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Update on the Diesel Exhaust Fluid Infrastructure in N.A. – the next steps

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Various Associations have been involved to oversee the launch of SCR / Diesel Exhaust Fluids in the North America:

- **Auto Alliance Association:**
 - SCR Stakeholders Group (300 supply companies, OEMs, agencies)
 - SCR Communications Task Force (www.FactsaboutSCR.com & www.TruckSCR.com with content managed by Quixote Group)
- **U.S. Department of Energy:**
 - Diesel Exhaust Fluid Locator Website
- **American Petroleum Institute:**
 - Quality Certification, Licensing & Official Mark
- **Engine Manufacturers Association:**
 - OEM Coordination
 - SCR Urea Task Force
- **NATSO involvement:**
 - National Association of Truck Stop Owners



Passenger cars and light duty trucks will launch SCR 1st in North America:

- Numerous automotive manufacturers will launch SCR technology in late 2008 / early 2009:
 - Mercedes, Audi, BMW will launch new models
 - DEF infrastructure will be in place to support this segment
 - DEF refills will be timed with service intervals and oil changes
 - Dealers and other retail outlets will support the requirement



The SCR vs. EGR debate occurred in the North American trucking segment:

- Daimler, Volvo & PACCAR made early announcements about their commitment to introducing SCR in 2010
- Cummins Engine Company announced a change in its direction and its support for SCR in August
- Over 90% of the industry (Class 8 trucks) will be focused on SCR for 2010
- SCR for off-road heavy duty and retrofits will also come online soon



The Consumption Estimates - The need for Information:

- Supply Chain required information in order to justify investments for the future
- TIAX study was outdated – June 2006
- OEM's had a clearer vision of 2010:
 - SCR dominated technology choice
- Engine Manufacturers Association agreed to conduct private OEM survey

Survey Requirements and Information:

- **Engine OEM's provided the following data privately to the EMA:**
 - **On-highway engine sales forecast:**
 - **In service dates from 2010 through 2019**
 - **Listed by vehicle weight categories:**
 - **Classes 3, 4 & 5**
 - **Classes 6 & 7**
 - **Class 8**

Survey Requirements and Information:

- **Details required by each OEM:**
 - **Annual number of SCR-equipped engines**
 - **DEF dosing rate (% to diesel fuel)**
 - **Average fuel economy (miles per gallon)**
 - **Annual miles traveled (1st year / 1/2 average annual mileage)**

Final Publication / Conclusion:

- Publication was delayed in mid August in order to finalize details:
 - Final release was published on August 25, 2008
- EMA consolidated all information keeping OEM data private
- Conclusion:
 - 1.342 billion gallons will be consumed in the first (10) years



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Diesel Exhaust Fluid (DEF) - Consumption Estimates For U.S. and Canadian On-Road Commercial Vehicles

Gross Vehicle Weight Rating	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Classes 3,4,5	4,508	15,289	24,322	33,655	53,831	53,730	62,054	70,428	78,858	87,486
Classes 6,7	7,041	13,288	22,683	32,053	41,120	50,344	59,928	69,604	80,365	92,101
Class 8	43,014	143,745	269,117	397,358	529,088	660,302	784,063	907,643	1,034,576	1,162,666
TOTAL	54,563	172,322	316,122	463,066	614,039	764,376	906,045	1,047,675	1,193,799	1,342,253

Gallons DEF x1000

DEF Manufacturing in North America:

- Terra Industries will produce DEF in numerous locations
- Yara International has made recent facility investments
- Other large producers are involved:
 - Agrium, CF Industries, Dyno Nobel, Potash Corp

The Agrium logo features the word "Agrium" in a serif font, with a green leaf-like symbol integrated into the letter "A".The CF Industries logo consists of a green leaf icon followed by the text "CF Industries" in a bold, sans-serif font. Below the text is a thick green horizontal bar.The logo for Dyno Nobel, featuring the word "DYNODyno Nobel" in a blue, sans-serif font.The logo for PotashCorp, featuring a green leaf icon followed by the text "PotashCorp" and the tagline "Helping Nature Provide" below it.

DEF Distribution:

- Distribution channels for DEF are in place:
 - Currently supply the public utilities and “Energy Sector”
 - 50% blend
- AUS 32 is in production in small quantities with transportation investments underway for 2010, including:
 - Rail spurs
 - Truck unloading stations
 - Laboratories
 - Dedicated tanker trucks



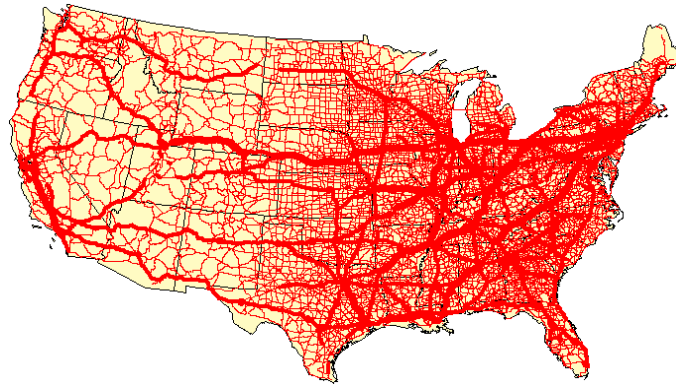
The dispensing segment of the supply chain is reacting to future demand:

- Numerous North American businesses have been engaged
- Gilbarco and Dresser Wayne, the leading commercial dispenser manufacturers:
 - “Demand will drive commitment”
 - Nozzle innovation and couplings are in process
- Joint ventures with European companies are possible
- Legal issues must be addressed:
 - Weights and Measures approval
 - Point of sale transactions
 - UL electrical approval
 - Truck plaza location
 - Fire marshal education and local approval



