

# Clean Diesel: The Progress The Message The Opportunity

*Allen Schaeffer  
Executive Director*



Diesel Technology  
Forum  
Leaders in Promoting  
Clean Diesel  
Technology



# Overview

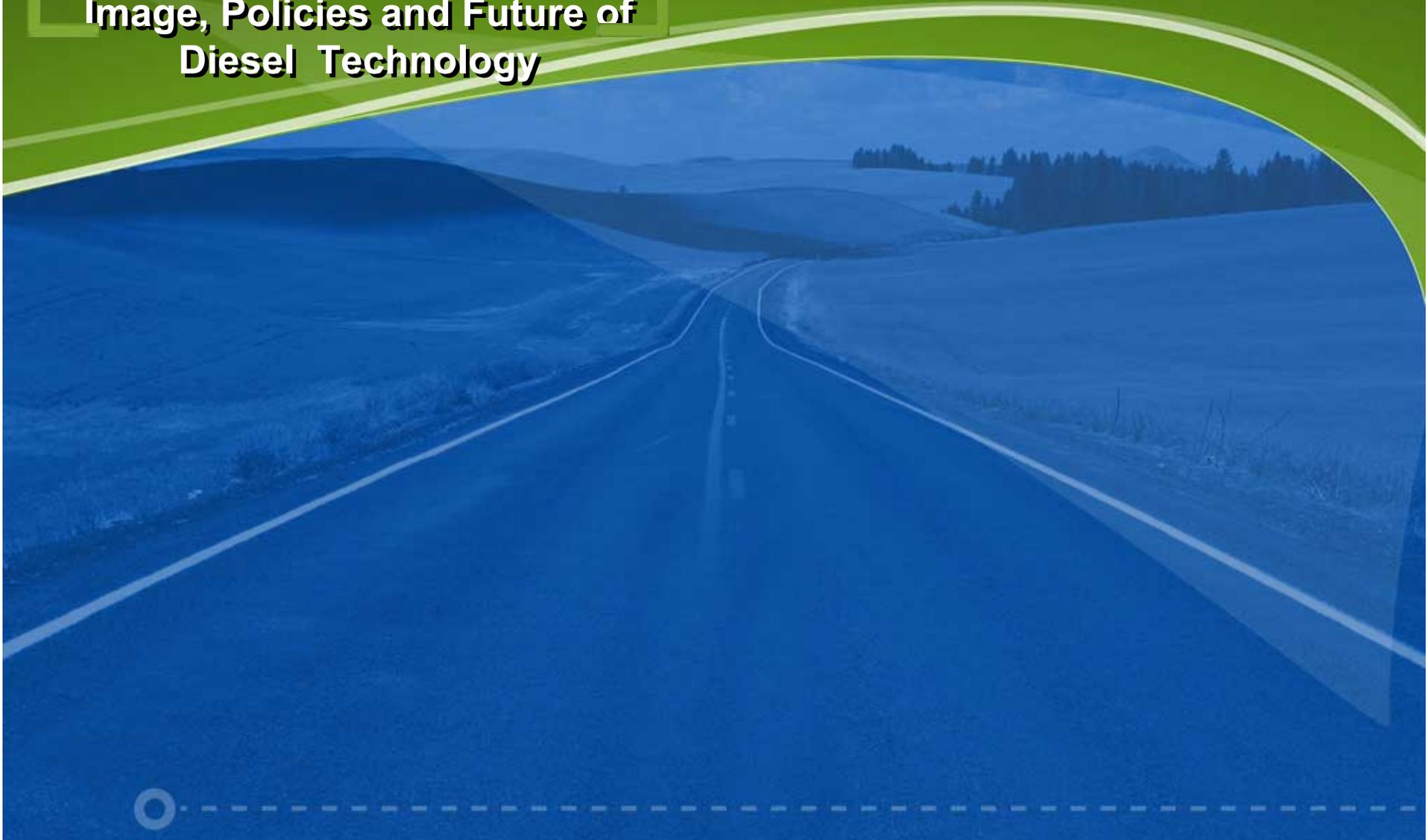


- **The Progress:** where are we from a Technology, Policy perspective?
- **The Message:** what is the credible message of diesel yesterday, today and tomorrow?
- **The Opportunity:** where does diesel fit in the future and how to get it there.





# Key Factors influencing the Image, Policies and Future of Diesel Technology





## Key Influences for Diesel Future

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**It's new, clean, real:** 2007 Cleaner Fuel and heavy-duty trucks --availability, price, supply, performance

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**The BIG Policy Dance:** Climate Change, Fuel Economy, Emissions – *can diesel deliver it all?*

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**Renewable Fuels** – everyone's talking home grown fuel, looking beyond basic bio, cost, quality, timing, -- new and unknown

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**Addressing the Old:** Legacy Products

Chasing the money– DERA & CMAQ, Policy approaches coming on – California mandate vs. voluntary;

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BIG Diesels Ports, Trains – unique, playing catch up, negative media + progressive policies

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**Light Duty Diesel** –Tier 2 Bin 5, 50 state –can do; real product announcements + some wishy-washiness

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Media and Public Perception: can they embrace diesel?

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**California** -- has it all: Greenhouse gases, Low Carbon Fuels Std, 50 state diesel? Technology neutral, right?



# The Progress

## Clean Diesel Technology



- 2007 has arrived
- Ultra-low sulfur diesel fuel is here... *without a hitch*
- 2007 emissions level heavy-duty engines are selling... and here's what people are saying



Image, Story Courtesy of Diesel Progress

# The Progress:

Meet Clean Diesel



***Washington Policymakers Have Seen  
the New Diesel and it is Clean***



# The Progress:

## What truckers have to say about 2007 Trucks



- “Our drivers think they’re performing outstanding. There’s plenty of power and we haven’t had any issues whatsoever.”

It’s going really good. I will say knowing what we know now about the 2007 engines, I wouldn’t be afraid to buy one or two or three.” Had we known two years ago what we do today.. We would not have planned our purchasing around the introduction of the new engines. We would have followed normal purchasing schedule instead of pre-buying.”

