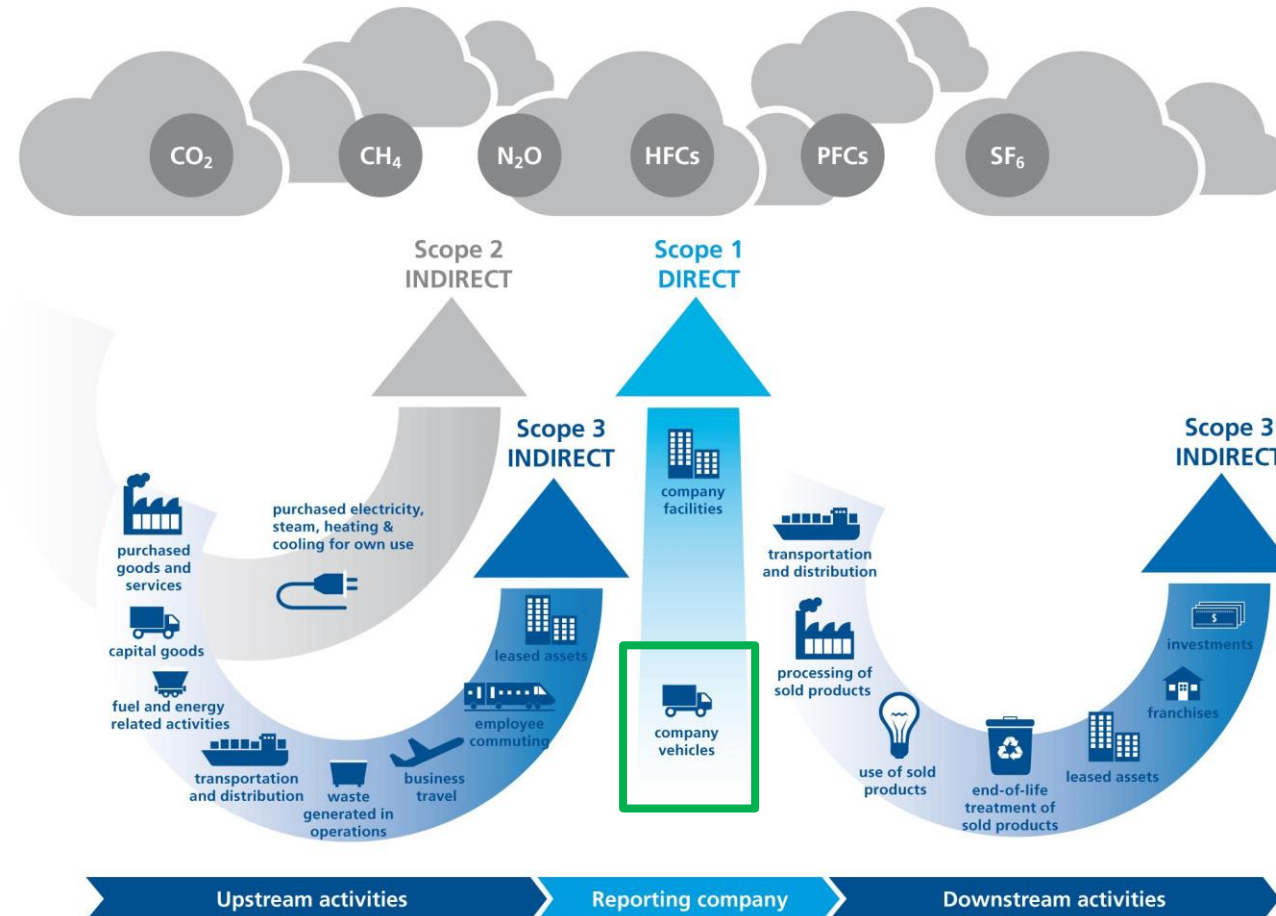
High cost of vehicles (~3x), limited range/payload, long equipment life and massive infrastructure challenges will limit broad scale adoption of heavy-duty EV's for the next 10-20 years



