



**Joint Northeast/Midwest States Equipment Management
Conference Freightliner Trucks – Chris Moran
GHG 14 and OBD 2013 Emissions Update**

June 24, 2013

Agenda



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- GHG 14 Emission Regulation
- OBD 13 Emission Regulation
- DDC Virtual Technician / Cummins Support Overview



Emissions History / Status



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EPA
02/04



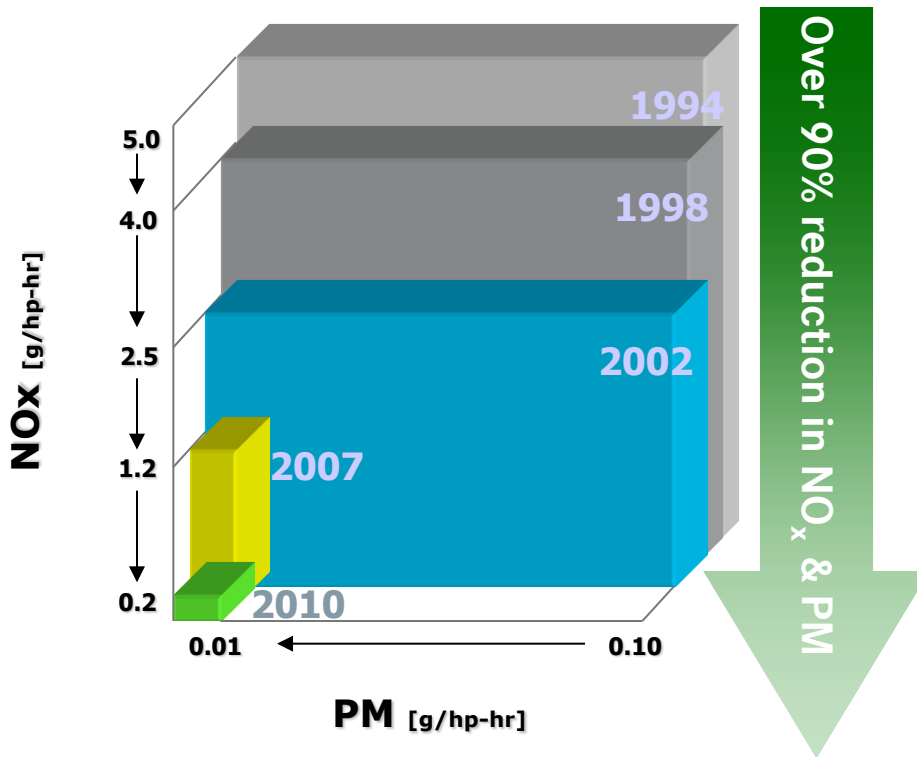
EPA07



EPA 10



OBD 13/
GHG 14



OBD13:

2007 – 2010 – 2013

GHG14:

2014 – Engine & Vehicle

2017 – More CO2 Reductions

What is Greenhouse Gas 2014 (GHG14)?

- The next government (EPA/NHTSA) emissions regulation which begins with model year 2014 and increases in stringency starting with model year 2017.
 - Breaks diverse truck section into (3) categories with unique approaches for each.
 - Pick Ups and Vans
 - HD Vocational Trucks
 - HD Combination Tractors
 - Individual Certification Required for: Chassis, Engine, A/C Systems
 - Separate CO₂, N₂O, and CH₄ standards* for engines, HFC standards for vehicles plus;
 - Greenhouse Gas (GHG): CO₂ Grams per Ton-Mile
 - Fuel Economy: Gallons per 1,000 Ton-Mile
 - HFC's: Leakage from A/C system may not exceed 1.50% per year
- *Does not change PM or NOX standards established for MY2010 engines**
- Every OEM must certify based on predetermined OEM Sales GHG14 target
 - Referred to as the 'GEM score' (see slide)
 - OEM is responsible for managing the certification of their units sold

