NC STATE UNIVERSITY

SUSTAINABLE FLEET TECHNOLOGY CONFERENCE & EXPO 2021

Session #5: Idle Reduction Simple & Impactful

September 23, 2021

NC CLEAN ENERGY TECHNOLOGY CENTER

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

SUSTAINABLE FLEET TECHNOLOGY
WEBINAR SERIES 2021

Sessions through December 09, 2021

SUSTAINABLE FLEET TECHNOLOGY
CONFERENCE & EXPO 2021

Sessions September 09, 2021 – October 19, 2021

https://www.sustainablefleetexpo.com/

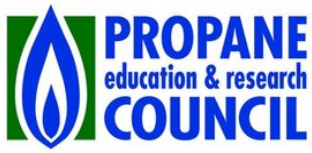
NC CLEAN ENERGY TECHNOLOGY CENTER

STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

SFT Conference Series Upcoming Sessions

- 09/30: Innovative Charging Solutions
- 10/05: Total Cost of Ownership--Comparisons of Alternative Fuel Vehicles versus Conventional Fuel Vehicles
- 10/07: Propane Applications and Success Stories
- 10/09: Funding Sources & Creative Financing for Sustainable Fleet Deployment
- 10/12: Funding Sources and Creative Financing for Sustainable Fleet Deployment

2021 SFT Conference Series Sponsors




XLFleet
TM


NC CLEAN ENERGY
TECHNOLOGY CENTER


STATE OF NORTH CAROLINA
DEPARTMENT OF TRANSPORTATION

Format

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

Working with your Utility and Understanding Fleet Charging Costs
September 21, 2021

2:00-2:10 **Rick Sapienza, NCCETC--**Introduction and Welcome

2:10-2:25 **Ron Zima, IDLE FREE**—Overview and Idle Reduction Strategies

2:25-2:40 **Todd Self, ZeroRPM & Lawrence Billotto, MEDIC**—The ZeorRPM Solution and Real World Application

2:40-2:55 **Charlie Mahoney, DERIVE**—Rethinking Idle with Technology

2:55-3:10 **Neeraj Chirmulay, Viatec & John Ferguson, City of Durham NC**—Rethinking Our Approach to Electrification with Real World Application

3:10-3:30 **Q&A**

Driving Clean Air & Renewable Energy
CleanTransportation.org
Supported by the NC Clean Energy Technology Center with funding from the North Carolina Department of Transportation

North Carolina State University
NC Clean Energy Technology Center
Clean Transportation Program
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STATE OF NORTH CAROLINA DEPARTMENT OF TRANSPORTATION

IDLE FREE Guy™

Idle Reduction Behavior Modification Expert.

- Former TV radio broadcaster.
- Sales and marketing: high tech, telecom.
- Cause branding: The Salvation Army.

- Father of two kids.
- Founder; The Children's Clean Air Network.
- Creator; IDLE FREE for our kids®

Ron's full BIO.
LinkedIn Profile.

Ron Zima ADpPR

GoGreen.

GoIDLEFREE.com

"Idle reduction from driver behavior modification in a fleet's gasoline and diesel burning assets is the biggest combined cost, greenhouse gas and air pollution reduction opportunity for fleet operators in the United States and Canada in all fleet industry sectors."

Cost metrics from driver idling behavior:

- Fuel.
- Added *maintenance, compromised warranties.
- Lifecycle costs.
- Vehicle downtime.
- Employee productivity.
- Carbon emissions.
- Air quality.
- Safety risk (vacant vehicle idling).
- Fleet reputation.

*Maintenance expenses equal to roughly half of the total cost of ownership over the vehicle life.

Total Savings Less Cost (Two Years)
2,480 Vehicles*

Engagement Range

Fuel Cost Reduction

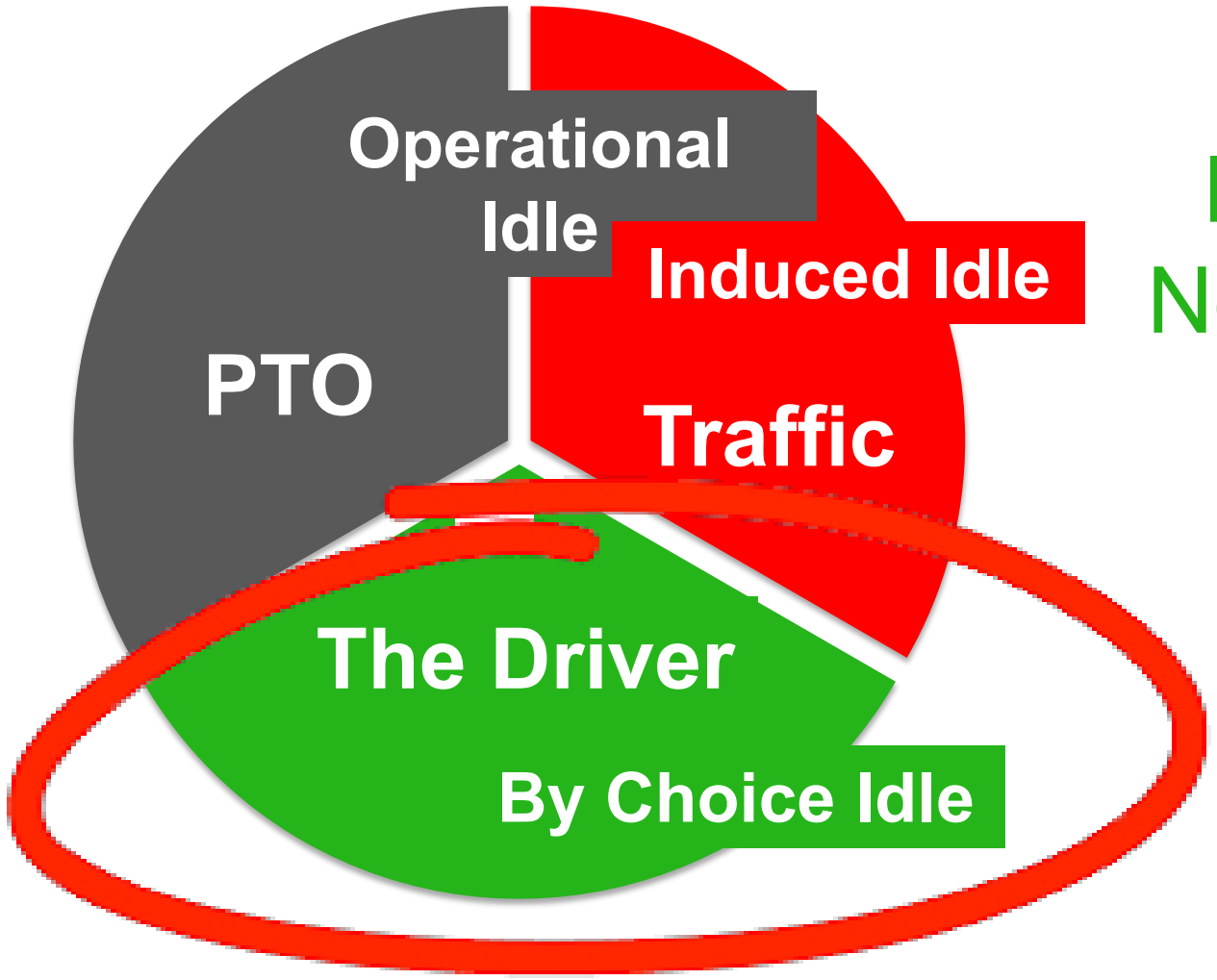
High	$4,330,123
Medium	$2,517,229
Low	$704,334

CO_2 Reduction in Tons

	Gasoline	Diesel	Total
High	2940.6	6360.6	9301.2
Medium	1960.4	4240.4	6200.8
Low	980.2	2120.2	3100.4

*While these are real fleet numbers, your individual fleet numbers and your local idle time measurements or assumptions will vary.

Idle Reduction Opportunity Assessment



Reduce ‘by choice’ idle.

Not Power Take Off (PTO.)