NEAR-ZERO CARBON

95%+ reduction in Scope 1 carbon emissions

Overview of GHG Protocol scopes and emissions across the value chain

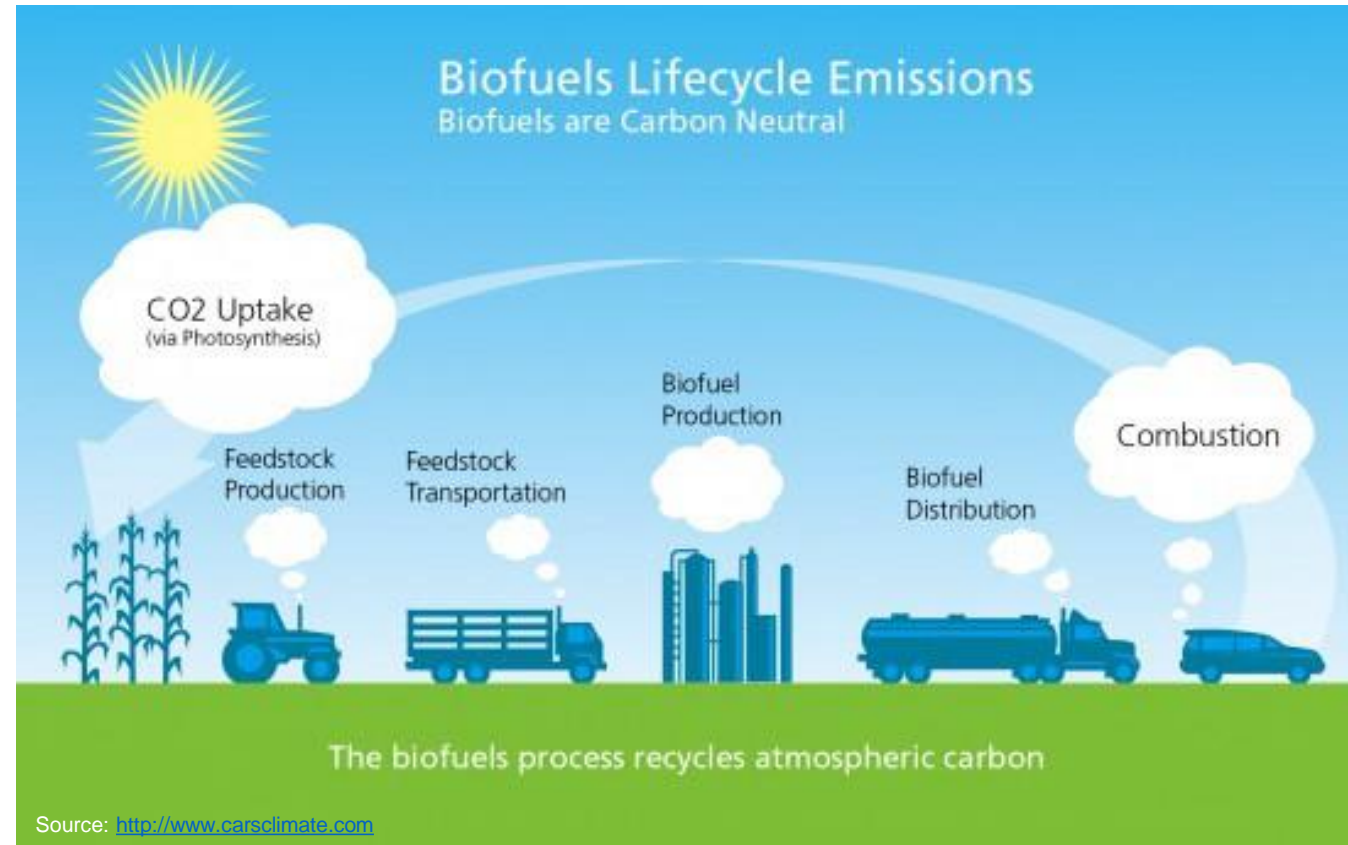


Source: myclimate.org - World Resources Institute & World Business Council for Sustainable Development, 2011.



NEAR-ZERO CARBON

Solar derived energy using recycled atmospheric carbon

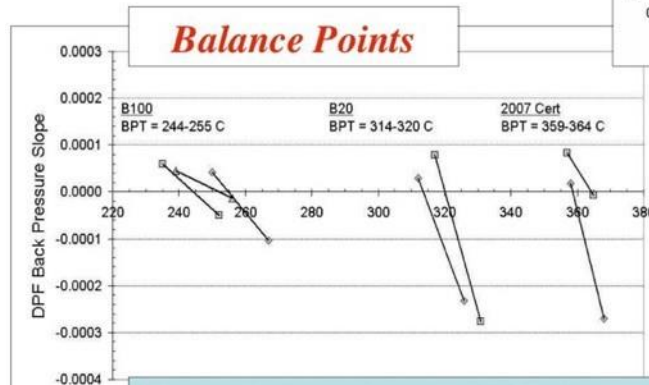
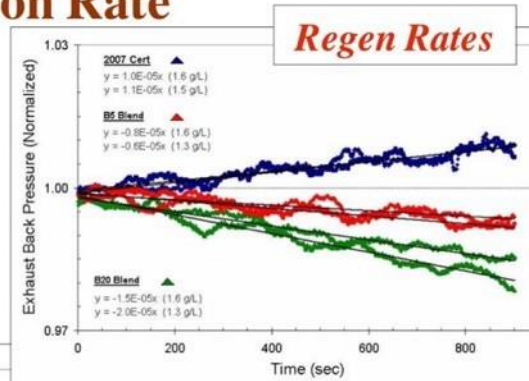


BIODIESEL IMPROVEMENTS ON DPF SYSTEMS

Improved efficiency and regeneration

DPF Balance Point Temperature & Regeneration Rate

- DPF Regeneration Rate increases with increasing biodiesel content
- Even at 5% blend levels biodiesel PM measurably oxidizes more quickly



- BPT – DPF temp where soot load rate is equal to soot regeneration rate
- BPT with B20 and B100 is lower than 2007 Cert by 45 °C and 112 °C

Effect of Biodiesel Blends on DPF Performance:
<http://www.nrel.gov/vehiclesandfuels/nptbf/pdfs/40015.pdf>

B100 (GAL)	Soot Offset (LBS)
1,000	-5.04
5,000	-25.20
10,000	-50.40
20,000	-100.80
30,000	-151.20



VECTOR SYSTEM OVERVIEW

The Optimus system integrates into existing diesel engines. The technology never inhibits the use of diesel fuel but primarily uses biodiesel for all operations. The technology is fully automated requiring no operator interaction.