*(Duplainville Transport, Sussex, WI)*

- “Their power is very good and their reliability is excellent. We like them so much that we first ordered 10 more but have since upped that for 70 in all.”  
*(Halvor Lines, Superior, WI)*
- The exhaust pipe inside looks brand new like the day I bought it.  
*(Kerstetter Trucking; Reedsville PA)*



**Bring on the  
Diesels cars,  
trucks and SUVs**

## A Brief History Of Light Duty Diesel: 2000-present:



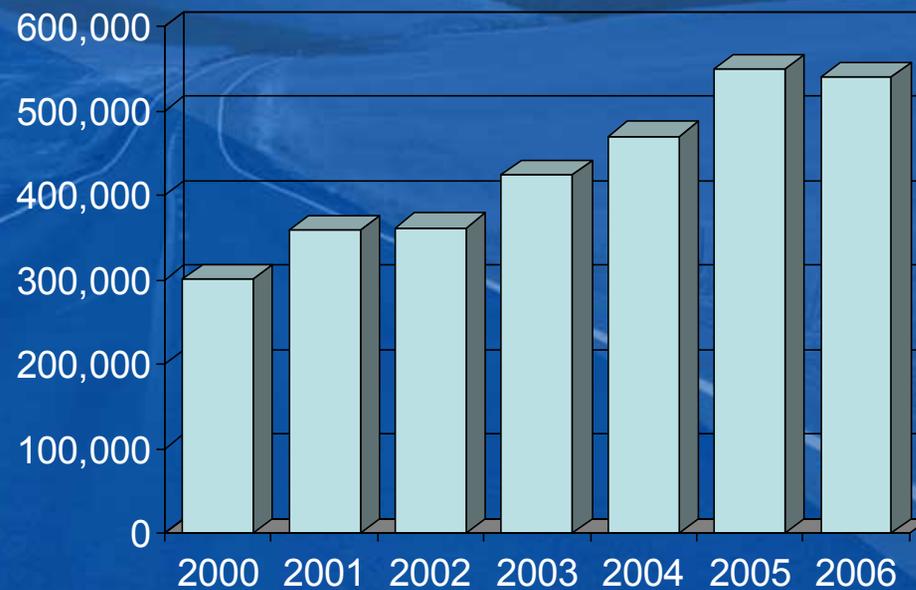
- 2000-2004
  - **Selling Hope**,... the promise of what could be, you can't have it here.... European envy...Keep the diesel option open
- 2005
  - **Feeling Hope** – President's Tax Credit; new products – E320 CDI, Jeep Liberty
- 2006
  - **Full of Hope** – ULSD here, more announcements! GM, Cummins, Honda, Daimler++ Chrysler
- 2007
  - **Cup of Hope runneth over** – Cummins/Dodge Ram rolls out, Nissan, Hyundai, GM\*



## Current Light Duty Diesel Share

- 70 %: Growth in diesel trucks and SUVs registered 2000-2006
- 78%: Growth in light duty diesel vehicles registered 2000-2006
- 43% choosing diesel option 2000-2006
- 3.6% of overall vehicles

### Diesel Registrations in US



Source: R.L. Polk and Company for the Diesel Technology Forum



## What do American Consumers think about Diesel, Fuel Prices, etc?

• This Mercedes Benz – Diesel Technology Forum report presents the findings of a telephone survey conducted among a national probability sample of 1,023 adults comprising 508 men and 515 women 18 years of age and older, living in private households in the continental United States.



Mercedes-Benz



## Consumer Awareness on Diesel: Good News and Bad News



- **Good news:**
  - More than three-fourths of Americans are aware that diesel-powered cars are available in the U.S. (79%). (*MORE THAN we expected*)
  - Many Americans (71%) agree that “diesel-powered cars are harder to find than gas-powered cars”. (*TRUE— not many models – and they’re looking!*)
  - Other statements people agree with are that “diesel-powered cars are more environmentally-friendly than gas-powered cars” (41%), “diesel-powered cars are more fuel-efficient than gas-powered cars (64%)”
- **Bad News: Overcoming old perceptions— still work to be done:**
  - The second most agreed with statement is that “diesel-powered cars are noisier than gas-powered cars” (67%),”, “diesel fuel is expensive” (both 64%), and. “diesel fuel is only for trucks” (20%).
  - Sixty-one percent agree that “diesel-powered cars are smellier than gas-powered cars.”

## Diesel Tech Forum & Mercedes Benz Public Opinion Survey Executive Summary



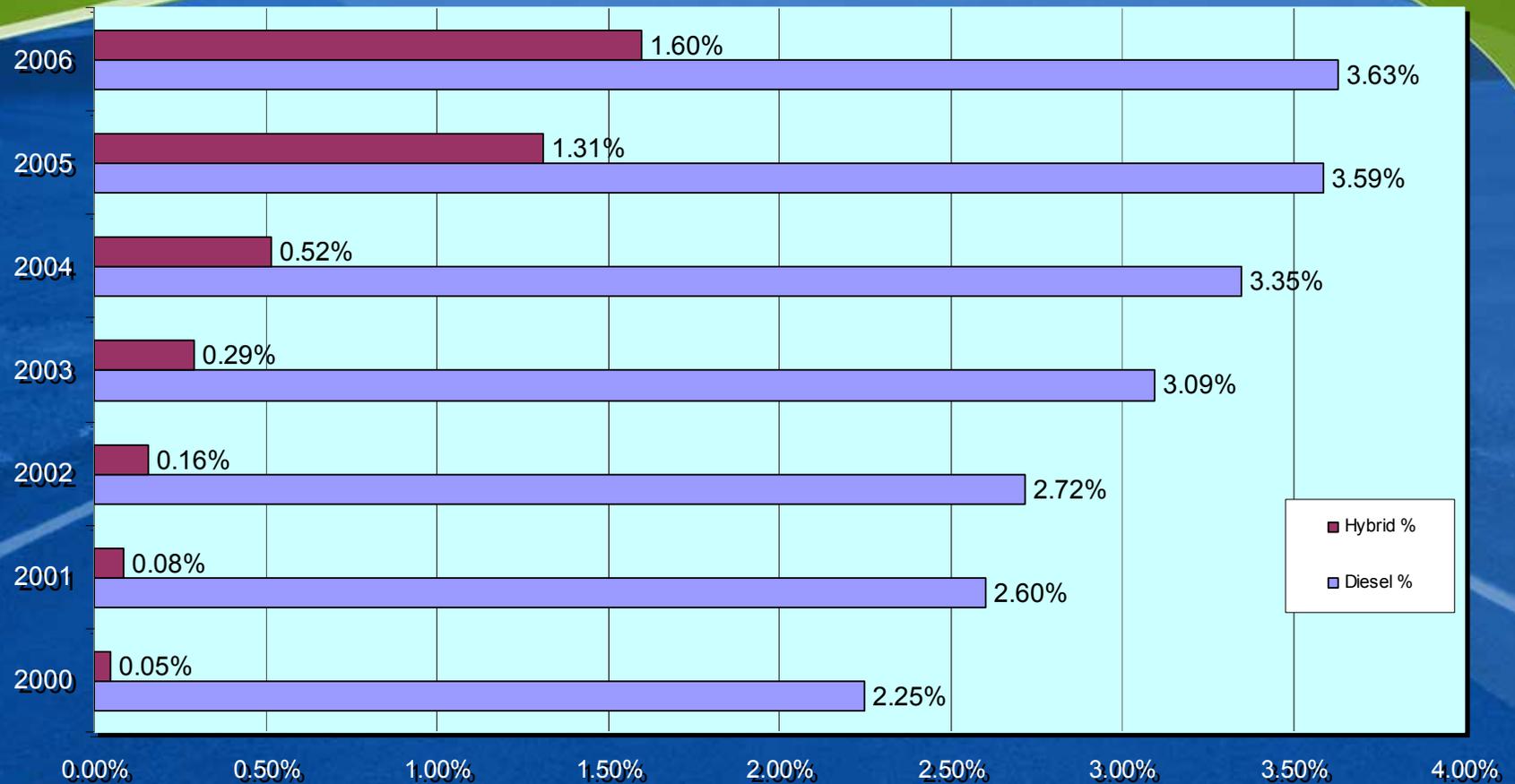
- Over two-thirds (70%) of the population disagree with the statement “Americans as a whole are doing enough to help reduce fuel consumption,” while 29% agree with it.
- Six out of ten Americans (60%) know that cars can use diesel fuel.
- About four out of ten people (41%) say that it is likely they will consider buying or leasing a diesel-powered car, while 58% say it is unlikely they would consider such a purchase.
  - The youngest age category, Generation Y, is the most likely to consider buying or leasing a diesel-powered car (50%). This number slightly declines with Generation X (46%) and Baby Boomers (40%), but significantly drops as only 27% of those over 60 would consider a diesel-powered car.