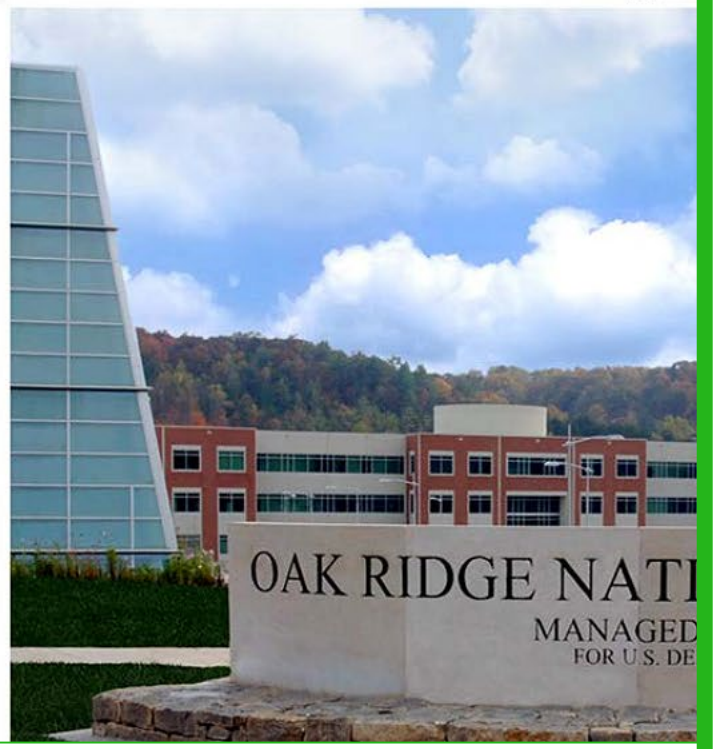
Not idle, stuck in traffic.

When not in motion, and it makes sense.

Idle MYTHS:

1. Restarts are bad.
2. Idling is good.
3. Long warmups are required.

Summary of OEM Idling Recommendations from Vehicle Owner's Manuals



Chevrolet:
"Avoid idling. Do not warm up the car."

Ford:
"Don't idle for more than 30 seconds."

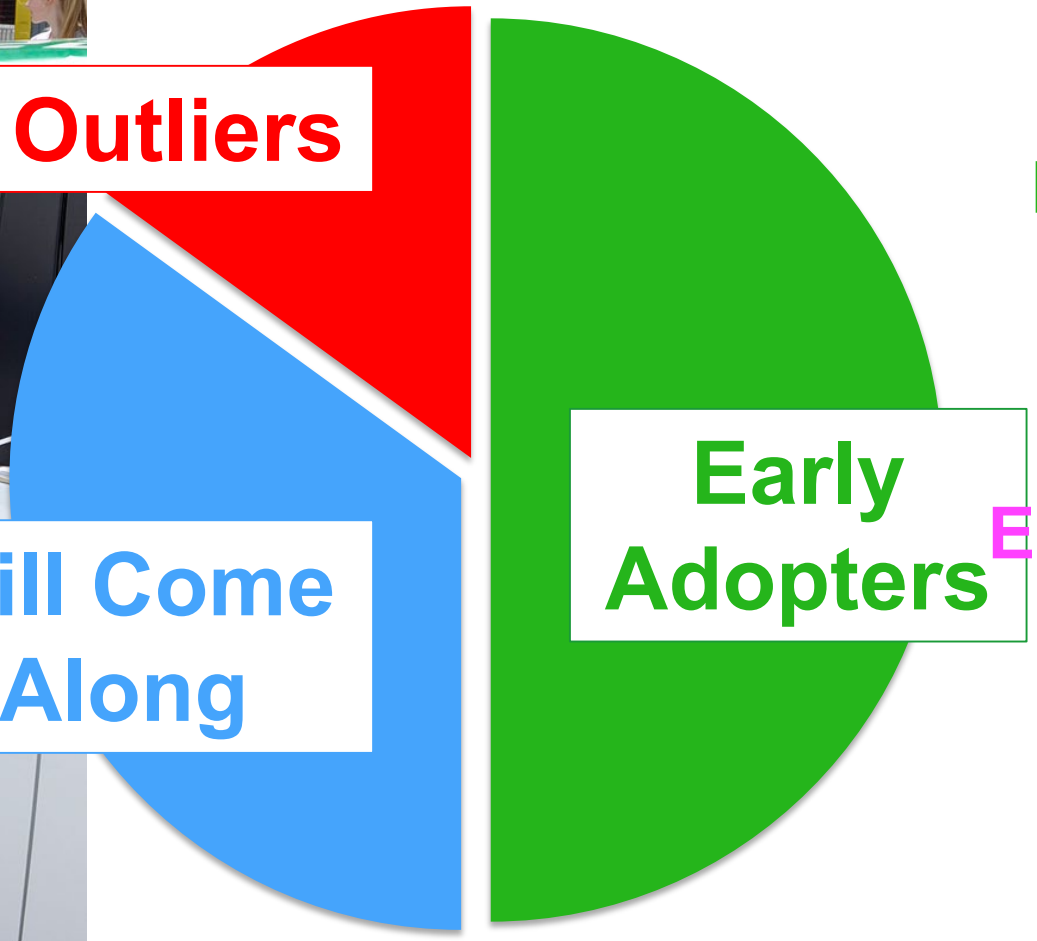
Proven formula:
EMOTIONAL ENGAGEMENT.

Drivers will modify beliefs, behavior with effective messaging around THREE values:

- ✓Their kids.
- ✓Their cars.
- ✓Their cash.

GoGreen.

Historical Response: Year One.



Age groups 18+
Psychographics.
Genders.

Respond
Enthusiastically:

- **Kids.**
- **Cars.**
- **Cash.**

Why Company Idle Reduction Initiatives Fail.
The agenda and the messengers:

Company Engagement:

"Help the company be more efficient."

"Help the company protect its vehicles."

"Save money for the company."

Home Engagement:

✓ ***Their*** kids, cars, cash.

Idle Reduction Communication.

Messengers **Receivers**

GoGreen.

GoIDLEFREE.com

Idle Reduction Strategies: Long Term and Immediate.

1. Long Term Strategy
New Equipment – Fleet.

- BEV, battery powered electric vehicles.
- HEV, hybrid electric vehicles.
- PHEV, plug-in hybrid electric vehicles.

9.5% of assets replaced annually (national average).

Meaning: Three years to replace a third of a manager's fleet.

2. Immediate Strategy
Legacy Equipment – Fleet.

Idle reduction technologies (IRT)

- Idle timer/limiter
- Auto engine shut-down/start-up
- Auxiliary power units (APUs)
- Fuel-or battery-powered AC / heat
- Telematics
- Programmable RPMs
- Alternative fuels (i.e. CNG)

Asset Focused

Driver Focused

- Driver Behavior Modification (no equipment)
  IDLE FREE for our kids® for Fleets

Case Studies

Case Study – International Bus Fleet
Novice to experienced drivers.
80% reduction sustained over two years.

Case Study – Port Maintenance Fleet
Novice to experienced drivers.
40% reduction in 4 months during harsh winter.

Case Study – Interstate Fleet
Novice to experienced drivers.
55% reduction in 30 days

Webinar attendees:
Get our in-depth research.

Including:

- **The IDLE FREE Formula**
- **Fleet Manager's Guide**

IDLE FREE Guy™

Idle Reduction Behavior Modification Expert.

Ron@GoIDLEFREE.com
902-456-2550

Ron Zima ADpPR

Todd Self
todd.self@zerorpm.com

- Chief Business Development Officer for ZeroRPM
- 30 years of experience in sales, marketing, customer service, business development, and product commercialization
- Previous experience in similar role with contract manufacturer for ZeroRPM

ZERORPM®
IDLE MITIGATION SYSTEMS®

EVERY HOUR OF IDLING CAUSES 33 MILES OF

WEAR AND TEAR ON THE VEHICLE

YOUR AVERAGE SERVICE VEHICLE IDLES

4 HOURS PER EVERY 8 HOURS SHIFT

REDUCE EMISSIONS AND PROTECT THE ENVIRONMENT

Protect the Environment: A gallon of gasoline and a gallon of diesel fuel produce 18.95 lbs and 22.06 lbs of CO_2, respectively. This translates to more than 31 tons of harmful emissions per double-shift vehicle each year. A fleet of 20 vehicles could produce more than 6 million lbs of CO_2 and other harmful emissions over their service lives.