**Patented*

VECTOR SYSTEM OVERVIEW



VECTOR
MANIFOLD



VECTOR SYSTEM OVERVIEW



VECTOR SYSTEM OVERVIEW



VECTOR SYSTEM OVERVIEW



ELECTRONIC
CONTROL
UNIT



VECTOR SYSTEM OVERVIEW




IN CAB
DISPLAY



VECTOR SYSTEM OVERVIEW

Fleet portal for engineering analytics, fleet management, and service



FLEET

STATIONS

ACCOUNT

DASHBOARD

FLEET STATUS

VEHICLE	LAST CONNECTION	STATUS	
AA123	2:00 AM	Operational	VIEW
AA124	2:00 AM	Requires Attention	VIEW
AA125	2:00 AM	Active Fault	VIEW
AA126	2:00 AM	Operational	VIEW
AA127	2:00 AM	Operational	VIEW

BIODIESEL STATIONS

Station 1

Station 2

Station 3

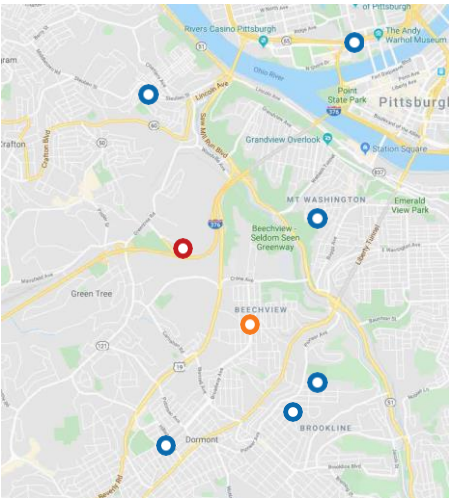
BIODIESEL CONSUMED

57,000 Gallons

CO2 OFFSET

28,031 Pounds

FLEET LOCATIONS



OPTIMUS TECHNOLOGIES

DC11878

ACTIVE FAULTS

None

FUEL LEVEL

JUN 23, 11:55 AM: 82%

E

F

FILTER DIFFERENTIAL

JUN 23, 11:55 AM: 3 PSI

0

15 psi

BIODIESEL RUNTIME

HOURS B/D 850.44 | HOURS DIESEL 115.02

88%

INACTIVE FAULTS

None

LATEST VEHICLE DATA

JUN 23, 11:55 AM

Vehicle State

Bio

Bio Pump Post Filter Pressure

22 psi

DPF Hours


2176 Hours

Fault Hours

--

GENERATE REPORT

FLEET LOCATIONS



STREET | SATELLITE

OPTIMUS TECHNOLOGIES

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SMARTFUEL – REFUELING TECHNOLOGY

Heated skid-mounted B100 refueling units



FLEETS USING B100 TO ACHIEVE CARBON REDUCTION GOALS



DC Department of Public Works

- Class 8 - Refuse Trucks



ADM

- Class 8 - Tractor Trailer Trucks



Cook-Illinois Corporation

- Class 6 - Type C School Buses



City of Ames, Iowa

- Class 8 - Snowplows



Broco Oil

- Class 8 - Fuel Delivery Trucks



Evergreen

- Class 8 - Tractor Trailer Trucks



Cornell University

- Farm Tractor



City of Chicago Parks

- Class 7 - Refuse Trucks



DC Water Authority

- Class 8 - Dump Trucks



Renewable Energy Group

- Class 8 - Tractor Trailer Trucks



Iowa Department of Transportation

- Class 8 - Snowplows



Star Oilco

- Class 8 - Fuel Delivery Trucks

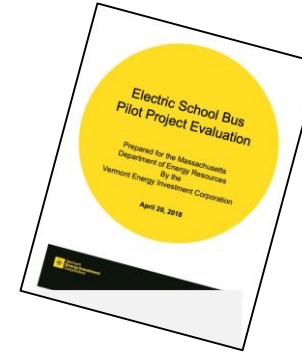


NEAR-ZERO CARBON EMISSIONS TECHNOLOGY... TODAY

Colin Huwyler, CEO || c.huwyler@optimustec.com



LOW CARBON SCHOOL BUS FLEET COMPARISON



	100% Biodiesel	Electric
CapEx (per new bus) ¹	\$107,500	\$350,000
CapEx (per repowered bus) ²	\$15,000	\$335,000
Fleet Infrastructure CapEx ³	\$125,000	\$525,000
Annual Fuel/Energy Cost (per bus) ⁴	\$4,082	\$7,240
Range (miles) ⁵	410	75
Repair Complexity ⁶	Simple	Complex
Product Availability	Upgrade or New Purchase	Limited
Tons of GHG Reduction (per bus) ⁷	28.26	18.5

¹ Electric School Bus Pilot Project Evaluation Prepared for the Massachusetts Department of Energy Resources, April 2018 pg.6, Diesel average cost +\$15,000 for The Vector System

² Ibid. pg. 10 Estimates based on 30 bus fleet

³ Ibid. pg. 11 \$10-25k per installed charger using average of \$17.5k, \$125k using Optimus previous project estimates

⁴ Ibid. pg. 35 Miles driven per bus per year 13,902 at 6.3 MPG estimate, Biodiesel cost savings of \$.15 per gallon vs. baseline diesel cost at \$2.00 per gallon

⁵ Ibid. pg. 17, Biodiesel range estimated at 6.3 MPG equipped with 65-gallon B100 fuel tank

⁶ Ibid. pg. 31




⁷ Ibid. pg. 37, B100 emissions at calculated at 90% of diesel GHG emissions based on expected runtime and 100% Scope 1 carbon emissions offset based on ICLEI's Local Government Operations Protocol



LOW CARBON SCHOOL BUS FLEET COMPARISON

100% biodiesel provides 25x lower cost carbon reduction opportunity



	<u>Bus CapEx¹</u>	<u>Infrastructure CapEx¹</u>	<u>Fuel Costs²</u>	<u>GHG Reductions⁴</u>	<u>\$/Ton Carbon Reduced⁴</u>
	\$2,775,000	-	\$926,800	-	-
	\$3,225,000	\$125,000	\$864,241	5,935	\$86
	\$10,500,000	\$525,000	\$1,520,400	3,885	\$2,276

¹ Assuming 30 bus fleet

² Based on evaluation over 7 years

³ Compared to diesel baseline

⁴ Dollars invested above the diesel baseline



Pursuing Federal Funding

October 21, 2021

Jill Hamilton

President , Sustainable Energy Strategies, Inc.