Sale of DEF in bulk at major truck stops is under consideration:

- Unlike Europe, many class 8 trucks do NOT return to home depots weekly
- The need for truck stops to be “on board” is critical:
 - Four major Truck Travel Centers support the current diesel infrastructure:
 - Pilot, Flying J, Travel Centers of America, and Loves
 - All four are considering bulk DEF dispensing
 - Customers will demand bulk service
 - Daimler has taken the educational lead, working with the supply chain



OEM Dealers and Distributors will handle smaller quantities:

- Daimler, Volvo, PACCAR, and Cummins locations will all stock DEF
 - 275 gallons, 55 gallons, and 10L emergency fills will be common



DTNA Brands – Dealer Networks

Home depots will support DEF:

- 275 gallon IBC's (Intermediate Bulk Containers) will be the most popular size for home depots:
 - Hot and cold climates require additional storage techniques:
 - Enclosures
 - Heating and cooling systems
 - Shelf life (USCAR study on shelf life and temperature is underway)



Dedicated SCR Online Information Sites Linked to Web Locator

FactsAboutSCR.com

FactsAboutSCR.com

SCR, 1. *Selective Catalytic Reduction*: one of the most cost-effective and fuel-efficient vehicle emissions control technologies capable of reducing emissions to near-zero levels.

What is SCR? Performance Environment Public Health Impact Diesel Exhaust Fluid

Welcome to Facts About SCR

Thanks for visiting FactsAboutSCR.com where you can find the latest news and information on "SCR" (Selective Catalytic Reduction), a vehicle emissions control technology that offers fuel and operational advantages while optimizing engine efficiency and reducing criteria pollutants recognized by the Environmental Protection Agency (EPA) to near-zero levels.

SCR is one of the only emissions reduction technologies that is as good for business as it is for the environment. The reach of SCR is broad. SCR technology is being adopted by passenger car and light truck manufacturers serving the U.S., starting in 2008. Those manufacturers include: Audi, BMW, Hyundai, Jeep, Kia, Mercedes-Benz, Mini and Volkswagen. It is also being recognized as the primary emissions control technology of choice among manufacturers in the commercial trucking industry, including: Freightliner, Kenworth, Mack, Peterbilt and Volvo trucks. Leading engine manufacturers, including Cummins and Detroit Diesel Corporation, have also recognized SCR to be the preferred emissions control technology to meet EPA 2010 standards.

However, word of this remarkable and proven technology has been slow to spread across North America or be understood by the general public and commercial trucking industry, where it offers the greatest return in both economic and environmental benefits.

FactsAboutSCR.com will strive to educate, inform and keep you updated as the focus on EPA 2010 and more stringent regulations draw near and the inevitable implementation of SCR becomes a reality.

Google WWW www.FactsAboutSCR.com

News & Headlines

2010 SCR: What to Expect (Video)

Fuel Costs Top Truckers' Concerns - ATA report

Trucks Adjusting to Clean Trucks Program at LA Ports

Pilot is First to Provide Diesel Exhaust Fluid "At the Pump" for SCR

SCR Test Truck

EPA Announces Recipients of First Clean Diesel Grants

ATA Pushes for Cleaner Fleet, Infrastructure Needs

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TruckSCR.com

SELECTIVE CATALYTIC REDUCTION

Home How SCR Works Introducing DEF SCR Advantages

TAKE THE TOUR View the Specs

Diesel-powered trucks are the workhorses of today's society, delivering the vast majority of goods used in North America. Now, after two decades of dramatic emissions reductions, the North American heavy truck industry has been challenged to develop even cleaner diesel engine solutions to meet the Environmental Protection Agency's new standards for 2010.

An outstanding solution is *Selective Catalytic Reduction (SCR)* - an emissions-reduction technology with the ability to deliver near-zero emissions of nitrogen oxides (NOx), a smog-causing pollutant and greenhouse gas. SCR's performance has been proved in millions of miles of real-world truck operations in other countries, as well as in long-term field tests in the U.S.

SCR reduces NOx emissions to very low levels, while at the same time delivering excellent fuel economy and reliability. The system doesn't change the design or operation of the basic engine. Rather, SCR is an aftertreatment system which converts NOx in the exhaust stream into harmless gases. Modern diesels already use exhaust aftertreatment systems, called diesel particulate filters, to control emissions of another pollutant, soot (also known as particulate matter or PM).

SCR works by injecting Diesel Exhaust Fluid (DEF) into the exhaust. DEF is a simple solution of water and urea, a common nitrogen-containing compound. DEF works with the heat of the exhaust and a catalyst to convert NOx into nitrogen and water vapor - two harmless and natural components of the air we breathe.

The end result is cleaner air, excellent fuel efficiency (which reduces the amount of imported oil needed) and a

Diagram illustrating the SCR system components and process:

- Cooling System
- Diesel Engine
- Diesel Particulate Filter (DPF)
- Hot Exhaust from (DPF)
- Control Unit
- Diesel Exhaust Fluid (DEF) Tank
- Exhaust with DEF
- SCR Catalyst
- Nitrogen + Water to the Environment

Total unique visitors (Sep. – Oct.): **4,800+**
 (Press Release end of Sep. increased traffic by **362%**)
 Total documents downloaded: **1,000+**

Summary and Outlook:

- **Many associations are actively involved and preparing for standardization of the DEF infrastructure**
- **The entire supply chain is investing, collaborating, and strategizing in order to accommodate the 2010 launch**
- **The Trucking Travel Centers will play a key role in market development, dispensing in a variety of quantities (emergency fills to bulk dispensing)**
- **OEM's are organizing their dealers and distributors to prepare, forming many customer delivery outlets**
- **Communications and dealer training programs are underway**

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Thank you for your attention



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