Why we can and should forget about bringing up the diesels of the 1980's.



# Diesel and Hybrid Registrations 2000-2006



Source: R.L. Polk and Company for the Diesel Technology Forum



## Consumer Clean Diesel Choices are Growing

- Chrysler: Jeep Grand Cherokee
- Dodge :Ram 2500/3500 Blue Tec – Cummins engine
- Ford: F-250 Powerstroke / International
- GM / Chevy/GMC -- Duramax
- Mercedes
  - E320 Blue Tec; R320 CDI
  - GL 320 CDI; ML 320 CDI
- VW : Touareg TDI; 2006 Jetta TDI
- BMW– diesel by 2009
- Chrysler– Cummins- LT diesel (Dodge 1500)
- Mercedes E320 CDI, GL & ML SUV lineup
- GM -- LT engine (announced 2006)
- Honda: by 2010 (Accord Pilot, Odyssey, Ridgeline?)
- Hyundai: Veracruz – CUV (2009)
- Nissan: Maxima
- VW: Jetta TDI -- 50 state (2008)

HERE NOW

COMING SOON

# The Media



***How is the Media portraying  
Diesel Technology?***



Discussion of Fuels and  
Technologies takes many  
forms



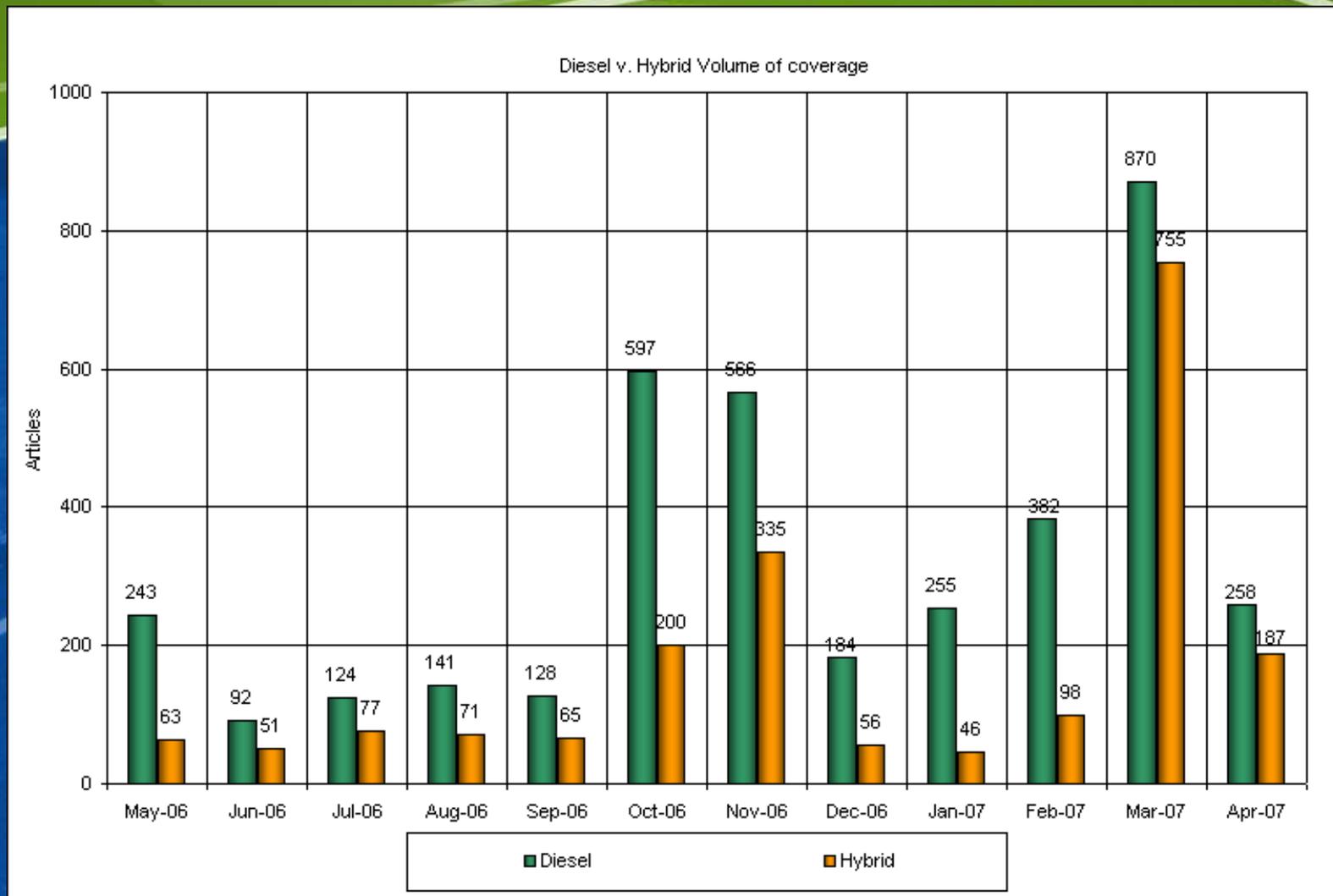
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**"You told me to change all of our computers to DSL.  
I thought that was short for 'diesel'."**