DERA Clean Diesel

- \$46 M Available nationally
- \$26 M Available for States
- 2009 and older vehicles only
- Pays for equipment and accelerated vehicle retirement
- Must decommission vehicle – no reselling except scrap
- Can include direct/indirect costs (management, training, etc.)
- Focused on Non-attainment areas

Year	Applicant / Fleet	B100 - Class 8 Vehicles Purchased	Grant Amount
2019	Iowa DOT	3 multi-purpose	\$ 165 K
2020	Iowa DOT	2 multi-purpose	\$ 124 K
2020	DC DPW / DC Water	24 short haul utility	\$ 1.28 M
2021	GWRCDC / DC Water	12 short haul/off-road*	\$ 659 K
2021	City of Mason, Iowa	2 dump trucks	\$ 117 K

(*2 short-haul, 10 off-road)

Use of DERA Funds

- Must use EPA verified technologies and certified engines
- **Optimus Technology** must be included with a **new vehicle purchase**; not an upgrade alone
- **Class 5 – Class 8 heavy-duty highway vehicles**
 - Onroad
 - School buses
 - Locomotive engines
 - Marine engines
 - Nonroad engines, equipment or vehicles used in construction, handling of cargo (including at ports or airports), agriculture, mining or energy production (including stationary generators and pumps), municipal, etc.
- VW can be used as voluntary match in some states



EPA Diesel Emissions Calculator

Biodiesel Emissions Calculator

This model provides average reduction of emissions comparing USEPA approved diesel fuel with biodiesel. The results are compiled from engine testing on diesel engines without diesel particulate filters or SCR equipped engines. Results for a particular engine type and model year may vary.

Bioheat © calculations are coming soon.

Type of Fuel:

Transportation Fuel Circa 2016

Total Fuel Usage:

1

Enter % biodiesel in blend:

100

Calculate



Average Change	Percent Reductions	Pounds of emission reduction
PM	-47.19	-0.01
HC	-67.36	-0.01
CO	-48.11	-0.06
NOx	10.29	0.02
SO2	-100	0
CO2	-76.4	-18.8

- EPA allows an option to justify your emissions.
- We used NBB's emissions calculator for emissions reductions.
- Enter one gallon to get the emissions reductions per gallon.
- <https://cfpub.epa.gov/quantifier/index.cfm?action=user.account>
- <https://www.biodiesel.org/support-pages/emissions-calculator>

From the NBB website: insert link

DERA Match Requirements

DERA Eligible Activities	DERA Funding Limits (EPA Funds + Voluntary Match)	Minimum Mandatory Cost-Share (Fleet Owner Contribution)
Exhaust Control Retrofit	100%	0%
Engine Upgrade / Remanufacture	40%	60%
Highway Idle Reduction Bundled with Exhaust Control Retrofit	100%	0%
Stand-alone Highway Idle Reduction	25%	75%
Locomotive Idle Reduction	40%	60%
Marine Shore Power	25%	75%
Electrified Parking Space	30%	70%
Engine Replacement	40%	60%
– Diesel or Alternative Fuel	40%	60%
Engine Replacement – Low NOx	50%	50%
Engine Replacement – Zero Emission	60%	40%
Vehicle/Equipment Replacement	25%	75%
– Diesel or Alternative Fuel	25%	75%
Vehicle/Equipment Replacement	35%	65%
– Low NOx	35%	65%
Vehicle/Equipment Replacement	45%	55%
– Zero Emission	45%	55%
Vehicle Replacement - Drayage	50%	50%
Clean Alternative Fuel Conversion	40%	60%

- Vehicle Replacement is **75% match**
- Drayage Vehicle Replacement is **50% match**
- Ex. $\$200k \times 0.25 = \$50,000$ grant

4/18/2019

FY 2019 State Clean Diesel Grant Program

15



DERA Benefits: B100 vs EV – Refuse Hauler

Assumptions: Retiring a MY06 vehicle – pre-DPF, 13 years remaining life, travels 25,000 miles per year on avg.

Lifetime Cost Effectiveness (\$/short ton reduced)	NOx	PM2.5	HC	CO	CO2
B100 Total Vehicle Cost Effectiveness 3 (includes all project costs)	\$103,714	\$957,984	\$925,725	\$499,491	\$118
Electric Vehicle Total Cost Effectiveness 4 (includes all project costs)	\$108,793	\$2,168,528	\$1,990,308	\$506,302	\$205

1 CO2 emissions calculations were based on the National Biodiesel Board's emissions calculator (1 gal of B100 = 76.4% reduction in life cycle GHGs). Other emissions reductions in this calculator are due to the new diesel vehicle and related emissions upgrades.

2 one short ton = 2000 lbs.

3 Cost effectiveness estimates include only vehicle purchase costs (\$220k) and do not include fuel, refueling equipment, or maintenance costs.

4 Cost effectiveness estimates include only vehicle purchase costs (\$500k) and do not include charging costs, charging equipment, or maintenance costs.