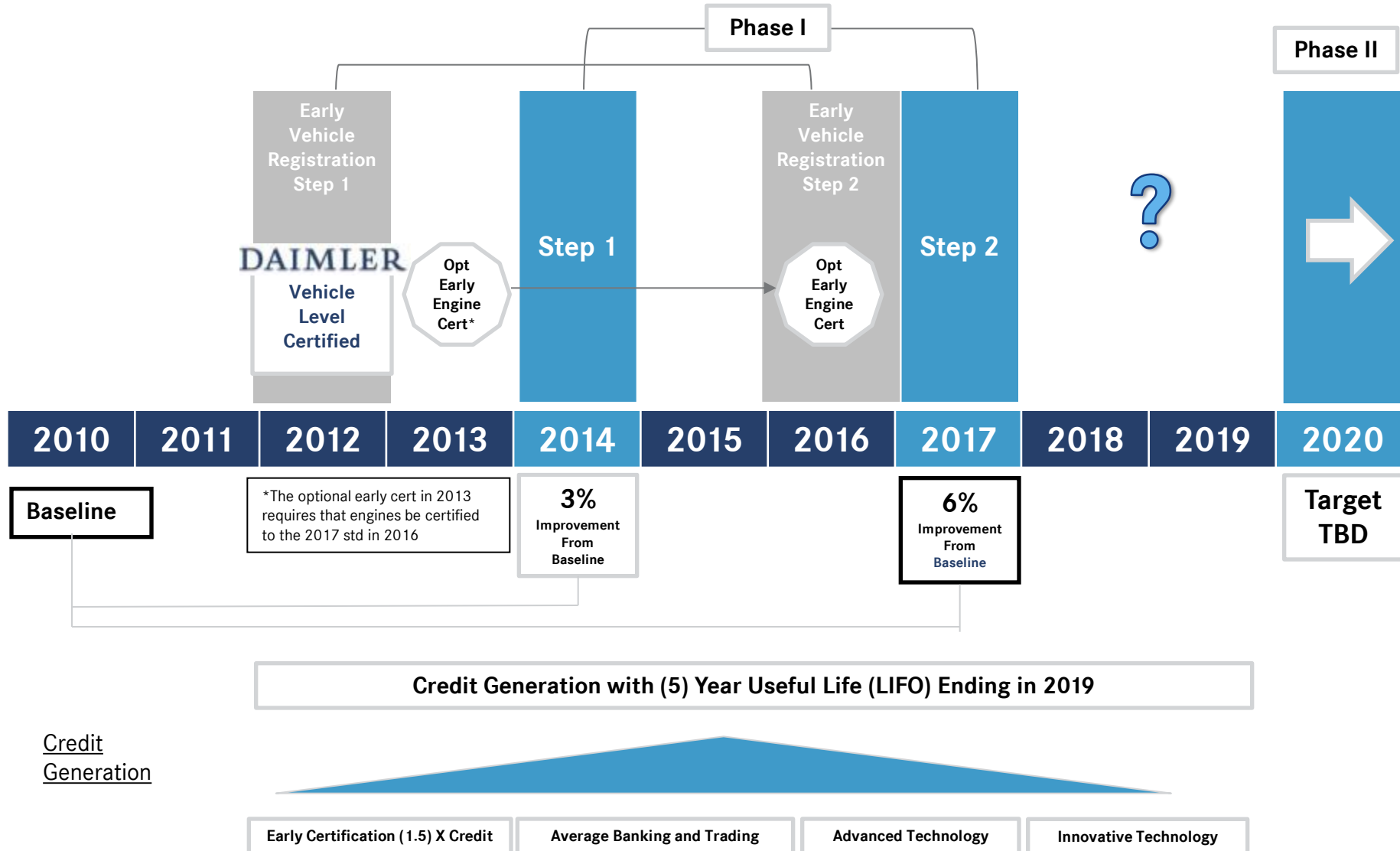
What do you need to know?