# Sharing the Spotlight:

## Clean Diesel & Hybrids



# Current Assessment



***Question: Have Perceptions changed regarding the image of diesel?***

- Recognized more as Clean Diesel than Dirty Diesel
- Favorable positioning relative to other clean or alternative fuels or technologies



# Meet Clean Diesel

**USA TODAY** What's Under The Hood? Automakers Have New Clean-Diesel Engines On Tap  
-October 3, 2006

**The Detroit News**  
"Hybrids have been getting the buzz, but with the kind of long-distance highway driving common for most Americans, diesel might be better..."  
- Jeff Plungis

**AP Associated Press**  
Cleaner Fuel To Spur Diesel Auto Revival  
-October 13, 2006

**AP Associated Press**  
Diesel Registrations Up 80% in Last 5 Years  
April 26, 2006

**The New York Times**  
*Diesel a Savior in Squeeze On Energy? Obstacles Exist*  
By MATTHEW L. WALD Savings From Diesel



Ben Schaeffer demonstrates...

Monday, June 5, 2006  
**usa**  
**Coming to a pump near you: clean diesel**  
Businesses are beginning to make low-sulfur fuel, under a new EPA rule. Cleaner engines to follow.

**BY MARK CLAYTON**  
The so long as people have owned what with from vehicle tailpipes, diesel engines have had the rap as the clean, quiet, and efficient engine on the road. That could soon change.

In a move that some people think of as the Clean Diesel Revolution, the Environmental Protection Agency on Thursday required 150 refineries to begin making ultra-low-sulfur diesel (ULSD), a fuel with 10 percent less sulfur than ordinary diesel fuel, on a small, limited scale.

The rule, which mandates that 80 percent of the diesel produced for highway use be ULSD, is a first step. By Oct. 15, all filling stations will be selling ULSD, and by then, most new cars and trucks will be required to use it.

All who drive diesel vehicles - which account for only about 3 percent of sales of light-duty vehicles - will immediately see about a 10 percent less pollution from their engines than the highest pollution...

**BAX FORD** Dealer from Bax, Ill., fills up his Volkswagen with low-sulfur diesel fuel.

...that the kinds of work people do that require vehicles have been an environmental and health hazard, unlike any. The new clean-diesel vehicles are expected to be no better than older diesel engines, but they get 30 to 40 percent better mileage per gallon.

...will that you never directly on the road?

...They are expected to be 10 to 15 percent of vehicle sales by 2010, some analysts say. But diesel vehicles are longer lived and more reliable than gas engines. The fact that they are more reliable than gas engines has helped the 1970s oil embargo. Twice, diesel fuel was the only alternative to gas.

...Off-road diesel vehicles - including farm and construction equipment - will be required to shift to ULSD immediately. Their emissions requirements will be relaxed to June 2007 to 2008.

...of 80 percent, not to 10 percent. The world's 12 million diesel trucks would save each year about \$1 billion, mostly in fuel.

...for more, visit us at [www.epa.gov](http://www.epa.gov).

...The new rule will require that 80 percent of the diesel produced for highway use be ULSD. The rule will be phased in over time.

...New, with the new rule, the number of diesel trucks will increase.

...New, with the new rule, the number of diesel trucks will increase.

# Meet Clean Diesel

FINANCIAL TIMES

## Motorists gear up for switch to clean-burn diesel fuel

Less noise, smell and soot may help convert sceptical car drivers. Bernard Simon reports

The drive to convert American motorists to diesel will take a big step forward during the next few days as a more environmentally friendly version of the fuel goes on sale.

The clean-burning, ultra-low sulphur-diesel emits only 15 parts per million of sulphur, compared with 500 parts for existing diesel. Used in conjunction with the latest diesel engines, it greatly reduces the noise, smell and soot that have up to now turned many Americans off diesel.

"We're bullish on this," said Volkswagen, which sells the most diesel vehicles in the US. "Several of the barriers to diesel ownership are going to go away."

Stephen Johnson, the administrator of the Environmental Protection Agency, described ULSD this week as the biggest advance in clean fuels since the removal of lead from petrol in the 1980s.

Diesel typically offers 30-45 per cent more fuel economy than petrol and is already widely used for trucks, buses and off-road vehicles. The introduction of ULSD has facilitated tighter emission standards for heavy-duty trucks, which take effect in January.

President George W. Bush said yesterday that developing alternative fuels would help the US economy and decrease the country's dependence on foreign oil. Talking in Chicago about energy policy, he said: "My worry is... that a low price of gasoline will... make us complacent about our future when it comes to energy."

But car owners have so far shown little enthusiasm. Though sales of diesel-powered cars and light trucks rose by almost a third last year, they still made up only 3.8 per cent of the total. In Europe, diesel accounts for close to half of vehicle sales.

## The New York Times

### Low-Sulfur Diesel Fuel Is Reaching Market

By FELICITY BARRINGER

WASHINGTON, Oct. 19 — The biggest revolution in highway fuels since lead was removed from gasoline will be nearly complete on Tuesday as a vast majority of trucks and buses will be able to fill their tanks with diesel fuel with just 15 percent of the sulfur content in the older fuel.

Like lead, sulfur generates air pollution that leads to severe health consequences. Like lead, it also causes the works of fine-tuned pollution control devices, making it exceedingly difficult to produce cleaner-burning engines.

So the new fuel will pave the way for new generations of diesel engines that experts say will eventually cut diesel particulate pollution from diesel trucks by an estimated 90 percent.