USDA Higher Blends Infrastructure Incentive Program (HBIIP)

- \$1 Billion over 8 years – House Approps Bill/Willingness in Senate
- Grants up to \$5M with 50% cost share (\$1 for \$1)
- Two Types of Projects
 - Transportation Fueling Facilities (Fueling stations, convenience stores, hypermarket fueling stations, fleet facilities, and similar entities with capital investments)
 - Fuel Distribution Facilities (Terminal operations, depots, and midstream partners, and similarly equivalent operations)



FTA Transit Program - \$409 M



Closes Nov. 19. Covers 80-90% of new buses and facility upgrades. Demonstrated need. 61% awarded

DOT RAISE Program

- \$1 Billion in Funding
- Max/Minimum Awards: \$25 M/\$5 M
- Maintain infrastructure/State-of-good-repair
- Fosters environmental sustainability
- Focus on inland ports and port of entry projects
- Freight rail, intermodal and passenger projects are eligible
- Environmental Justice a priority
- Former Tiger/BUILD Program



DOT Ferry Programs



- **\$38 M** available annually for ferry improvements
 - Infrastructure is eligible
 - B100 Considered “Innovative”
 - Closed Oct. 5, 2021, plan for next year
-
- Dozens of other transportation grants available see: www.transit.dot.gov/grants

CMAQ – Congestion Mitigation Air Quality

- **\$2.449 Billion** per year available
- Each state given an allocation and administers funds
- B100 Qualifies under CMAQ either as
 - Diesel engine retrofits and advanced truck technologies
 - Alternative Fuels
 - Innovative project

Restrictions:

- Administered through MPO in cooperation with the state transportation office.
- Project must address transportation emissions in non-attainment areas
- Must meet a TIP (Transportation Improvement Plan) Program (MPO specific)
- Drawback – Competition: CMAQ can be used in a variety of way...everyone wants a piece of it
- Key - Find a champion

Federal Funding Distributed at STATE Level

EPA DERA State
Grants - \$26 M

DOT CMAQ
\$2.4 B

Volkswagen Env.
Mitigation Trust
\$2.9 B

DOT RAISE
\$1B



**Clean Cities will Partner
and can help write Grants**

- PA Alternative Fuels Incentive Grant Program (AFIG) / \$5 M / Dec. 17, 2021
- PA Driving Pennsylvania Forward Grants / \$118.5 M / multiple deadlines
Truck & bus fleet grants / On-road vehicle rebates / Marine & rail freight / Clean diesel grants
- Driving a Cleaner Illinois (DERA, CMAQ, VW)
- WA State Clean Diesel Grants / \$600,000 / Jan. 2022
- WA Local Partner Core Operations Grant / Open every other summer - 2023

Getting Help With Your Application

Jill Hamilton, SESI

jhamilton@sesi-online.com

703-322-4484 Office



RESOURCES

ORGANIZATIONS

- Clean Cities Coalitions: <https://cleancities.energy.gov/coalitions/locations/>
- National Biodiesel Foundation (NBF) Website: biodieselfoundation.org
- Health Benefits Study (Trinity): <https://www.biodiesel.org/news-resources/health-benefits-study>

FEDERAL PROGRAMS

- EPA DERA: <https://www.epa.gov/dera>
- <https://www.epa.gov/dera>
- EPA Environmental Justice Grants: <https://www.epa.gov/environmentaljustice/environmental-justice-grants-and-resources>
- DOT Congestion Mitigation and Air Quality Improvement Program (CMAQ): <https://www.fhwa.dot.gov/fastact/factsheets/cmaqfs.cfm>
- Volkswagen Environmental Mitigation Trust State Programs: <https://www.vwenvironmentalmitigationtrust.com/state-trust>
- DOT Rebuilding American Infrastructure with Sustainability and Equity (RAISE) Grants (formerly BUILD/TIGER): <https://www.transportation.gov/RAISEgrants>
- USDA: [higher-blends-infrastructure-incentive-program](#)

RESOURCES

EXAMPLES OF STATE GRANTS THAT WILL BENEFIT ENVIRONMENTAL JUSTICE WORK

- California EPA Environmental Justice (EJ) Small Grants <https://calepa.ca.gov/envjustice/funding/>
- Driving Pennsylvania Forward (truck & bus fleet grants; rebates; freight; clean diesel grant: <https://gis.dep.pa.gov/drivingpaforward/>
- Driving a Cleaner Illinois: <https://www2.illinois.gov/epa/topics/air-quality/driving-a-cleaner-illinois/Pages/default.aspx>
- New York EJ Community Impact Grant Program: https://grantsgateway.ny.gov/IntelliGrants_NYSGG/module/nysgg/goportal.aspx?NavItem1=3
- PA Alternative Fuels Incentive Grant Program (AFIG) : <https://www.dep.pa.gov/Citizens/GrantsLoansRebates/Alternative-Fuels-Incentive-Grant/Pages/default.aspx>
- PA Department of Environmental Protection Environmental Education Grants Program: <https://www.dep.pa.gov/Citizens/EnvironmentalEducation/Grants/pages/default.aspx>
- Washington State Clean Diesel Grants: <https://ecology.wa.gov/About-us/How-we-operate/Grants-loans/Find-a-grant-or-loan>
- Washington Local Partner Core Operations Grant: <https://ecology.wa.gov/About-us/How-we-operate/Grants-loans/Find-a-grant-or-loan/Core-operations>



**Need Assistance?
We can Help**

Jill Hamilton

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CITY OF AMES
FLEET SERVICES

B100

Pilot Project

Presented by Rich Iverson
Fleet Support Manager

100 BEST
FLEETS™

honored as one of the 100 Best F

S - FLEET SERV



CITY COUNCIL

Climate Change Assumptions

- Climate change is real and primarily driven by human activity.
- The City of Ames is committed to creating a climate-friendly future by partnering with the community.
- The City of Ames is prepared to pursue policy changes that encourage and require carbon reduction behaviors.



Ames City Council's
Key Message

Investment in climate action contributes to Ames' economic development, in addition to generating co-benefits related to health, improved environment, equity, and economic growth.