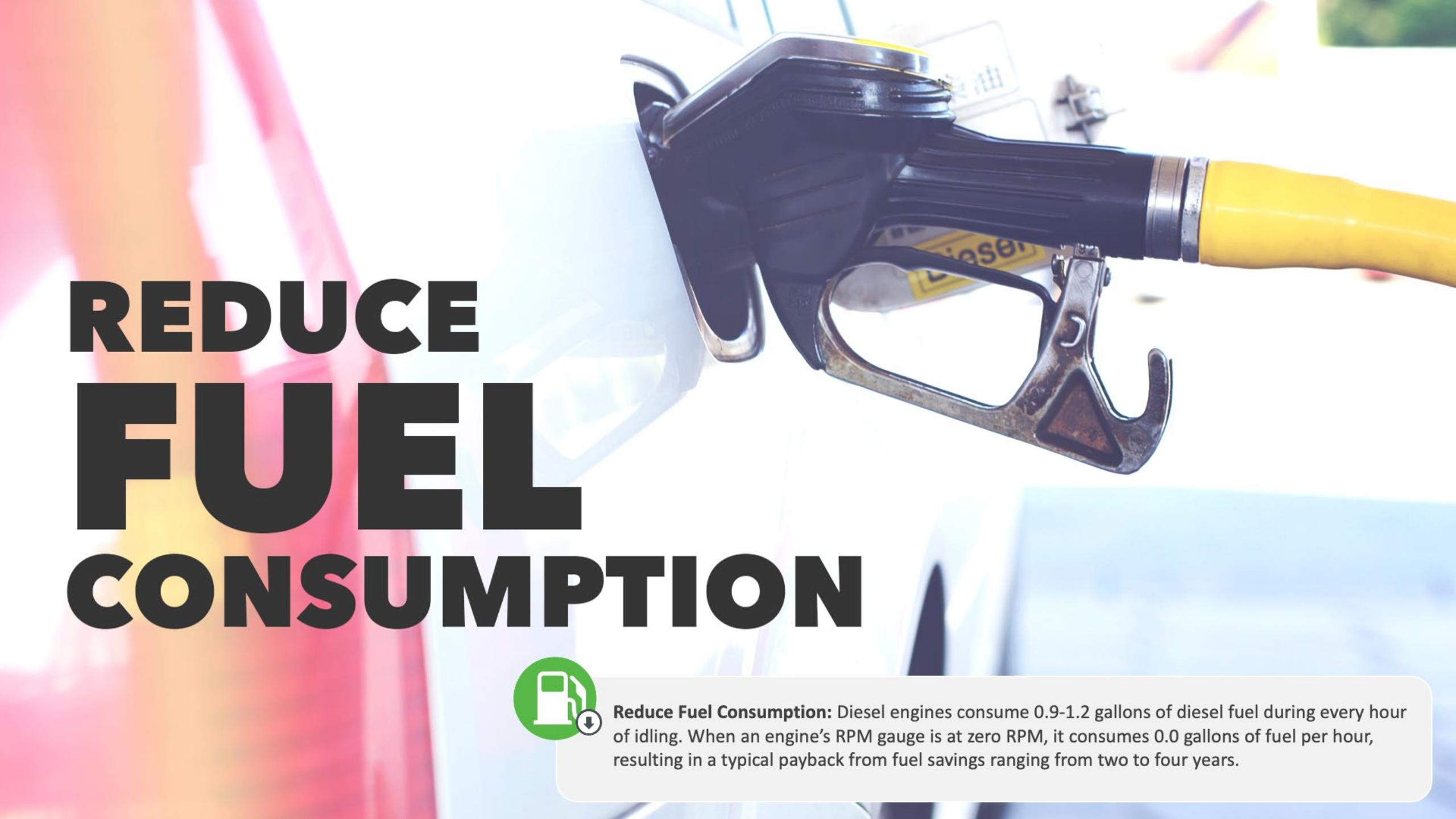
IMPROVE OPERATOR SAFETY & COMFORT

Improve Operator Safety and Comfort: The IMS provides full use of all HVAC and electrical components without the fumes and noise from an idling engine. The system's automatic delivery of heat, air conditioning, and power for equipment in park (as if the engine were running while the engine is off) means fewer distractions. A focused operator is a safe and happy operator.

REDUCE OPERATING COST

Less wear and tear extends the service life of your vehicle

Reduce Operating Costs: Every hour an engine idles, it is estimated to create the same wear and tear as 33 miles of driving. Many fleets reduce the payback period by 1/3 or more when maintenance cost reduction and asset life reduction are factored into the payback calculation. DPF regenerations are often cut in half and manual regenerations are usually eliminated.



REDUCE FUEL CONSUMPTION

Reduce Fuel Consumption: Diesel engines consume 0.9-1.2 gallons of diesel fuel during every hour of idling. When an engine's RPM gauge is at zero RPM, it consumes 0.0 gallons of fuel per hour, resulting in a typical payback from fuel savings ranging from two to four years.

When you put the vehicle in park...

P R N D

...we will automatically shut off the engine...

#end_idling

...EVERYTHING continues to operate as if the engine remains on!

HEAT

RADIO & ELECTRONICS

A/C

INVERTER

Saving you MONEY while protecting the ENVIRONMENT.

HOW DOES IT WORK?

WHEN THE ENGINE IS ON

BELT DRIVEN ALTERNATOR

BELT DRIVEN COOLANT PUMP

BELT DRIVEN A/C COMPRESSOR

POWER

HEAT

A/C

WHEN THE ENGINE IS OFF

LITHIUM-IRON* BATTERY

DC ELECTRIC COOLANT PUMP

DC ELECTRIC A/C COMPRESSOR

ZERORPM®
IDLE MITIGATION SYSTEMS®

*"Lithium-Iron" is a marketing term for ZeroRPM's LiFeMnPO4 packaged energy storage systems.

FEATURES

Engine-off A/C Through the Factory Vents

Using patented ZeroRPM technology, the system provides cooling through the factory vents without running the chassis engine.

Engine-off Heat Through the Factory Vents

The system provides heating through the factory vents without running the chassis engine. You no longer have to enter a freezing vehicle on a cold day!

Lithium-Iron Power to All Electronics

Using safe lithium-iron batteries, the system provides power to all electronics (e.g. radio, lights, and computers) without running the chassis engine. The batteries have a five-year warranty.

Automatic Recharging

The batteries charge natively from a 12V alternator. Solar panel and shore power integrations are optional.

ZeroKEY™

ZeroKEY allows you to securely leave the vehicle while our system takes care of climate control and powering your electronics. When you return to the vehicle everything will be in operation as you left it.

ZeroIDLE®

ZeroIDLE prevents the IMS® from automatically starting the engine in "no-idle" zones. The operator can be notified by an optional buzzer, backup alarm, or voice annunciator.

ZeroDRAW®

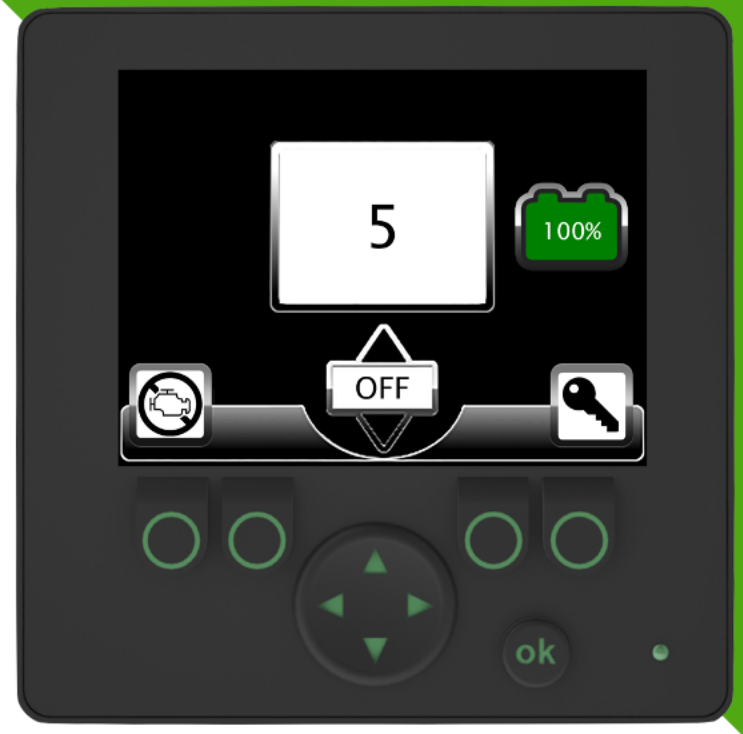
Our system protects the chassis batteries from being drained by your vehicle's accessories. This protects you from returning to your vehicle to find a dead chassis battery.

Electric PTO *Optional*

Our system can provide energy to powered take-off (PTO) equipment such as hydraulic buckets, booms, and lifts, all while the engine is off.

Basic IMS Operation

- **Once the operator places the transmission in Park, the IMS will begin a five-second countdown.**



Basic IMS Operation

- When the operator is ready to use the vehicle for transportation, a brake press will restart the engine. This will be indicated by the green ***Engine On*** icon in the center of the IMS display.
- If the transmission does not enter Drive within five seconds, the system will re-enter IMS mode.