- Freightliner Trucks certified early for GHG 14
 - All truck models certified in February 2012
 - All engine families **certified for Model Year 2013**
- No DTNA truck models will need to use any GHG 14 regulation parameters to meet certification (see slide for details)
- Customer are not responsible for buying 'GHG 14 certified' trucks; Daimler Trucks North America (per the regulation) is responsible for ensuring their mix of units sold meet GHG 14 certification.
- DTNA sale of MY 2014 **vehicles** certified to GHG 14 regulations started on January 7, 2013

GHG14 - Regulation Overview



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Regulated Categories and GEM inputs



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Greenhouse Gas Emissions Model (GEM)

Identification

Manufacturer Name: Vehicle Configuration: Date:

Vehicle Family: Vehicle Model Year:

Regulatory Subcategory

- Class 8 Combination - Sleeper Cab - High Roof
- Class 8 Combination - Sleeper Cab - Mid Roof
- Class 8 Combination - Sleeper Cab - Low Roof
- Class 8 Combination - Day Cab - High Roof
- Class 8 Combination - Day Cab - Mid Roof
- Class 8 Combination - Day Cab - Low Roof
- Class 7 Combination - Day Cab - High Roof
- Class 7 Combination - Day Cab - Mid Roof
- Class 7 Combination - Day Cab - Low Roof
- Heavy Heavy-Duty - Vocational Truck (Class 8)
- Medium Heavy-Duty - Vocational Truck (Class 6-7)
- Light Heavy-Duty - Vocational Truck (Class 2b-5)

Simulation Inputs

Coefficient of Aerodynamic Drag:

Steer Tire Rolling Resistance [kg/metric ton]:

Drive Tire Rolling Resistance [kg/metric ton]:

Vehicle Speed Limiter [mph]:

Vehicle Weight Reduction [lbs]:

Extended Idle Reduction:

Simulation Type

- Single Configuration
- Plot Output
- Multiple Configurations

RUN

gCO₂/ton-mile

Tractor regulatory sub-categories

- Aerodynamics
- Rolling resistance of tires
- Vehicle weight
- Engine efficiency
- Idle reduction (AES or Automatic Engine Shutdown)
- Speed limiters (VSL)

Vocational regulatory sub-categories

- Engine efficiency
- Rolling resistance of tires

The model inputs will determine the Family Emission Limit (FEL) for that vehicle configuration - Each truck will be compared to a “standard”

Source: 40 C.F.R. Parts 1036 and 1037, 76 Fed. Reg. 57106 Sep. 15, 2011.

Example of how GHG14 components affect vehicles



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Non-Aero



This Cascadia features only minor aero options, no VSL, and regular tires

Estimated GEM score: 78



Aero



This Cascadia features many aero options, no VSL, and low rolling resistance tires

Estimated GEM score: 71



This Cascadia features many aero options, VSL, and low rolling resistance tires

Estimated GEM score: 64



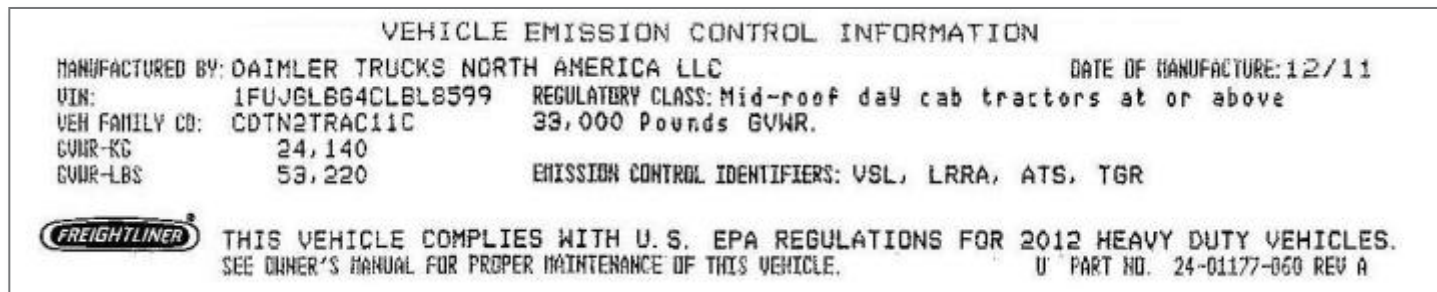
With all the **available technologies** that DTNA offers, **improving** the vehicle's grams CO₂/ton-mile and fuel efficiency **is easy!**

GHG14 requires few changes to your vehicle



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We've added an emissions label (found on the inside edge of the driver-side door or inside the driver-side door jamb on most vehicles). **The label displays that your DTNA vehicle meets GHG efficiency requirements, as designed.**



Do not remove or tamper with this label. It's part of the vehicle's certification.