<https://www.cityofames.org/living/sustainability-in-ames>

City of Ames Fleet

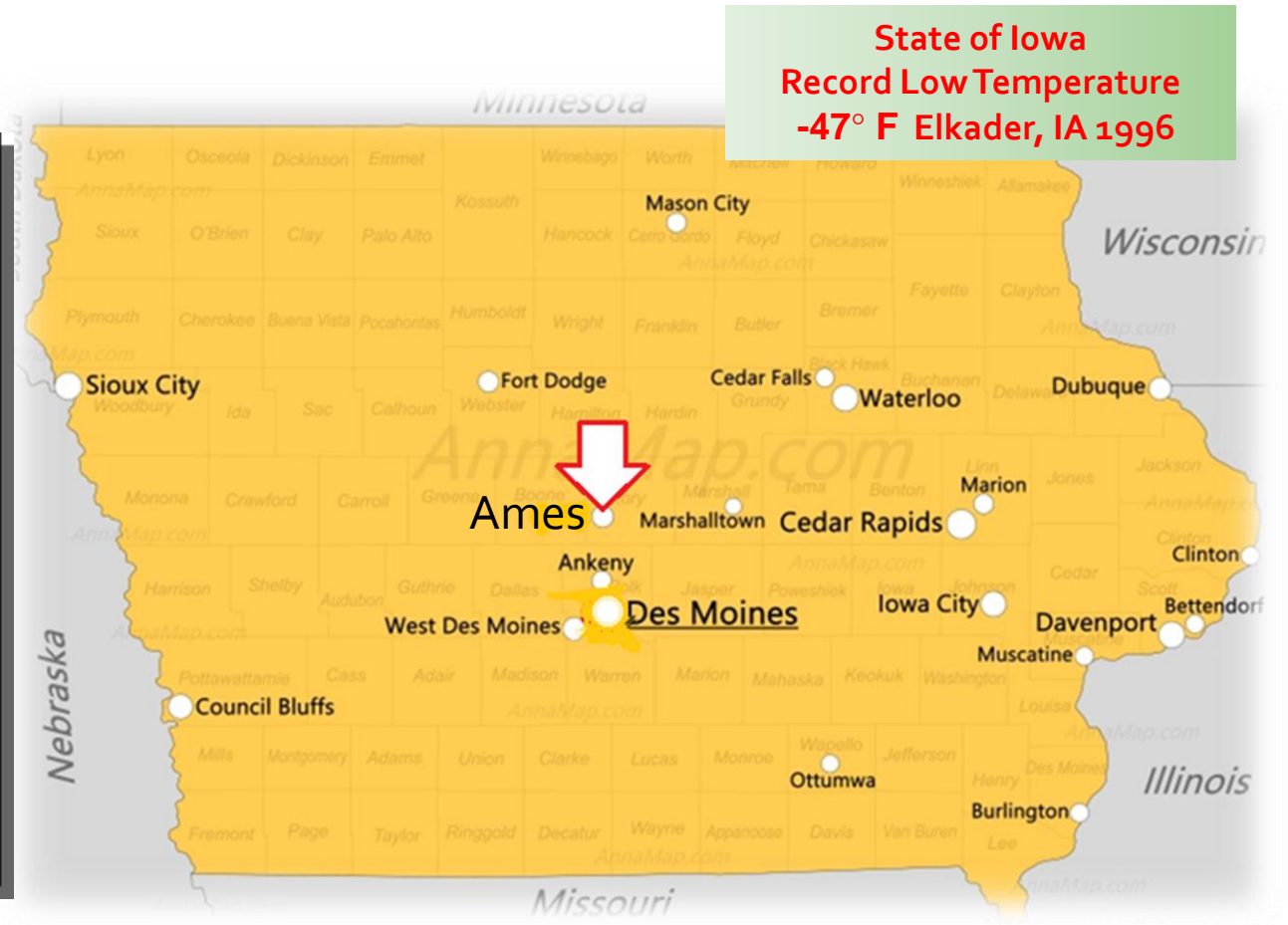
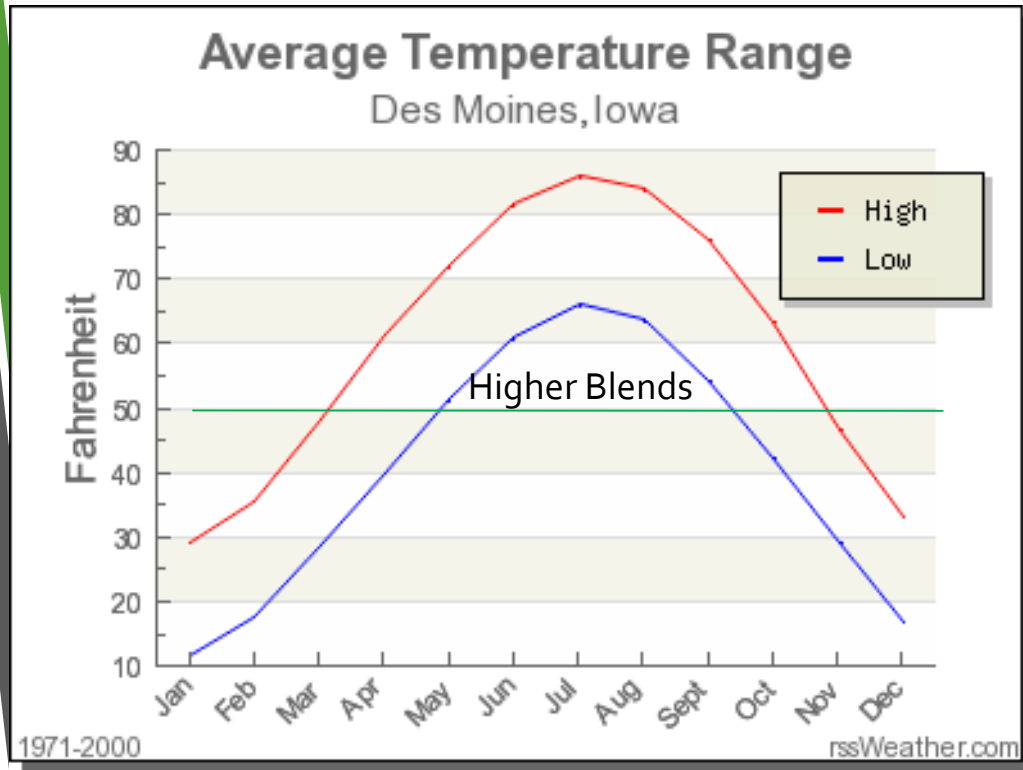
- 21 Autos (2) Full Electric (5) Hybrid (5) E85
- 59 Pickups (29) E85 Gasohol
- 57 Vans and SUVs (11) hybrids (19) E85
- 44 Diesel Trucks (31)B20 **(12)B100** (1)B65
- 7 Fire Pumper/Ladder Trucks (7) B20
- 11 Light-duty Gas Trucks (all) E10 gasohol
- 10 Tractors (10) B20
- 4 Wheel loaders (2) B20 (2) Hybrid B20/Electric
- 75 Assorted equipment electric/gas/propane/diesel