Basic IMS Operation

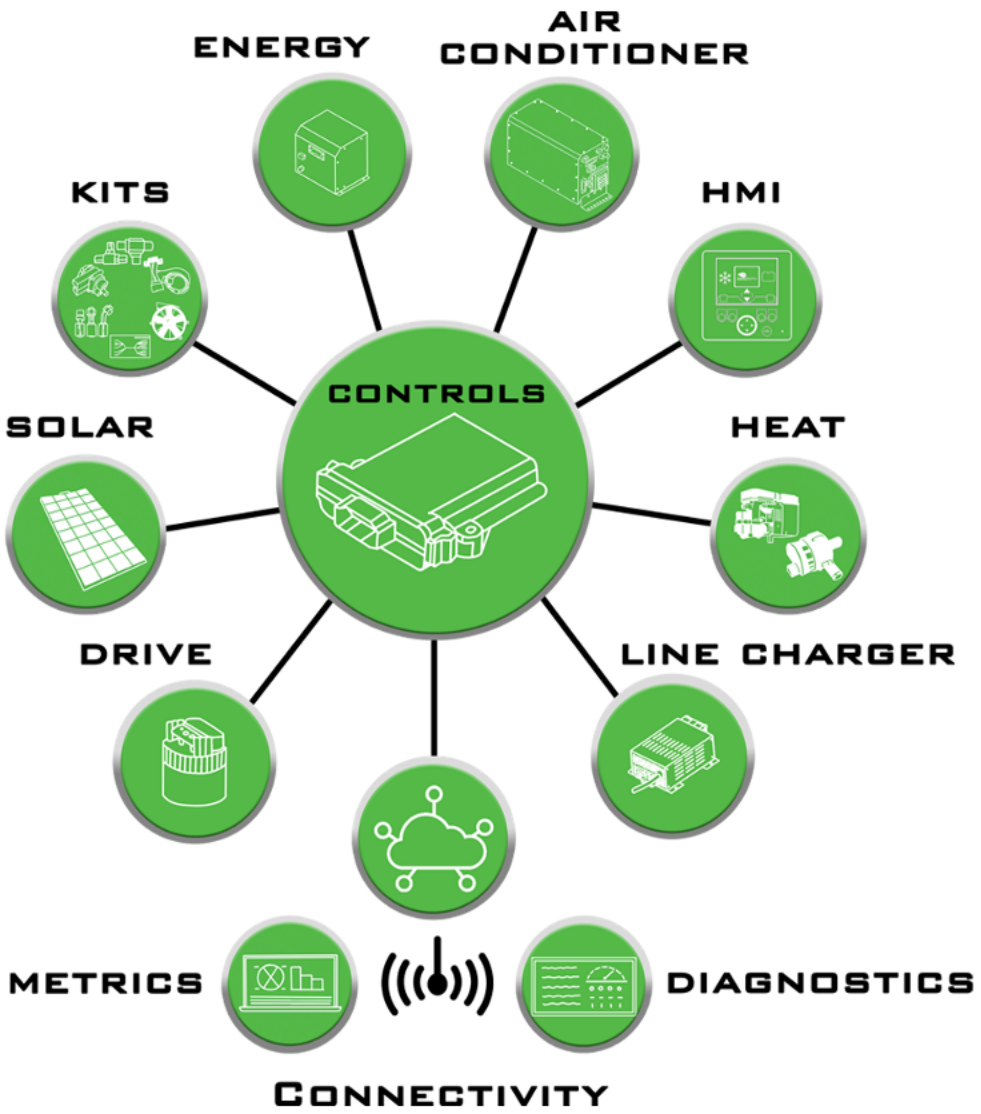
- **IMS A/C Mode will be indicated by the *Snowflake* icon in the left-center of the IMS control display.**

Basic IMS Operation

- **IMS Heat Mode will be indicated by the *Flame* icon in the left-center of the IMS control display.**

Basic IMS Operation

- The activation of the ZeroKEY® feature will allow IMS Mode to maintain the vehicle power and environmental conditions with the key out of the ignition and the vehicle secured.
- ZeroKEY icon illuminates in green to indicate the feature is activated.



EXTENDING VALUE THROUGH SYSTEM INTEGRATION

POWER VERSATILITY

WIDESPREAD CHASSIS COMPATIBILITY

ZERORPM SYSTEMS ARE COMPATIBLE WITH LIGHT-, MEDIUM-, AND HEAVY-DUTY CHASSIS FROM ALL MAJOR MANUFACTURERS.

UNIVERSAL SOFTWARE

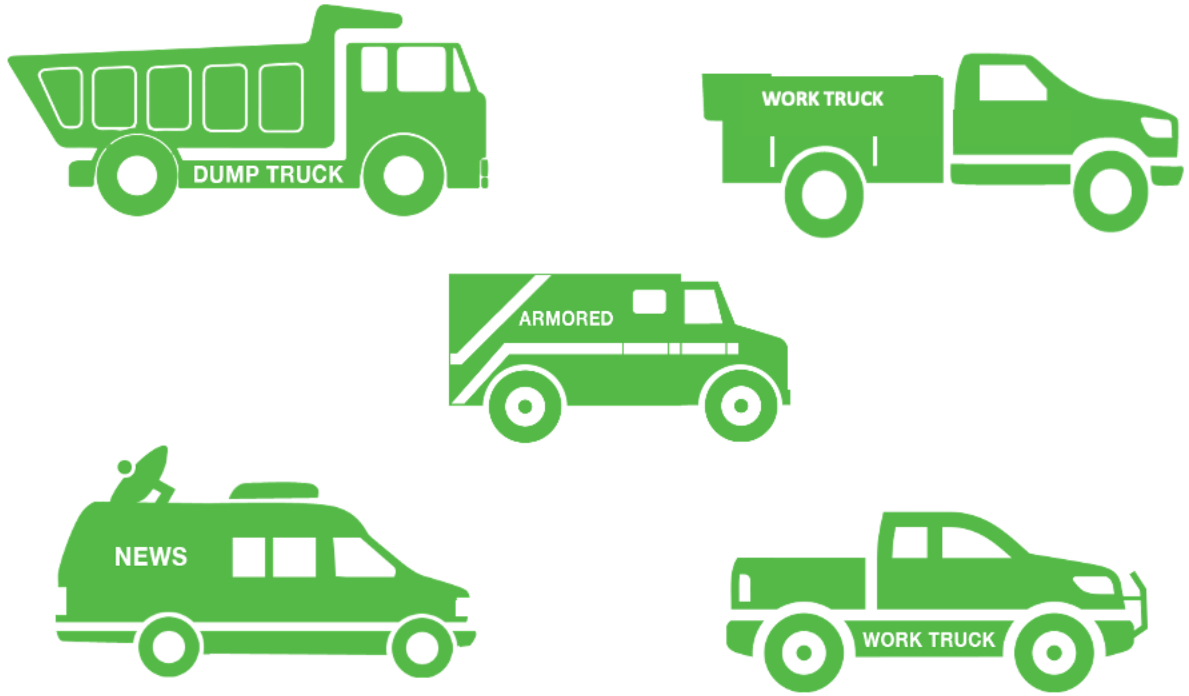
ALL PLATFORMS ARE DRIVEN BY THE SAME CORE SOFTWARE WITH A STANDARDIZED USER INTERFACE.

STACKABLE SOLUTIONS

12VDC, 24VCD, AND 48VDC SYSTEMS ARE AVAILABLE ON COMMON IMS PLATFORMS.

HYBRIDIZE YOUR FLEET

ADDING A ZERORPM IMS® TURNS ANY CONVENTIONAL VEHICLE INTO A PLUG-IN HYBRID ELECTRIC VEHICLE (PHEV) WHILE IN PARK.



EXTEND YOUR IMS VALUE

GET RETURNS DAY 1

TRACK YOUR VEHICLES' SAVINGS WITH INTELLIMETRICS®

SEE WHAT HAPPENS AFTER PARK WITH INTELLIMETRICS®

- AS MOBILE AS YOU ARE
- WEB-BASED PORTAL
- OPTIMIZED FOR YOUR CHOSEN DEVICE
- DATA EXPORT AVAILABLE IN EXCEL FORMAT


ZERORPM®
IDLE MITIGATION SYSTEMS®

MEDIC
Mecklenburg EMS Agency

Lawrence Billotto
LawrenceB@medic911.com

- Support Services Manager MEDIC: Mecklenburg EMS Agency
- Busiest EMS agency in North Carolina
- Responsibilities include overseeing daily operations of Fleet Services, Facilities and Clinical Equipment
- 33 years automotive experience with 23 at MEDIC
- Led improvement projects, including a custom ambulance redesign, idle reduction/emissions improvement, testing idle reduction technology on engine wear and fuel consumption
- Member of the Commission on Accreditation of Ambulance Services and recipient of the American Ambulance Associations Star of Life Award
- ASE, EVT and EMT certified