On Tuesday, the Bush administration unveiled the signal accomplishment of its own, ignoring the original of the underlying regulation in the 1990's and the fact that it became effective in December 2000, before President Bush took office.

In a news conference in Columbus, Ind., the headquarters of Cummins Inc., a major manufacturer of diesel engines, the environmental protection administrator, Stephen L. Johnson, said, "Under President Bush's leadership, the pumps are primed to deliver clean diesel and a primer to deliver clean diesel to America."

The new fuel contains 15 parts per million of sulfur, down from the standard of 500 parts per million, thanks to changes in the refining process. As of Sunday, at least 80 percent of the diesel available for trucks and buses had to meet the new standard.

Officials at the environmental agency said Tuesday that the changeover was occurring so swiftly that 90 percent of the fuel would be comparable.

Old diesel engines burning the cleaner fuel will reduce dangerous particulate emissions by 10 percent, experts say. New engines with improved controls, which have to be available by Jan. 1, will cut this particulate pollution by more than 90

percent. The rule mandates more improved engines in 2010. It is also clear how soon existing trucks and buses, which often are in use for more than 10 years, will be turned in for newer models.

The new fuel is expected to cost 3 cents to 4 cents more per gallon. Like many regulations that took effect in the twilight of the Clinton administration, the diesel rule, covering fuel for the trucks, was temporarily vetoed by the Bush administration.

Then the Environmental Protection Agency allowed it to proceed and in 2004 supplemented it with a similar rule requiring tight controls on engines in off-road equipment like

tractors, tractors and construction equipment.

Leading environmental groups expressed praise for the new fuel and chorus of praise for the new fuel and the health benefits and the novel wording of the rule. Unlike earlier regulations, the new rule links the development of the new fuel to development of cleaner-burning engines. Richard Kassel, a senior lawyer and air quality specialist with the Natural Resources Defense Council, said that when planning for the rule began in 1995, gasoline-powered cars outnumbered diesel-powered trucks and buses by 100 million to 8.7 million.

The diesel vehicles emitted 42 percent of the soot, and particulate matter of the same, and more than two-thirds of the soot. Even though the diesel-produced particulates were 3 percent of the total particulate matter in the air, most of

which was from industrial sources, Mr. Kassel added, "nitrogen particulates are coming out right where we breathe."

Mr. Johnson said diesel engines had been the workhorses of the economy and the vehicle fleet. The relatively high sulfur levels in diesel have been a significant obstacle to producing diesel-powered cars that met federal environmental standards.

Several engine and automobile manufacturers have signaled that more high-mileage European light cars, a flatbed or executive director, may become available.

Allen Schaeffer, executive director of the Diesel Technology Forum, an industry group, said in a conference call Tuesday that the new standard "opens up the door of possibility" to a new generation of light-duty diesel cars and trucks in the United States in the near future.

The environmental agency estimates that when the current rule and the diesel rule for trucks and buses has been widely adopted, the government, industry, environmental and environmental groups, estimates that these three groups have

saved 4,300 premature deaths annually. In the Clinton and Bush administrations, the development and roll-out of the diesel rule for trucks and buses has been notable for the cooperation among industry, the government and environmental groups, estimates that these three groups have

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# The Washington Post

A recent rule cleaning up exhaust has automakers preparing new models and asking:

## Has Diesel Grown on the United States?

### WALL STREET JOURNAL

## Cleaner Diesel Fuel Is Set to Pump

Ultra-low-Sulfur Formula Could Cut Reliance on Oil; Economy's 'Invisible Force'

By Mike Novacek

Ultra-low-sulfur diesel fuel will start hitting U.S. fuel pumps this month, opening the door for auto makers to expand the use of European diesel technology in U.S. cars and light trucks.

The Bush administration and the Natural Resources Defense Council, an environmental group, yesterday hailed the expected arrival Sunday of ultra-low-sulfur diesel fuel and the potential for modern diesel engines to use such fuels to help the U.S. reduce its oil consumption.

The new diesel contains 97% less sulfur than the old version, officials said, emitting only 15 parts per million sulfur, compared with 500 parts per gallon.

Auto makers—particularly those that have made substantial investments in low-sulfur technology for European markets—say they expect to see a wave of new diesel deliveries to be of the new variety. Ultra-low-sulfur diesel will be the only diesel fuel allowed beginning in 2010.

"Diesel is the invisible force that moves the American economy, but until now it has also been a big pollutant," said Richard Kassel, head of the NADIC's clean fuels and vehicles project. "Combining the new fuel with cleaner and more energy-efficient engines will mean healthier air and re-

duce significant long-term health benefits, including 114 billion in annual health-care and premature deaths savings and 20,000 fewer premature deaths each year.

Until now, diesel has primarily powered trucks and buses in the U.S. Diesel trucks move more than 10 million tons of the nation's freight a day, according to the NADIC. About 14 million Americans ride half a million diesel buses to work and school, the group says.

**Pollution vs. Mileage**  
Diesel has historically been viewed as an environmental problem because burning it produces more pollutants than gasoline. But diesel engines get better mileage than gasoline engines.

Now, Americans could see more diesel engines in passenger cars. Researchers at J.D. Power & Associates predict diesel sales will nearly triple in the next 10 years because of the engine's fuel efficiency—typically 20% to 40% more miles per gallon than gasoline engines.

In Europe, diesel cars account for nearly half of the car market. In the U.S., diesel-powered passenger cars and light trucks are a niche market, despite recent efforts by VW and DaimlerChrysler to rekindle interest in their European diesel engines.

GM is an issue. In North America, diesel engines could add \$2,000 to passenger-car prices, and possibly more, said Charles Frenze, GM's executive director of diesel engineering. In addition, after treatment technology to address nitrogen oxide and particulate emissions—can run thousands of dollars, he said.

Large markets such as California

will meet standards in all 50 states as early as 2005.

"Fuel that's cleaner initially, that's the key to getting more diesel on the road and also meeting emissions requirements," said Mercedes spokesman Bob Maras.