Pilot Group B100 Trucks

It's not uncommon to have -23°C (-10°F)
temperatures in December, January and February

Iowa

State of Iowa
Record Low Temperature
-47° F Elkader, IA 1996



Before the Pilot Project

- 20 % biodiesel April – September
- 5 % biodiesel October – March
- Annual average for 5 pilot trucks 8 % bio

B100 Pilot Project

October 2019

City of Ames entered into a unique partnership with Renewable Energy Group and Optimus Technologies to conduct a 3-year pilot project to equip five City snowplow trucks with new technology enabling the trucks to use 100% biodiesel during normal operations - even in winter conditions.



Possible through a unique partnership with REG & Optimus Technologies

Rich Iverson Fleet Support Manager - City of Ames, Iowa

12,000 Gallon B100 Fuel Tank and Dispenser

Heated



Opportunity

Solar Heating

Underground Storage

Increase Volume



5 trucks equipped with
Optimus Technologies'
Vector Systems just in
time to plow snow in a
January blizzard.

Temperatures fell to -10°F.

Used **90% biodiesel**,
nearly 1,000 gallons in 3 days
without issue.

Operators reported normal
power and performance.

Pilot Project Begins January 2020



Truck #

City of Ames Snow Removal Operations 1.17.20-1.18.20

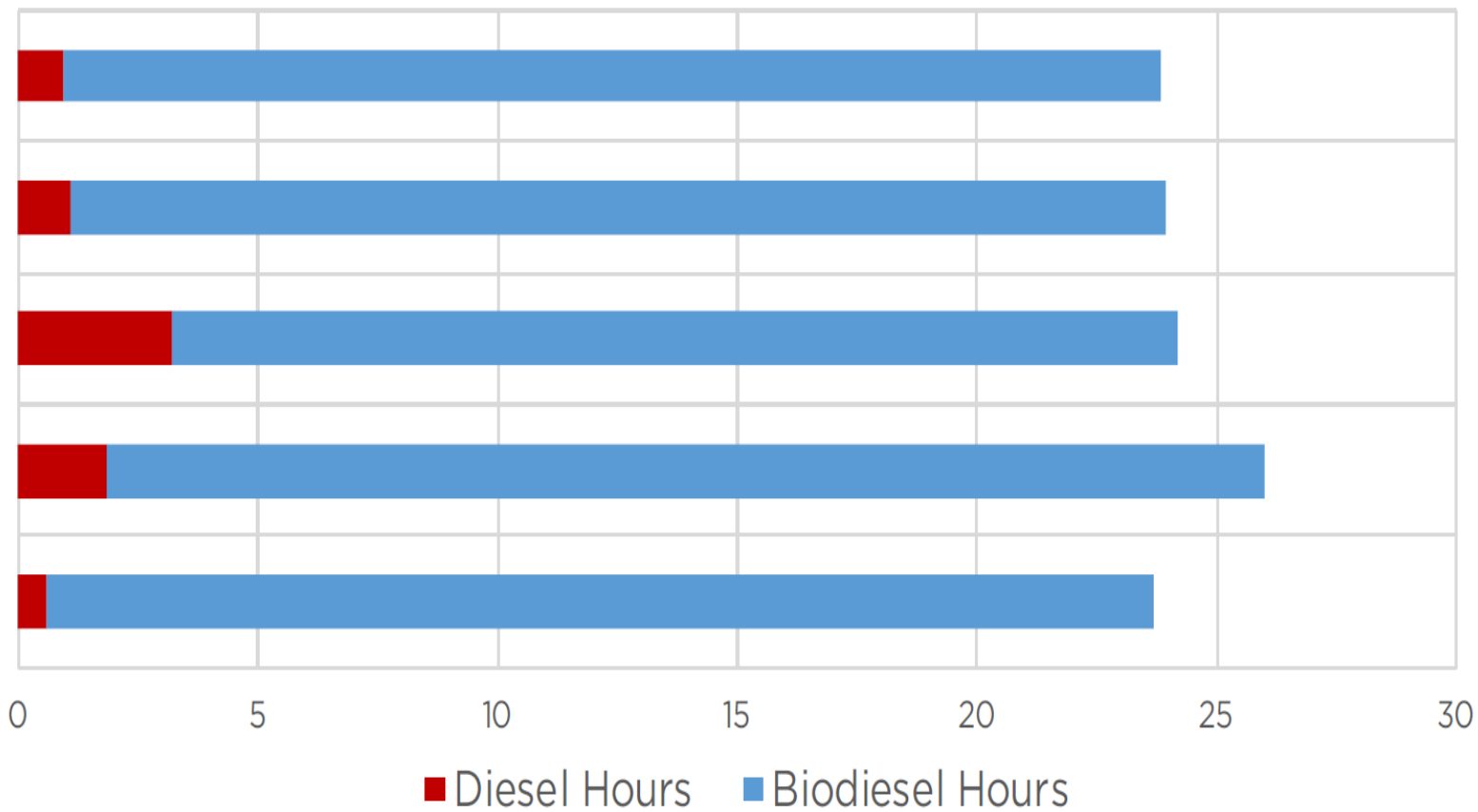
979

977

967

934

933



Trucks are used year-round working road maintenance in warm months and snow removal in winter



What do I need to begin using B100 year-round even in a cold climate?