E
60
MEDIC
Mecklenburg EMS Agency

Charlie Mahoney
charlie.mahoney@derivesystems.com
866-617-6493

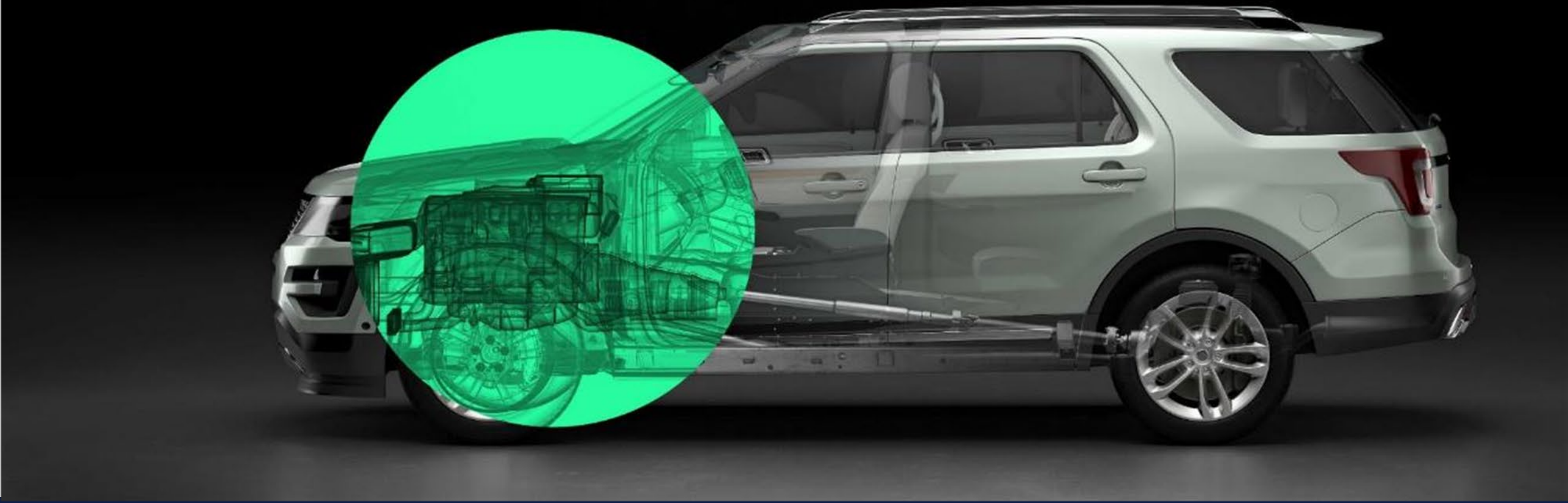
- Business Development Manager for Derive Efficiency
- Been serving the fleet industry since 2007 promoting “right sizing” calibration parameters for public and private fleets
- More than 20 years ECU experience in providing logical, pragmatic recommendations to increase efficiency while promoting safety and environmental responsibility
- National Membership Committee Chairperson for NAFA (National Association of Fleet Administrators)

DERIVE

Rethinking Idle with Technology

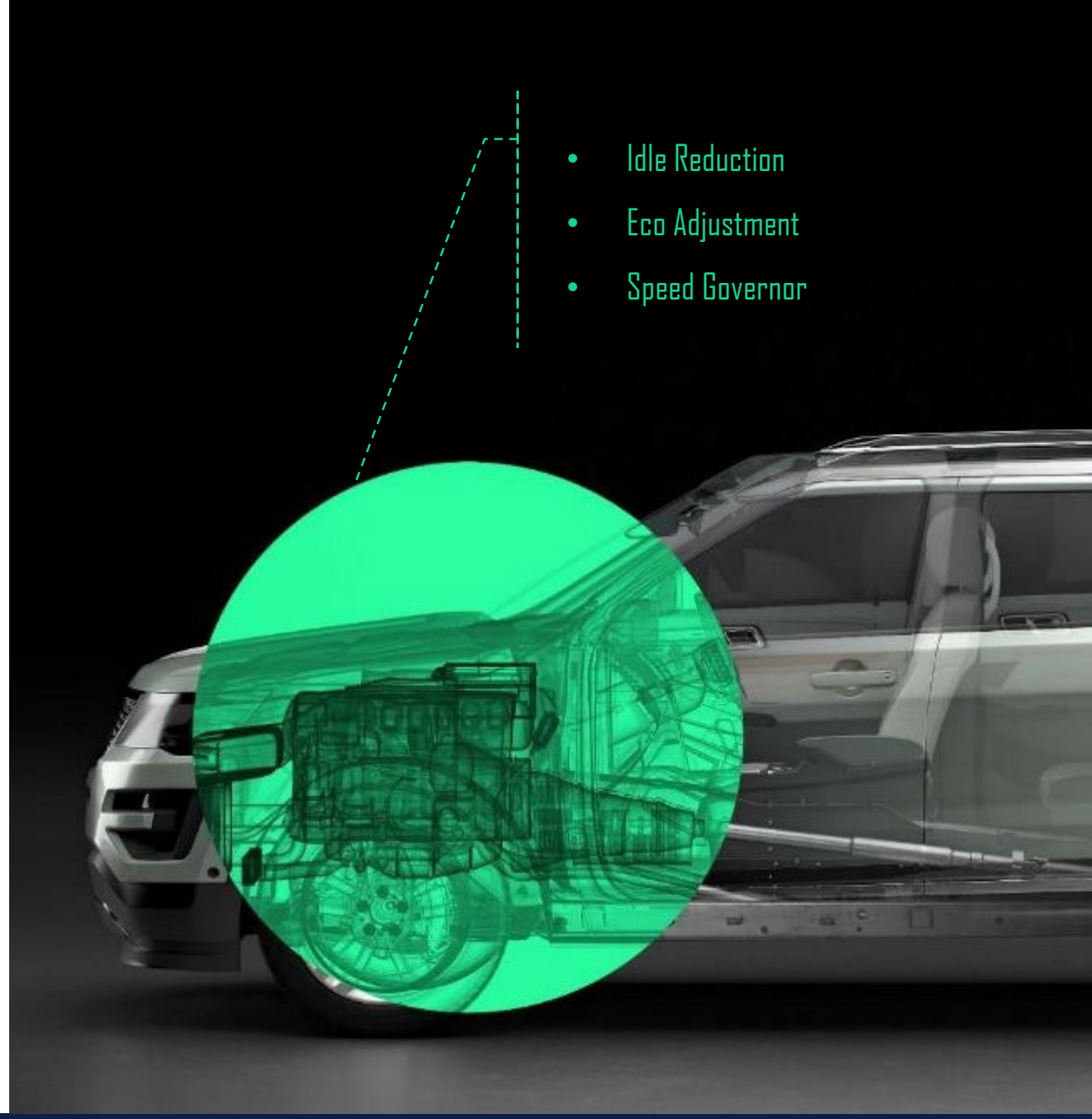
9/23/2021

Derive VQ recalibrates engines for better efficiency, provides enhanced telematics for greater savings, and shifts safety compliance from the driver to the vehicle.



What Makes VQ-Efficiency Unique: Calibration

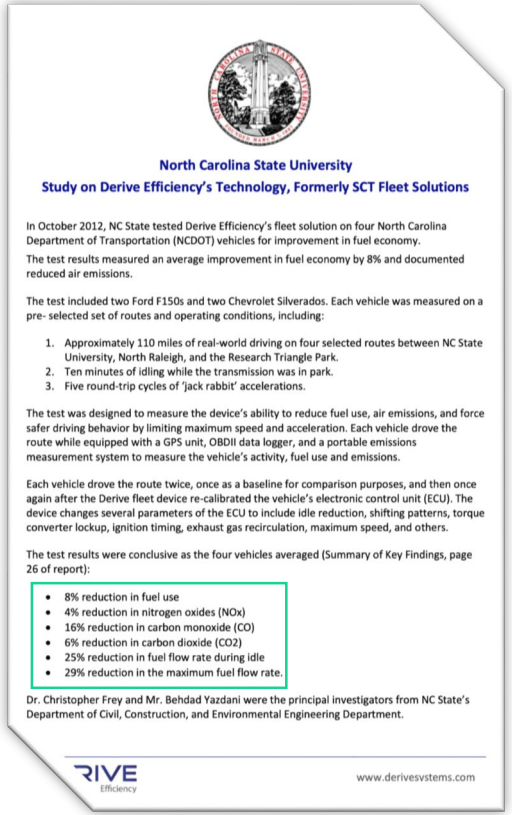
- We determine the standards of an internal combustion engine in order to ascertain the proper customization factors.
- We then use ECU Remapping (“calibration”) as a simple, safe and extremely effective method of electronic engine tuning.
- Every calibration is Clean Air compliant and designed to enhance the sustainability of the standard engine.
- It allows fleet managers to customize items like the speed allowed or idle times to increase of the engine's efficiency – thus driving safety and fuel savings.