Answers to commonly asked questions 1/2



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“Daimler certified early just for the credits...”

- Early certification maintains Daimler’s fuel efficiency market position.
- Credits are granted only if we sell fuel efficient vehicles; they are not provided merely for certification.
- Value of the credits is unknown.
- We hope that gathering credits our first year will allow for increased flexibility for our customers in the future.

“Vehicle speed limiters are mandatory...”

- Daimler chose not to make VSLs mandatory in 2013.
- Our vehicles were fuel-efficient enough to certify in 2013 without VSLs, but they may carry more weight in the future.

“My costs will go up...”

- Unlike EPA04 and EPA07, if you decide to buy GHG14 fuel efficiency packages, up front costs will pay for themselves within a few years.
- You can expect normal end-of-year escalators, but those price increases aren’t due to GHG14.

“I have to buy the vehicle you want me to buy...”

- Flexibility to configure your vehicles is the same as today.
- We plan to give you enough information about fuel efficiency options to make the smartest decisions for your business model.

Answers to commonly asked questions 2/2



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“After purchase, I can’t make changes to my vehicle...”

- The EPA understands that it is possible components (i.e. LRR tires) might be replaced with other non-regulation components (i.e. non LRR tires).
- EPA knows that once the vehicle has been entered into commerce, the most OEMs can do is educate customers on the most fuel efficient options. Remember, technically the EPA could say the addition of a bike rack on a passenger car alters the aerodynamic profile of the vehicle.
- OEM’s duty is to inform customers to replace like with like, as stated in the letter. As an OEM, we are motivated to best educate customers because our compliance is contingent on sales and maintenance of compliant components.



We are currently **collecting questions from fleets and customers** to incorporate in a Q&A document. Our goal is to address all customer concerns while answering with a **consistent message**.

What is On Board Diagnostics (OBD 2013)?

- OBD regulations require diagnostics that detect discrete failures or degradation of components and degradation of systems
- OBD systems must monitor all the inputs and outputs of the emissions control system to verify proper functionality
- OBD systems must inform the operator that a failure has been confirmed via the Malfunction Indicator Lamp (MIL).
 - State Inspectors may inspect for illuminated MIL.
- The OBD system must record failure codes and event data to aid repair technicians in their diagnosis and repair of failures
- OBD is required for all engine families
- The number of systems being monitored have been increased (Compared to previous 2010 regulations.)
- The variances allowed (from the emissions standard) are lower for OBD 2013 (Compared to previous 2010 regulations.)
- OBD requirements are driven by California Air Resource Board (CARB) and regulated by both EPA and ARB.
- OBD requirements increase in stringency, complexity and applicability as model years progress. e.g. MY2010/2013/2016

What do you need to know

- All MY 2013 Detroit and Cummins engines are certified to meet OBD 2013

The 2013 MY is the first MY that all engine families require OBD certification. Previously each manufacturer was only required to submit one engine family for OBD certification. For DDC, that was the DD15 engine. The OBD application for Certification is separate from the criteria pollutant and GHG application. OBD approval for each engine family is required for each engine family prior to EPA granting a Certificate of Conformity and ARB granting an Executive Order. The OBD review and approval process is more detailed and can affect the timing of the Certificates of Conformity and the Executive Orders.