- Any medium or HD truck
- B100 fuel source
- The right technology

Pictured: Diesel vehicle
before being equipped with
Optimus Vector System





Optimus Technologies Installation

Pictured above: Shows the new 60/40 split tank installed on the truck, replacing the old tank, removed, shown resting the floor.

To the right: Shows this Optimus Vector unit conveniently installed outside the cab on the back wall.



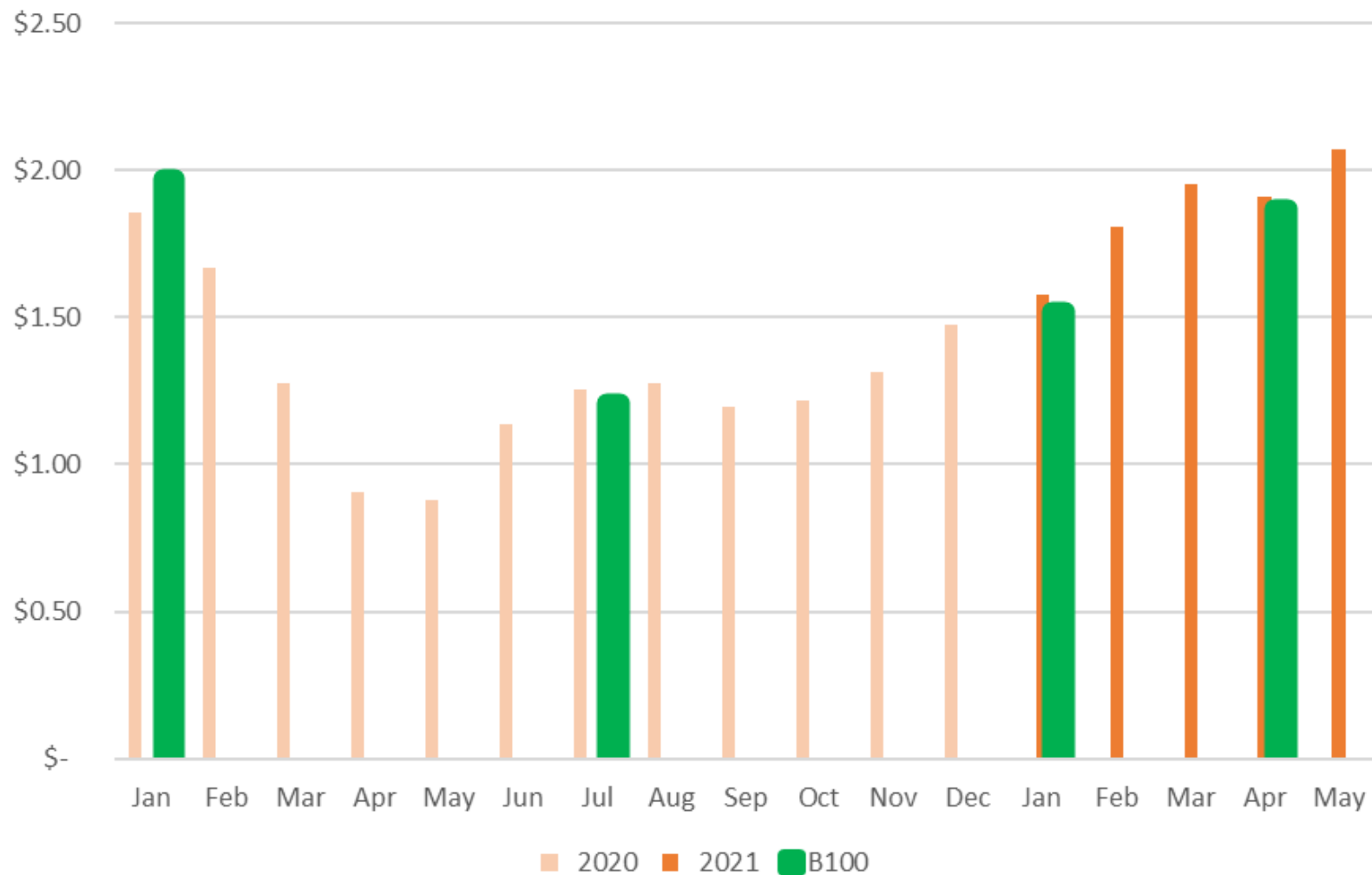


Truck #967
New in August 2016



Truck #967 with Optimus Vector
System, shown in 2020

B99.9 Biodiesel Purchases Compared to Fuel Wholesale Price Diesel #2



Pilot Project Midway Findings

- Biodiesel 8% → 84% avg.
- Fuel economy 7% lower MPG
- No performance issues
- Fuel heating cost 17 cents/gallon (above ground)
- 156 metric tons CO₂ offset

Thank you!

I encourage you to visit CityofAmes.org and see what the City is doing

- Rich Iverson, Fleet Support Manager
- City of Ames, Iowa
- Rich.Iverson@cityofames.org