Volkswagen AG, currently the top seller of diesel-engine passenger cars in the U.S., plans to offer new diesel models in 2005 that will meet emission standards in all states. Other auto makers, including Japan's Honda, Toyota, GM, and U.S. market leader General Motors,

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reduction in the U.S. Automakers are producing vehicles



- 12V, 150HP
- New Grand Cherokee
- Chevrolet Equinox
- Mercedes-Benz ML 320 CDI

Source: EPA

State Sales  
DaimlerChrysler AG's Mercedes-Benz brand will start selling its diesel-powered E220 Bluetec sedan in 11 states starting next week. The current model bears the strongest federal emissions standard but falls short of the

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# Light Duty Clean Diesel Gaining Coverage



## Detroit Free Press

"Diesel engines, once a sooty scourge of American roads, may be poised for popularity in the United States starting as soon as this year."

-Justin Hyde

## WALL STREET JOURNAL

Diesel power is about to get its best shot in at least 20 years in the U.S. car and light truck market.

-May 8, 2006

Day Of The Diesel - Forbes.com - Mozilla Firefox

...is to always move up.  
**2007 LINCOLN MKZ**  
EXPERIENCE MORE >>>

Forbes.com

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### Time to Step on the Diesel

Low-sulfur diesel reduces those risks. And low-sulfur diesel based on modern common rail direct injection engines helps to reduce those risks even more.

The diesel engine, developed by German engineer Rudolf Diesel in 1893, compresses the air-fuel mixture in combustion chambers until it becomes super-heated and ignites, creating the power to move drive shafts and wheels.

Diesel engines use an outside ignition device, such as a spark plug.

In traditional diesel engines, a piston pushes air to the top of the combustion chamber, compressing and heating it to the point where it can then receive and ignite an injection of diesel fuel.

Common rail direct injection diesels contribute a major development in compression ignition technology. A high-pressure pump stores a reservoir of fuel in a tube — the “common rail” — 10 feet above the injection point. The fuel is precisely metered, creating that it is delivered at optimum combustion point for a clean more complete, more powerful burn.

High-sulfur diesel had undermined performance of exhaust-treated diesel engines “the way lead once did the effectiveness of catalytic convert gasoline cars,” according to the Diesel Technology Forum. “Removing the sulfur from diesel will usher in a new generation of clean diesel technology applications across all vehicle types,” the forum predicts.



## Not your Dad's diesel

Industry claims it has cleaned up its act

The diesel industry has one word to describe its new image: clean. It's a word that's been used a lot in the past few years, but it's never been used so often as it is now.

“Do not compare today's technology to Daddy's technology,” Klaus-Peter Schuder, manager of research and development for Volkswagen AG, told industry analysts and reporters yesterday at the Diesel Technology Forum. “Removing the sulfur from diesel will usher in a new generation of clean diesel technology applications across all vehicle types,” the forum predicts.