Derive & The Internal Combustion Engine

An NC State University Study on Calibration Technology found that traditional ICE engines custom calibrated by Derive show:

8%	4%	16%	6%	25%
LESS Fuel Use	LESS Nitrogen Oxides	LESS Carbon Monoxide	LESS Carbon Dioxide	LOWER Fuel Flow (idle)



North Carolina State University

Study on Derive Efficiency's Technology, Formerly SCT Fleet Solutions

In October 2012, NC State tested Derive Efficiency's fleet solution on four North Carolina Department of Transportation (NCDOT) vehicles for improvement in fuel economy.

The test results measured an average improvement in fuel economy by 8% and documented reduced air emissions.

The test included two Ford F150s and two Chevrolet Silverados. Each vehicle was measured on a pre- selected set of routes and operating conditions, including:

1. Approximately 110 miles of real-world driving on four selected routes between NC State University, North Raleigh, and the Research Triangle Park.
2. Ten minutes of idling while the transmission was in park.
3. Five round-trip cycles of 'jack rabbit' accelerations.

The test was designed to measure the device's ability to reduce fuel use, air emissions, and force safer driving behavior by limiting maximum speed and acceleration. Each vehicle drove the route while equipped with a GPS unit, OBDII data logger, and a portable emissions measurement system to measure the vehicle's activity, fuel use and emissions.

Each vehicle drove the route twice, once as a baseline for comparison purposes, and then once again after the Derive fleet device re-calibrated the vehicle's electronic control unit (ECU). The device changes several parameters of the ECU to include idle reduction, shifting patterns, torque converter lockup, ignition timing, exhaust gas recirculation, maximum speed, and others.

The test results were conclusive as the four vehicles averaged (Summary of Key Findings, page 26 of report):

- 8% reduction in fuel use
- 4% reduction in nitrogen oxides (NOx)
- 16% reduction in carbon monoxide (CO)
- 6% reduction in carbon dioxide (CO2)
- 25% reduction in fuel flow rate during idle
- 29% reduction in the maximum fuel flow rate.

Dr. Christopher Frey and Mr. Behdad Yazdani were the principal investigators from NC State's Department of Civil, Construction, and Environmental Engineering Department.

RIVE Efficiency www.derivesystems.com

Vehicle Idle – Office on Wheels

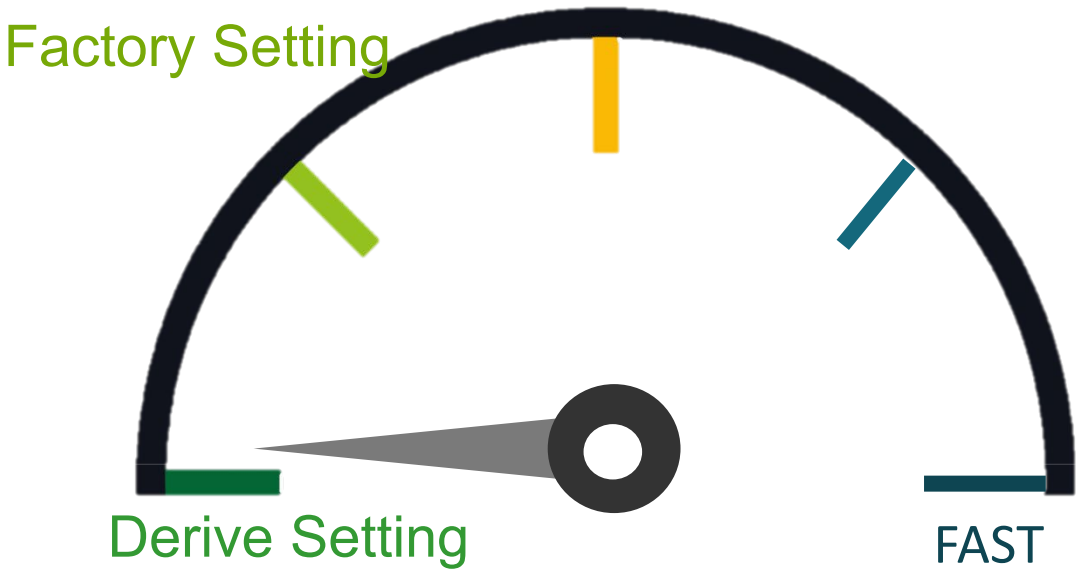
Idling is a vehicle function for a host of reasons:

- Mobile office
- Powering ancillary tools
  - Computers
  - Emergency lighting
  - Lifesaving equipment
  - Devices to perform services
- Providing shelter (climate)
- Distancing during Pandemic


How does Derive VQ Optimization work?

Derive VQ's idle is setting is lower than your factory setting

- Lower idle revolutions per minute (RPM) goes down by 20%-30%
- Does not impact your Vehicle auxiliary systems (HVAC, Electrification)
- 50 state emissions compliant (CARB)
- Business as usual



Case Study 1 – City of Ontario

Fuel Management

Calif. City Reduces Fuel Use With Vehicle Calibration

April 05, 2017 – Government Fleet Magazine

- Fuel Use: 140 Gallons of Month
- Derive Saves: 22.5 Gallons per month
- Idle: 56%
- Annual Savings: $750.60 @ $2.78
- Emissions Reductions: 5300+# lbs

Case Study 2 – NYPD

Derive Pilot

New York Police Department

Conducted 2016

- Fuel Use: 94 Gallons of Month
- Derive Saves: 9 Gallons per month
- Idle: 60%
- Annual Savings: $255 @ $2.32
- Emissions Reductions: 2100+# lbs

Case Study 3 – City of Port St Lucie

How one Florida PD is saving nearly 12 percent on fuel

Port St. Lucie Police Department

July 26, 2016 - Policeone

- Fuel Use: 91 Gallons of Month
- Derive Saves: 10.45 Gallons per month
- Idle: 76%
- Annual Savings: $275.00 @ $2.20
- Emissions Reductions: 2450+# lbs

DERIVE VQ

A Solution for Today to **Save Tomorrow**

The VQ platform's core purpose is to deliver advanced mobility solutions to decrease carbon emissions from fleet vehicles. Here is a closer look at how we are helping our planet with our cutting-edge software.

6.2M

Vehicles in enterprise fleets compatible with Derive VQ Efficiency

VQ® +

DERIVE VQ-E

If just 15% of these vehicles deployed Derive VQ Efficiency...

1.2M

Metric tons of CO_2 **eliminated** – annually

Or the equivalent of **74K**

Vehicles **eliminated** from the roads – annually

DERIVE SYSTEMS

How the emissions savings add up for the planet:

200M

EQUIVALENT OF TREES

2.8K

EQUIVALENT OF SQ. KM OF RAIN FOREST

Derive technology can reduce your fleet's carbon footprint today, and our technology is designed for the long-term sustainability of fleets.

Learn more at derivevq.com about how together; we can make an impact today.

*Study done by Bobit Business Media
Figures are estimated from past performance and vary by vehicle type and age

Getting Started is Simple

YOU PROVIDE

- VIN List
- Speed limit policy
- Seatbelt / phone policy
- Primary use case of a driver

DERIVE PROVIDES

- Coverage from VIN list
- Low monthly price
- ROI breakdown (month 1 / life)
- Customized implementation plan


THANK YOU

Example VQ-Efficiency Custom Calibrations

Fuel Efficiency

- Reduce Idle RPM by 10-30%
- Optimize the electronic throttle control to moderate acceleration levels
- Optimize shift points

Advantages

- Reduced Fuel Consumption
- Reduced Carbon Emissions
- Lower maintenance

Speed Limiting

- 1mph & 5mph increments
- Top speed by fleet manager
- Eliminate speeding tickets, aggressive driving, accident and complaints.

Advantages

- Increased Safety
- Reduced Liability
- Fuel savings

Law Enforcement

- Increase horsepower settings (+10 – 15 hp)
- Improve throttle response and quicker acceleration
- Reduce Idle RPM by 10%-30%

Advantages

- Improved performance
- Fuel efficiency
- Safety

Validated By 3rd Party Findings

*"Derive software **is an extremely viable investment from both a financial and sustainability** standpoint.*

*There was a significant improvement in fuel efficiency…an **average mpg improvement of 8.65%**."*

***Element Fleet Management** - Safelite Auto Glass Project*

SUMMARY

- $3,082 Savings Per Vehicle
- 7.9T reduction in CO2 Emissions
- Monthly return on investment