Legislative Requirements Changes



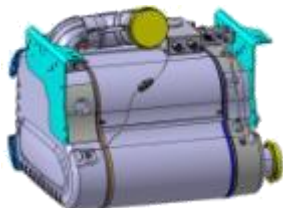
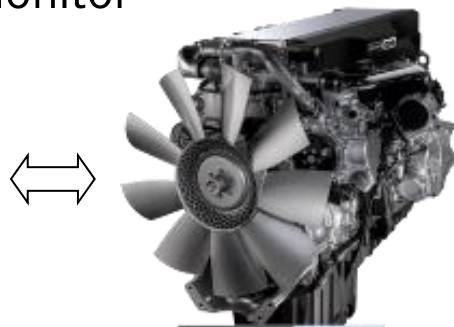
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Topic	OBD 2010 Requirements	OBD 2013 Requirements
Product scope	One engine family requires OBD certification per engine OEM – Only one engine rating per year requires certification demonstration	All engines families require OBD certification
Emission threshold monitoring	Certify major emissions threshold monitors to 2.5 times emissions threshold limit	Certify major emissions threshold monitors to 2.0 times emissions threshold limit
Compliance of monitors	Compliance demonstration of over 30 major monitors	Compliance demonstration of over 40 major monitors
Communication protocol	Required OBD diagnostics information communicated acceptable in a OEM proprietary protocol format	Standardized J1939 diagnostics communication required (OEM proprietary format no longer acceptable)
Performance ratio requirements	Performance ratio only required to be tracked and reported	Liability for performance ratio requirements of 0.1 not met
Reporting	n/a	Increased reporting requirements

Monitored Components / Systems











To monitor the performance of all components that have an impact on emissions or are part of the OBD system in order to detect deterioration or failure:

- Example – fouled EGR cooler will be detected by low EGR flow monitor and/or poor EGR cooler performance monitor



Fuel system	
Air system	
EGR system	
Cooling system	
Crankcase ventilation system	
DPF system	
SCR system	
Sensors and harnesses	
Actuators	

Monitored Components / Systems

Major System	Air	EGR	Other Base Engine
Individual MU	<ul style="list-style-type: none"> • Low Boost  • High Boost  • Feedback Control • Slow Boost  • Charge Air Cooler Performance 	<ul style="list-style-type: none"> • Low Flow • High Flow • Feedback Control • Slow EGR  • EGR Cooler Performance 	<ul style="list-style-type: none"> • Cold Start Monitoring  • Engine Out NOx sensor rationality • Idle Fuel Quantity Error   • Thermostat  • Engine Warm Up  • Intake Throttle Rationality 



Deficiency in 2010/New feature in 2013/New Requirement in 2013

Pioneers in Natural Gas Market



Freightliner Trucks – The leader in natural gas deliveries of conventional heavy duty trucks: 50% market share in conventional products*

More than 2200 natural gas-powered trucks and tractors since 2008, plus 755 more on order

Only conventional OEM producing natural gas vehicles with full factory installation and warranty

First to publicly demonstrate ISX12 G-powered vehicle

First to drive a loaded heavy duty commercial truck cross-country on publicly available CNG



*Class 6-8 2010-YTD 2012; Source: RL Polk registration data

What's Driving Natural Gas?



Lower fuel costs and less price volatility than diesel fuel – quick payback

Dependable spark ignition engine technology

Simple after-treatment - **NO DPF, NO REGENS**

No SCR required

Reduced GHG emissions, 20% Average

Noise reduction – ten (10) db reduction vs diesel

Domestic fuel/energy security/NAFTA Jobs

Renewable fuel technology advances

Education- No longer mystery fuel

CNG
LNG
Diesel



	Diesel	CNG
MPG	6.0	5.4
Miles/Year	80,000	80,000
Fuel Price	\$4.04	\$1.80*
Gallons/Year	13,333	14,815
Fuel Costs/Yr	\$53,867	\$26,618
Annual Fuel Savings	Yrs Payback @ \$40,000 Premium	
\$27,249	1.47	

LA to DC on CNG Cross Country Tour Summary



What: Drive Cascadia with ISX12 G from Long Beach, CA to Washington, DC

When: Began following ACT Expo, which ended May 17, 2012. First stop on May 18. Tour ended at dealer meeting location in Washington May 24.