# Meet Clean Diesel

Getting the Word Out

## Radio and TV Broadcast Coverage

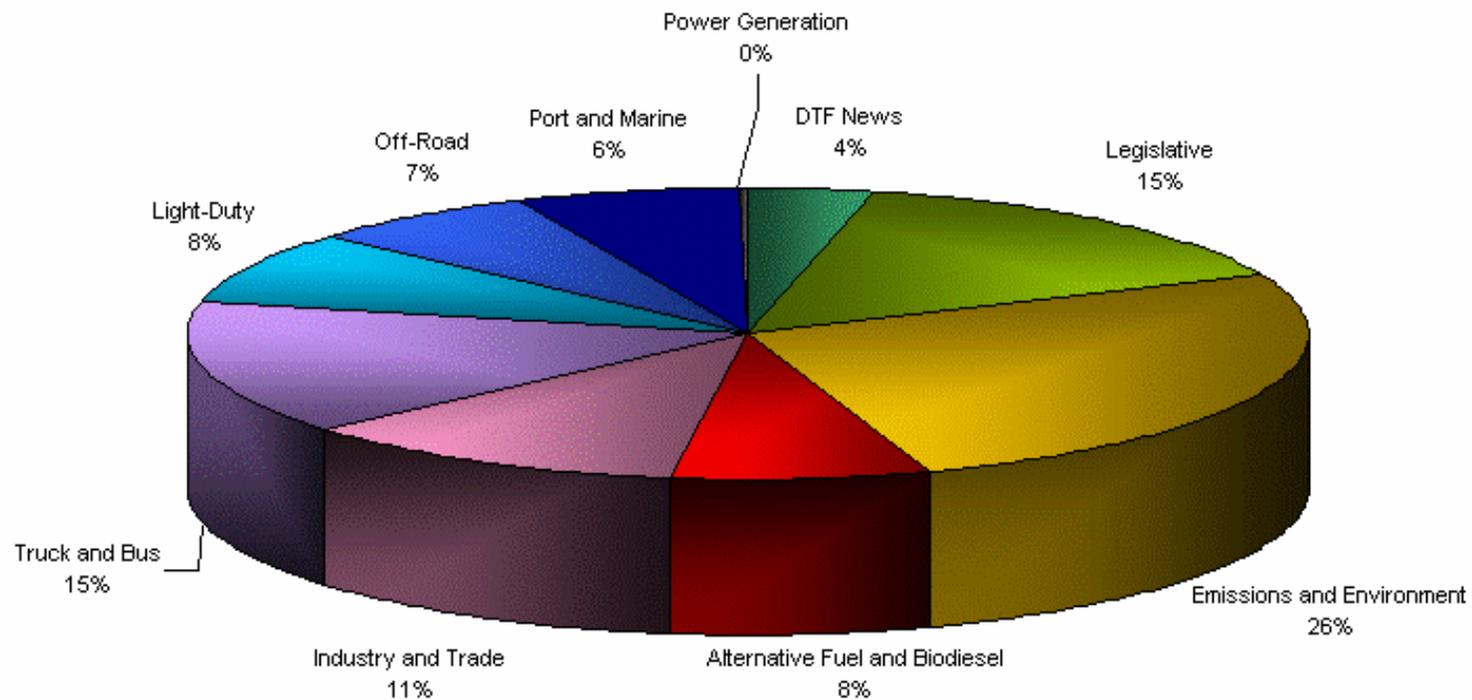


- 45 Million Viewers

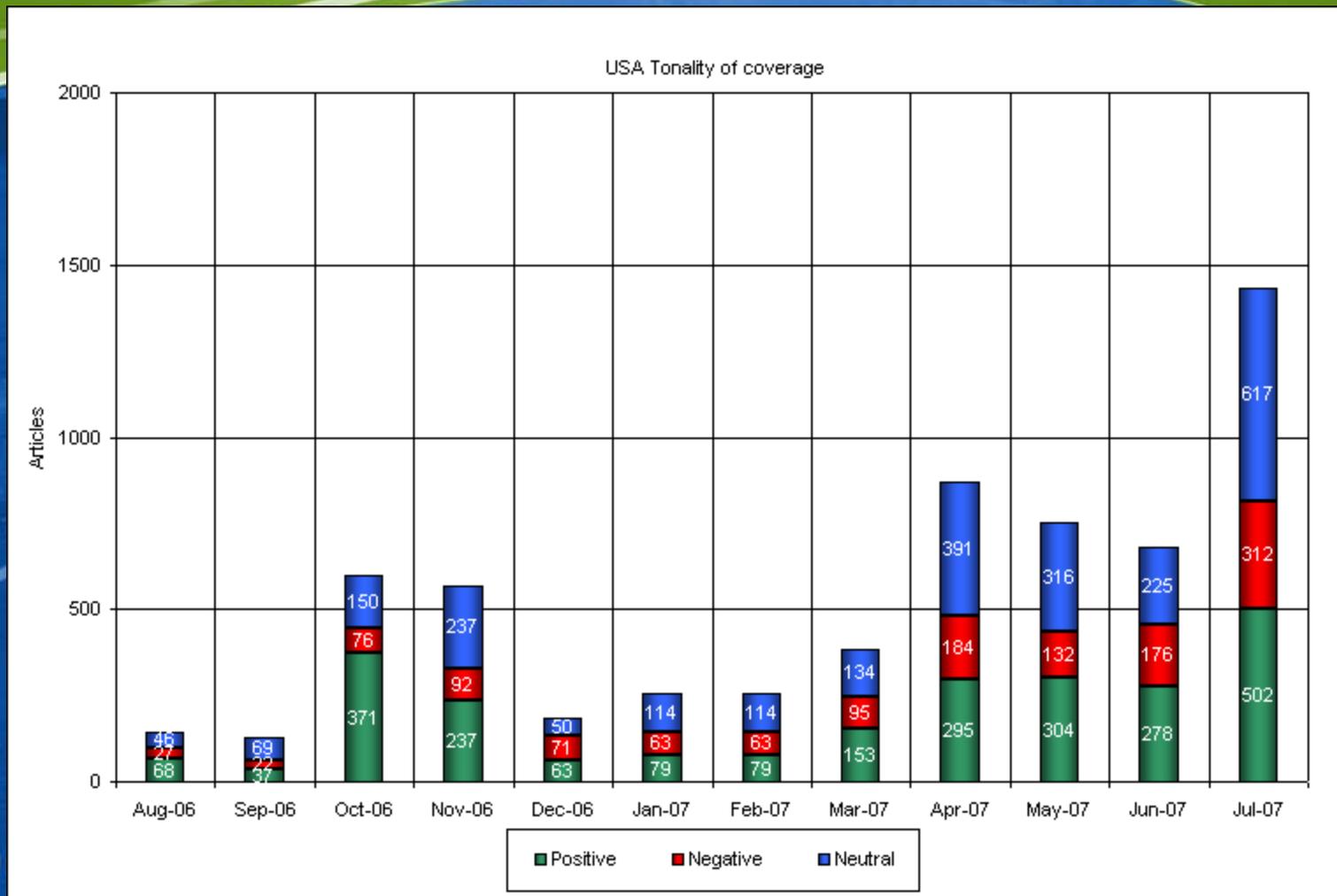


# USA Mindshare: Diesel Topics

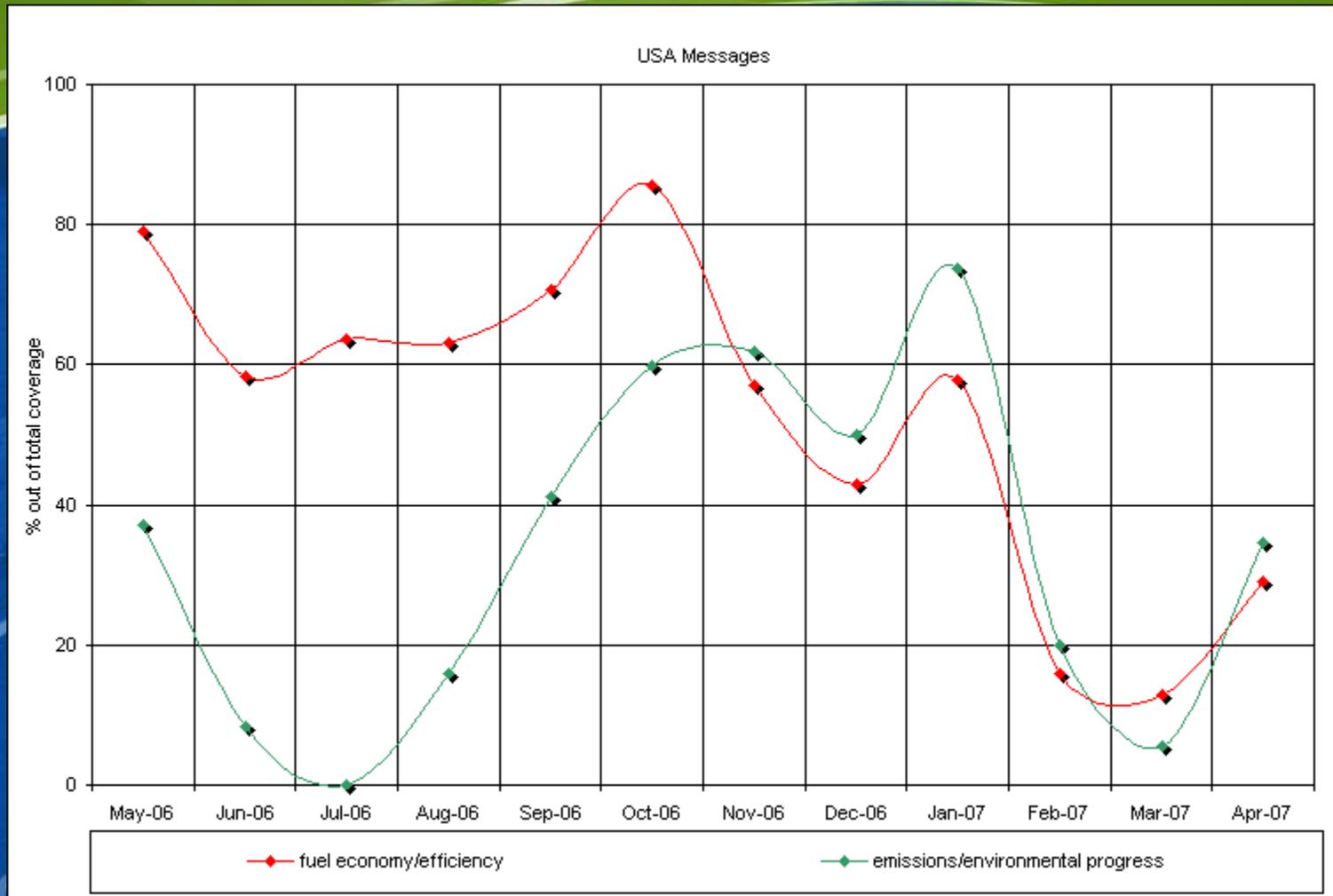
USA Mindshare: July 07



# Overall USA diesel coverage is consistently positive – neutral



# Top diesel messages in the US:



Dirty

Clean

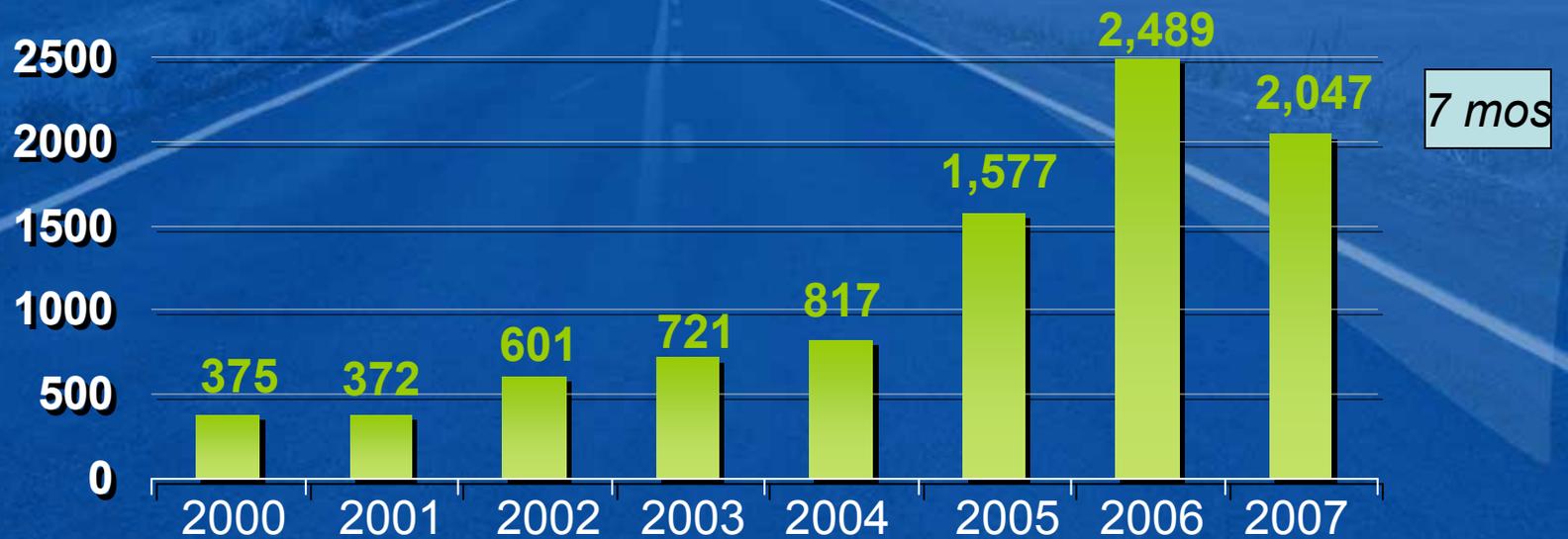


# Clean Diesel



## Growing the Brand: "CLEAN DIESEL"

"Clean Diesel" Mentions in Nexis Database  
2000-2007 YTD



# Future Considerations

## ***What are the Key Issues driving the Future for Diesel***

- Technology validation and Market Acceptance
  - Both light and heavy-duty; see you in 2010 !
- Preservation of economics that make sense and characteristics and benefits unique to diesel in the competing trade offs of fuel economy, emissions, climate, business goals:
- Public Perceptions:
  - Increasing sophistication with environmental quality, personal awareness and choices;
- Fuel: Relative prices, Renewables, Fuel as a policy driver (low carbon fuel standard).

**Biggest challenges are also  
the greatest opportunities**

Clean

Diesel

- Reducing greenhouse gas emissions
- Reducing reliance on imported oil
- Low Carbon Fuel Strategy
- Use of more renewable energy
- Improving fuel economy
- Improving Air Quality

# Key Influences for the Future of Diesel



Parameter	Rating