Validated By Customer Deployments

COMCAST

9.2%

ARS RESCUE ROOTER

8.3%

Safelite

8.3%

dish NETWORK

7.2%

sears

10.6%

USIC

7.1%

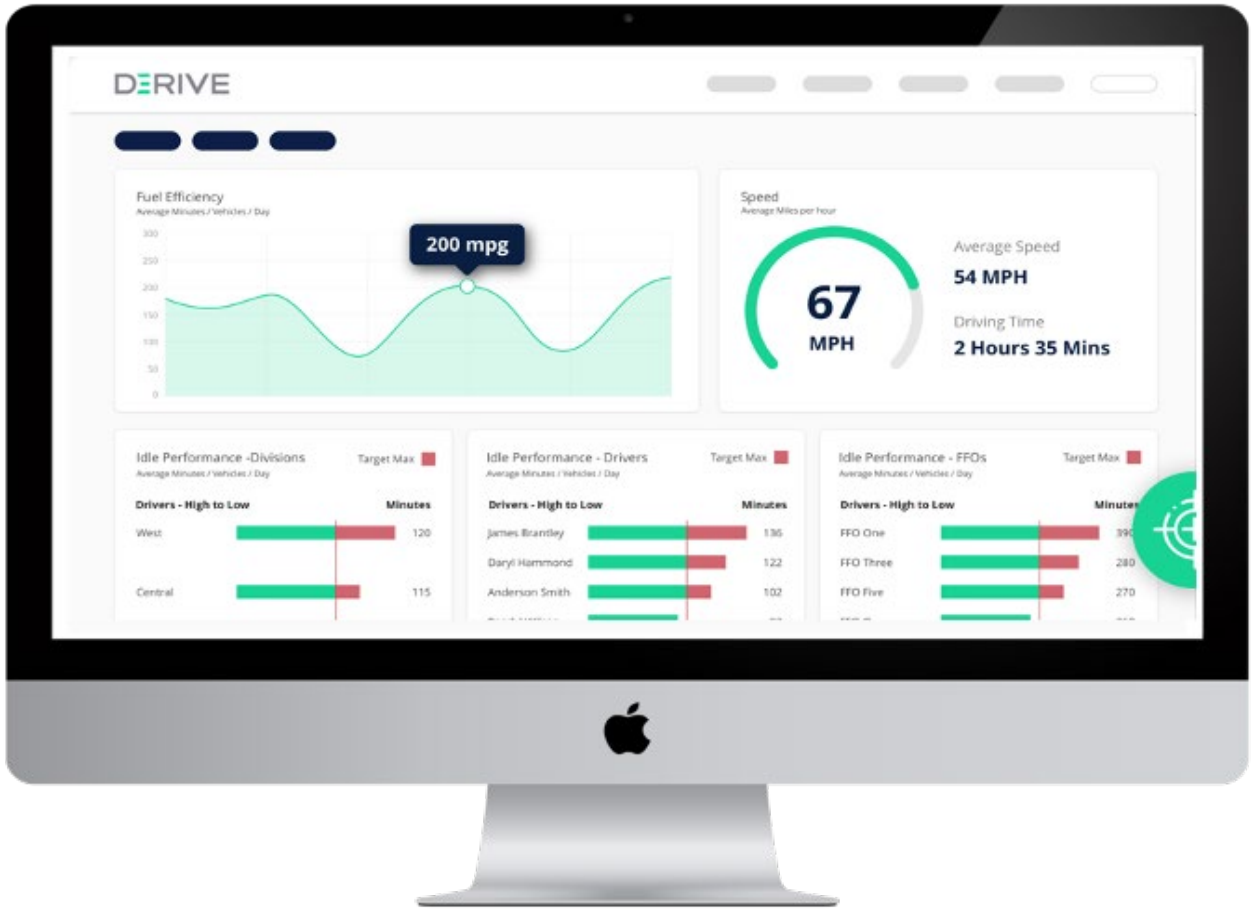
The Derive Platform has consistently shown fuel savings in excess of 6%, with some clients achieving greater than 10%.

Key Benefits

- ✓ Scalable platform (3 solutions in 1)
- ✓ Proven fuel savings of +6%
- ✓ Enhances traditional telematics ROI
- ✓ Simple installation (one time)
- ✓ Immediate Breakeven (ROI in month 1)
- ✓ Future orders can be installed at upfit
- ✓ No driver management/training for VQ-E
- ✓ No management oversight required for VQ-E
- ✓ OEM warranty unaffected + backstopped By Derive on VQ-E

Continuous Eco & Fuel Monitoring

- Real Time Fuel Burn Data
- Benchmarking / Testing
- Carbon Footprint
- Carbon Credits / Offsets
- Telematics Device Agnostic
- Regular Eco Reporting
  - ✓ nitrogen oxides (NOx)
  - ✓ carbon monoxide (CO)
  - ✓ carbon dioxide (CO2)
  - ✓ Total carbon reductions / equivalents



Neeraj Chirmulay
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864.283.2427

- Co-Founder and CTO for Viatec
- Primary interest and expertise is in systems engineering where different disciplines of engineering--mechanical, electrical and software--meet to create a final product
- Previous experience as a consultant for Washington DC Metro and with transportation electrification on electric buses and an off-highway multi-purpose electric work vehicle & power station
- Before jumping into transportation electrification worked on diesel engine development
- Master's degree at Clemson University's International Center for Automotive Research

VIATEC

VIATEC

Sustainable Fleet Expo Webinar Series

Idle Reduction: Simple and Impactful

Neeraj Chirmulay, CTO and Head of Eng.
Viatec, Inc.

NEERAJ CHIRMULAY

RETHINKING OUR APPROACH TO ELECTRIFICATION

Electric Trucks are the Future
...Eventually

THERE IS A PROBLEM WITH FLEET ELECTRIFICATION

- People focused on electrifying utility trucks for commercial work
- Cycles for new vehicles typically span 10 years
- This means many combustion Utility Vehicles will be in service for as much as 10 years after the advent of widely used electric trucks
- These trucks create most of their emissions while parked at the worksite, powering auxiliary equipment with the idling engine of the truck.
- Current solutions for electrification fundamentally change the composition of the vehicle which complicates it's lifecycle

- With this approach the time it takes to go electric is compounded

- The Question: Why aren't we focused on electrifying equipment first?
- It's not Smart-

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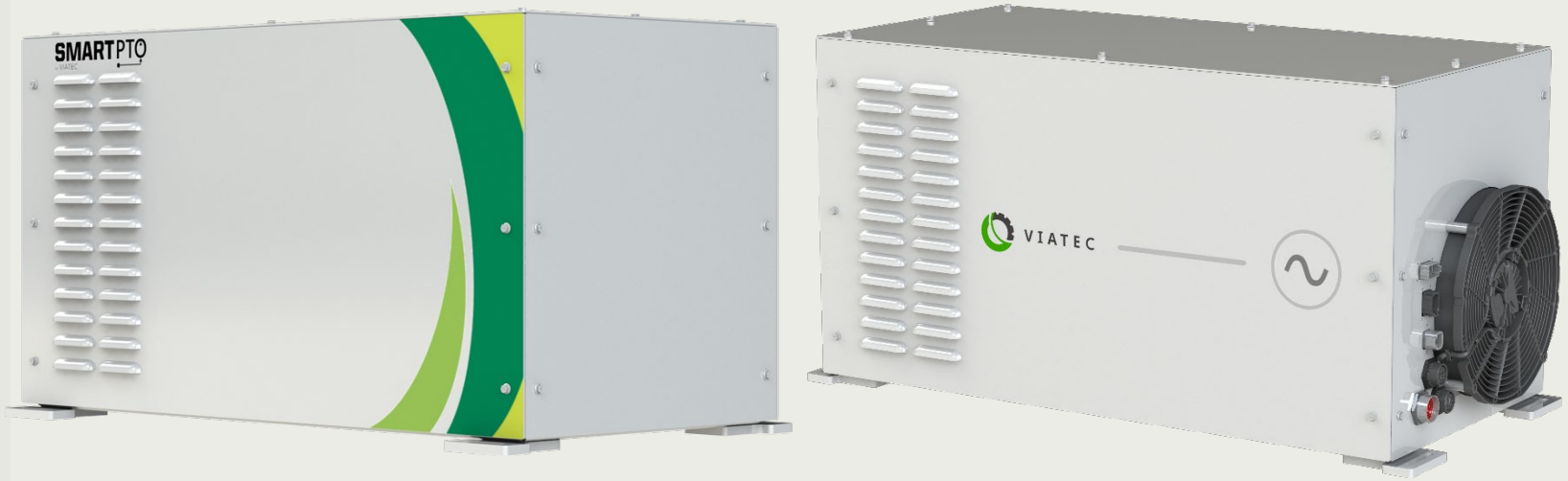
OUR SOLUTION
THE SMART APPROACH

RETHINKING OUR APPROACH TO ELECTRIFICATION

We created a solution that is fully parallel, plug and play. With a two-day installation we can power a work day's worth of equipment with an easy to install electric auxiliary power unit..

SMARTPTO & SMARTPX



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VIATEC LEADERSHIP

MARK FERRI
Founder and CEO

NEERAJ CHIRMULAY
CTO

ANJALI DEODHAR
VP-Sales and Marketing

An environmentally conscious corporation looking to lead the movement for greener solutions for trucks

An established team of forward thinkers with the goal of improving the world we live in by solving problems that impact the human footprint on the environment.