Where: Four (4) stops between Long Beach and Washington:

- Phoenix
- OKC
- Little Rock
- Nashville



CNG Cross Country Tour – The Return Trip

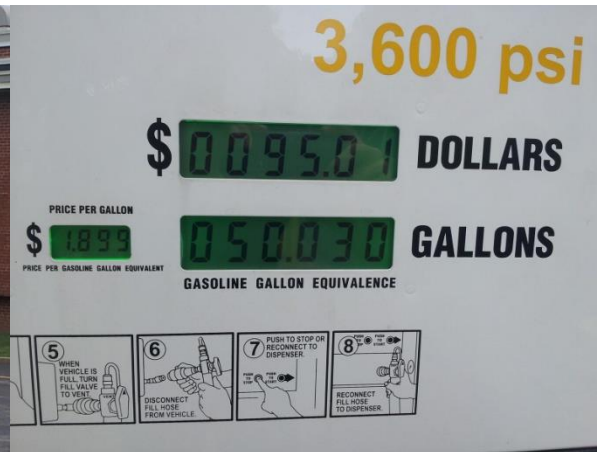


What: Drove Cascadia 113 with ISX12 G from Richmond, VA to Los Angeles, CA

When: Began July 13, 2012 and concluded July 25, 2012 in Los Angeles, CA.

Where: Tour traveled from Richmond up I-95 through DC, to I-70 west to Kansas City, up to Omaha and along I-80 corridor to Salt Lake City, then down I-15 to Los Angeles.

- Three day stop at Cummins Indianapolis/Columbus, IN for testing purposes



Cummins Commitment to Better Processes and Systems to Support

Key Improvement Areas

- RAPIDSERVE Web Improvements
- Dealer Diagnostic Support
- Expert Diagnostic Systems (EDS)
- Web-based Cummins Virtual College



Silver Award Winner – Edison Awards!



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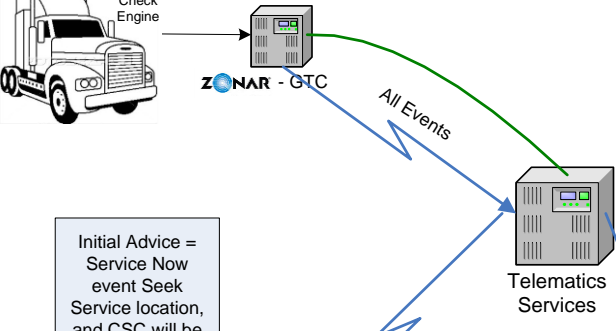
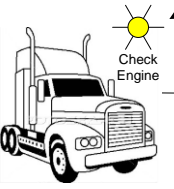
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Virtual Technician



Virtual Technician Data Flow

Check engine light comes on, the diagnostics start immediately



Service Now Events escalate to the Customer Support Center in the form of a Remedy ticket

Service Info

- Advises operator/dispatch of CEL/MIL
No action required – Information only

Service Soon

- Advises operator/dispatch to check when convenient or on completed trip – Not Urgent

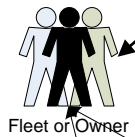
Service Now

- Advises the CSC, review of fault log and send a note with recommendations to operator/dispatch

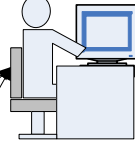
Initial Advice = Service Now event Seek Service location, and CSC will be in touch in 20 minutes

Automatic Customized E-Mail Notification Details of event (SN, SS, or SI)

Location Name	First Name	Last Name	Contact Type	Reference #
ZONAR	Virtual/Fleet	Virtual/Fleet	Fleet	000000037034
LDC Code	DDC Code			
	{ 734 }	776	-[8490] Ext	
VIN/Serial #	DDC Engine SN	Engine Model No	Replacement Eng SN	Ship Date
2F2HDMCV93AY77650	47230150035678	D472301		2/27/2010
Fleet Name	Fleet Number	Engine Version	Mileage	MI
DTNA Valued Customer	101234	D15E10	45632	0
CSC Rating				Alt Phone
2 - Meets				123-456-7890
Group Assigned				Priority
DDC Engineer				Urgent