<b>It's new, clean, real:</b> 2007 Cleaner Fuel and heavy-duty trucks --availability, price, supply, performance	★★★★
<b>Light Duty Diesel</b> –Tier 2 Bin 5, 50 state –can do; real product announcements + some wishy-washiness	★★★
<b>Renewable Fuels</b> – everyone's talking home grown fuel, looking beyond basic bio, cost, quality, timing, -- new and unknownnessy	★★
<b>Addressing the Old:</b> Legacy Products Chasing the money– DERA & CMAQ, Policy approaches coming on – California mandate vs. voluntary;	★★★
<u>BIG Diesels Ports, Trains</u> – unique, playing catch up, negative media + progressive policies	⚡⚡
<b>The BIG Policy Dance:</b> Climate Change, Fuel Economy, Emissions – <i>can diesel deliver it all?</i>	★★⚡
<b>California</b> -- has it all: Greenhouse gases, Low Carbon Fuels Std, 50 state diesel? Technology neutral, right?	★★⚡



## To further advance diesel technology

- Embrace and highlight the synergies of renewable fuels and clean diesel fuel and technology;
- Expand on record of meeting technology commitments and expectations ... *Can 2010 look like 2007?*
- Light duty diesels must be successful
- Contribute positively to the policy and technical solutions for legacy products
- Expand the message reach for clean diesel technology



# Then vs. Now



Year 2000:.....

Can we preserve Diesel as an option for the future ?

*“diesel is the problem – we must eliminate it”*

Year 2007....

*“ diesel is a solution– using more offers a benefit”*