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GOAL: ELECTRIFY EQUIPMENT

Viatec products are designed to electrify vehicle work functions and enable Zero Emission Worksites

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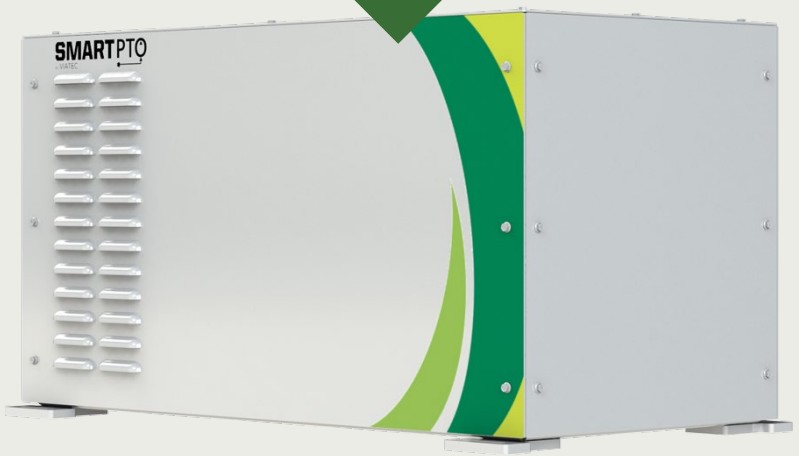
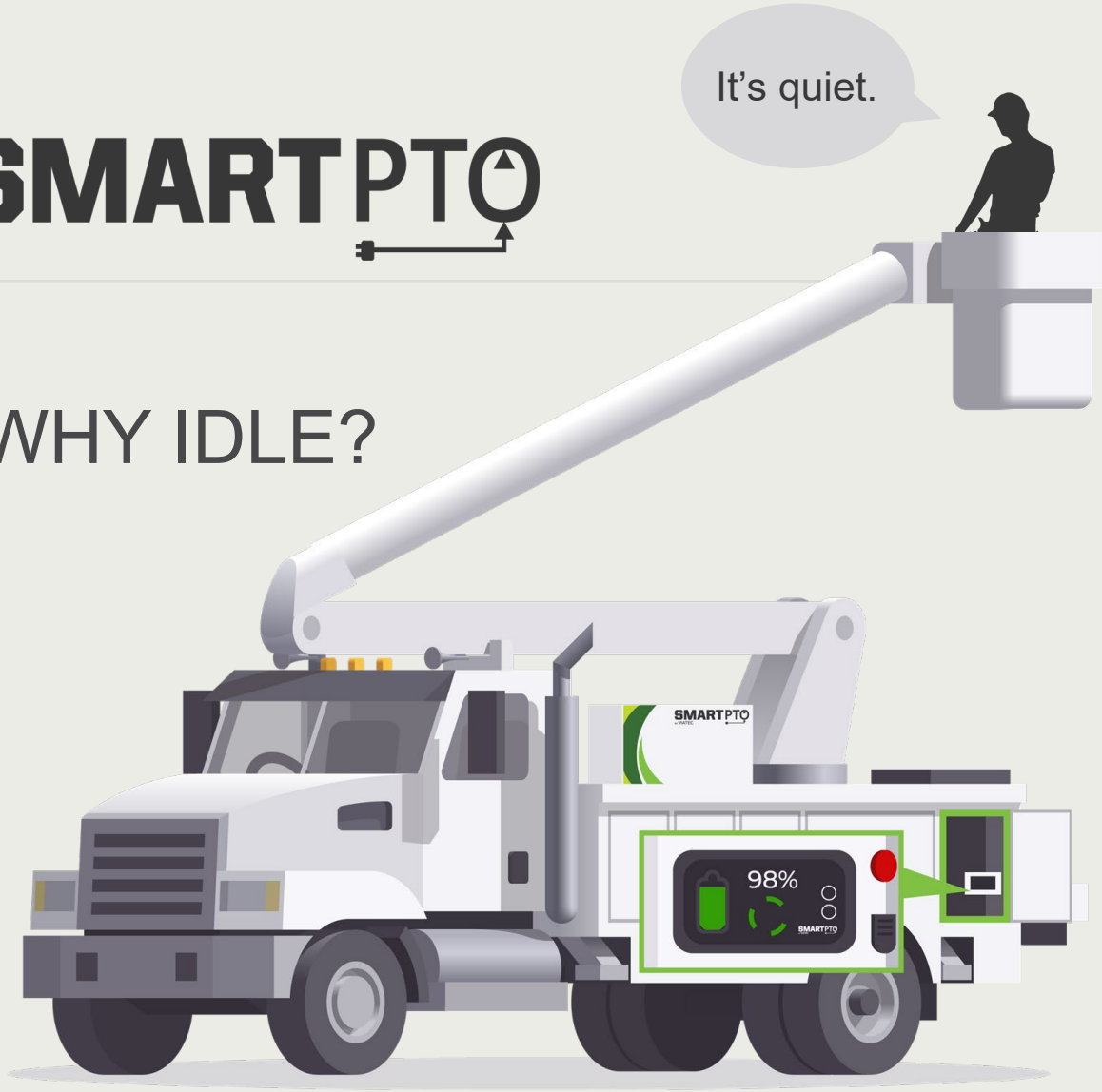
OUR FLAGSHIP SMARTPTO

Truly Parallel Auxiliary Power: Zero-Emission Worksites



WHY IDLE?



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AN ePTO THAT CHECKS ALL THE BOXES

Low Up-front Investment

Quick Implementation

Immediate Results

110 outlet or Level II charger

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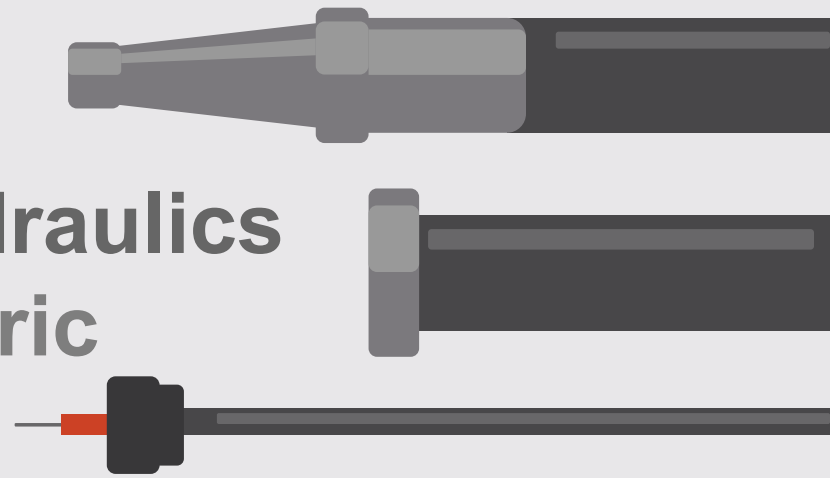
SIMPLE INSTALLATION, MINIMAL INTERFACING

Chassis and aerial device agnostic.
Retrofittable.

Pick a spot
Bolt it on
Connect hydraulics
Plug in electric
Done.



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7.2 / 14.4 / 21.6/ 28.8 kWh Battery Capacity Options
Sufficient for more than one full day of truck use

1300W On-board Charger (6000W optional)
Plug-in recharge with 110V plug (or EV Charger*)

Electrified Cab Air Conditioning (Optional)
Maintains comfortable cab temperature

Non-intrusive
Truck can still operate conventionally when desired

Telematics
Monitoring, Remote Diagnostics, Over-the-air updates

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FOR UTILITIES: Equipping your trucks with SmartPTO counts towards your EEI commitments!

Edison Electric INSTITUTE

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Now’s the time!

CARB Approval for HVIP

70+ Systems
Deployed

Top-5 Electric Utility
converting fleet to SmartPTO over 2021-25

OEM Preferred
2 leading manufacturers offer as only electric option

$100M
invested in powertrain development and testing (through our suppliers)

JOIN US AT THE UTILITY EXPO 2021

Join Viatec at the 2021 Utility Expo, both outside at demo stations with our OEM Terex and inside at our booth #N1814

Demonstrations with Terex
Terex Booth E1335 - Demo Area

- **Tuesday, September 28:**
  10:00 AM and 2:00 PM EDT
- **Wednesday, September 29:**
  10:00 AM and 2:00 PM EDT
- **Thursday, September 30:**
  10:00 AM EDT

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John Ferguson
Assistant Director
Fleet Management Department
John.Ferguson@durhamnc.gov

Bucket Truck

- CFAT grant for VIATEC Smart PTO
- Recently place into service
- Some pushback from the aerial OEM
- APU powered HVAC-Employee heat stress policy drives excessive idle in the summer months