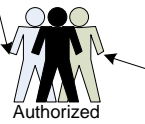
Fleet of Owner



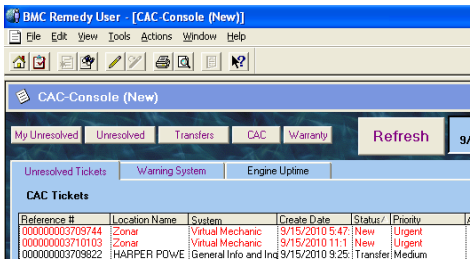
CSC

Follow up Email communications by CSR, customer, and/or service location

Fleet and SL arrange Service agreement

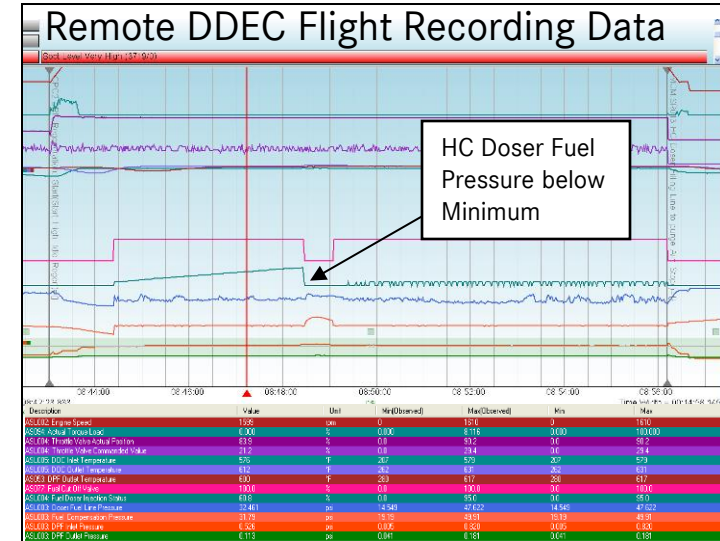


Authorized Service Locations (SL)



What is the device?

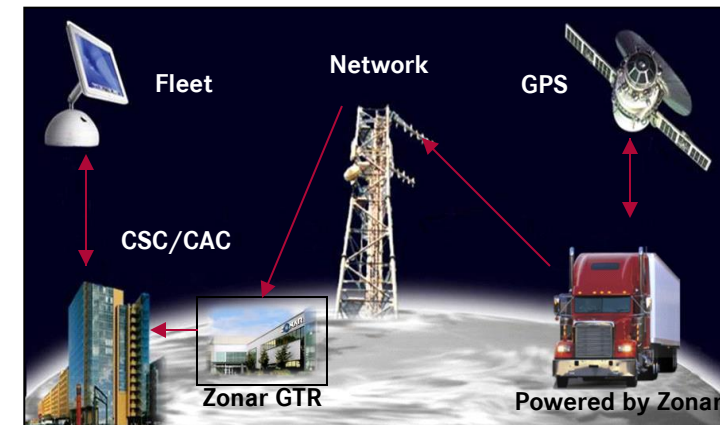
Virtual Technician



The Virtual Technician module which is mounted inside the vehicle will perform a “snapshot” or “flight recording” upon occurrence or an Engine Dash light. Then send the information via cellular to a Ground Traffic Control web site accessed by the Customer Support Center three minutes after the event occurs.

This provides flight recorded data to the CSC as it occurs and allows for a proactive versus reactive service repair approach.



The CSC contacts the fleet to determine the desired service location and prepares a package with the flight recording, cause of the problem, service procedure to correct and parts required for the repair before the customer arrives at the repair facility.



What does Virtual Technician do for the Customer?

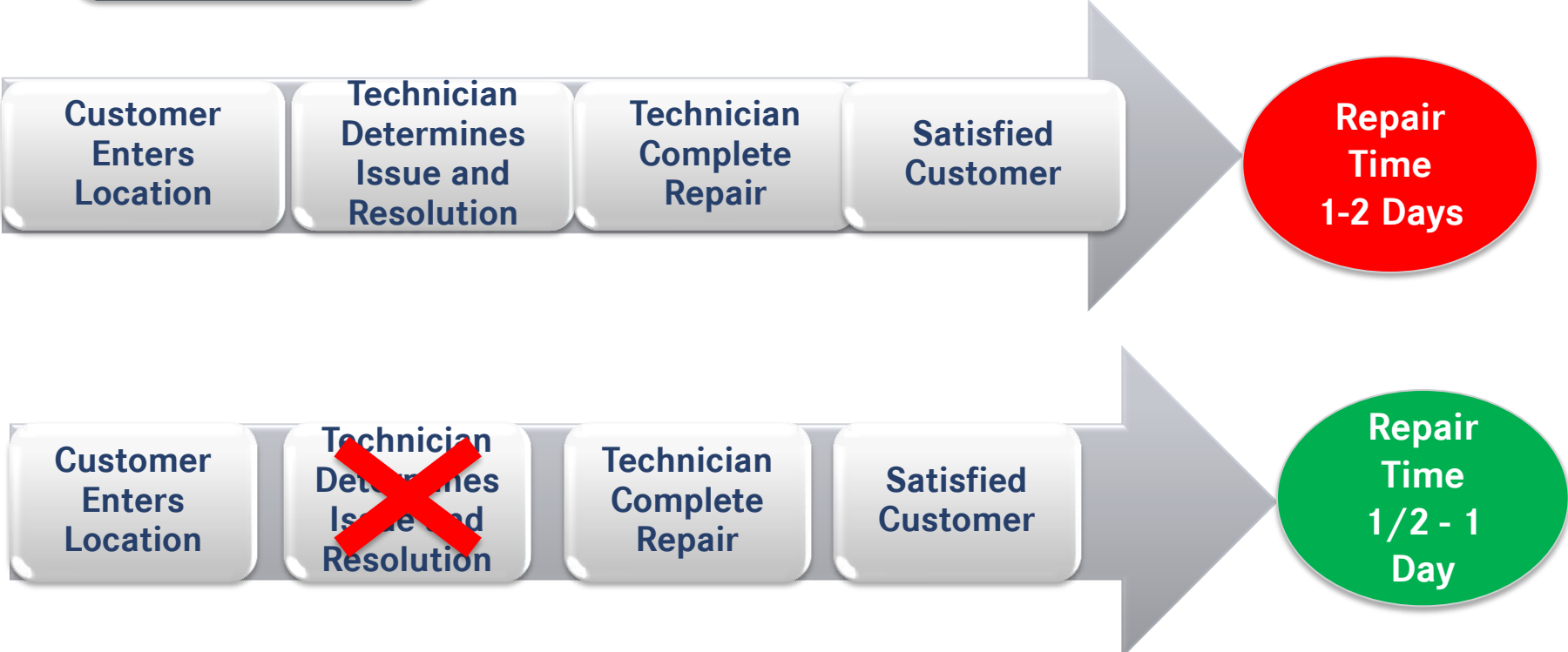


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Service Event	VT Action	Customer Benefit
<p>Service Soon</p> 	<p>Detroit CSC sends a notification, as well as recommended service and contact information for the Detroit Customer Support Center (CSC)</p>	<p>Trucks continues to operate and customer is notified of recommended action (and potential assistance if needed)</p>
<p>Service Now</p> 	<p>Engine information automatically relayed to the Detroit CSC for analysis. A trained representative will evaluate the data and recommend possible solutions. If required, the CSC will provide listings of the nearest service locations to the customer, who makes the decision on which location to seek service.</p>	<p>Customer contact (and driver via contact) is notified of recommended action avoiding any potential damage to engine and providing quickest up time solution.</p>

Repair Time Benefits

DEALER INVOLVEMENT:
Location prepares for customer: service bay, technician, parts



Virtual Technician Customer Benefits

- **Avoided or reduced truck downtime**
- Real time communication to the fleet of vehicle event and type of event
- Provide fleet the choice of repair facility and opportunity to “schedule” repair with service procedure and parts required identified
- Advanced notice provides repair facility with opportunity to obtain parts required
- Remote diagnostics eliminates unnecessary repair facility referrals
- Accurate diagnosis and “fix right the first time”
- Fast, detailed and accurate communication of event
- Reinforces Daimler is customer focused

**DEALER
INVOLVEMENT:**
Satisfied Customer



Questions?