

Clean Diesel

Health Issues, Voluntary Programs, and Minnesota's Efforts



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Project Green Fleet

Health Effects of Diesel Emissions

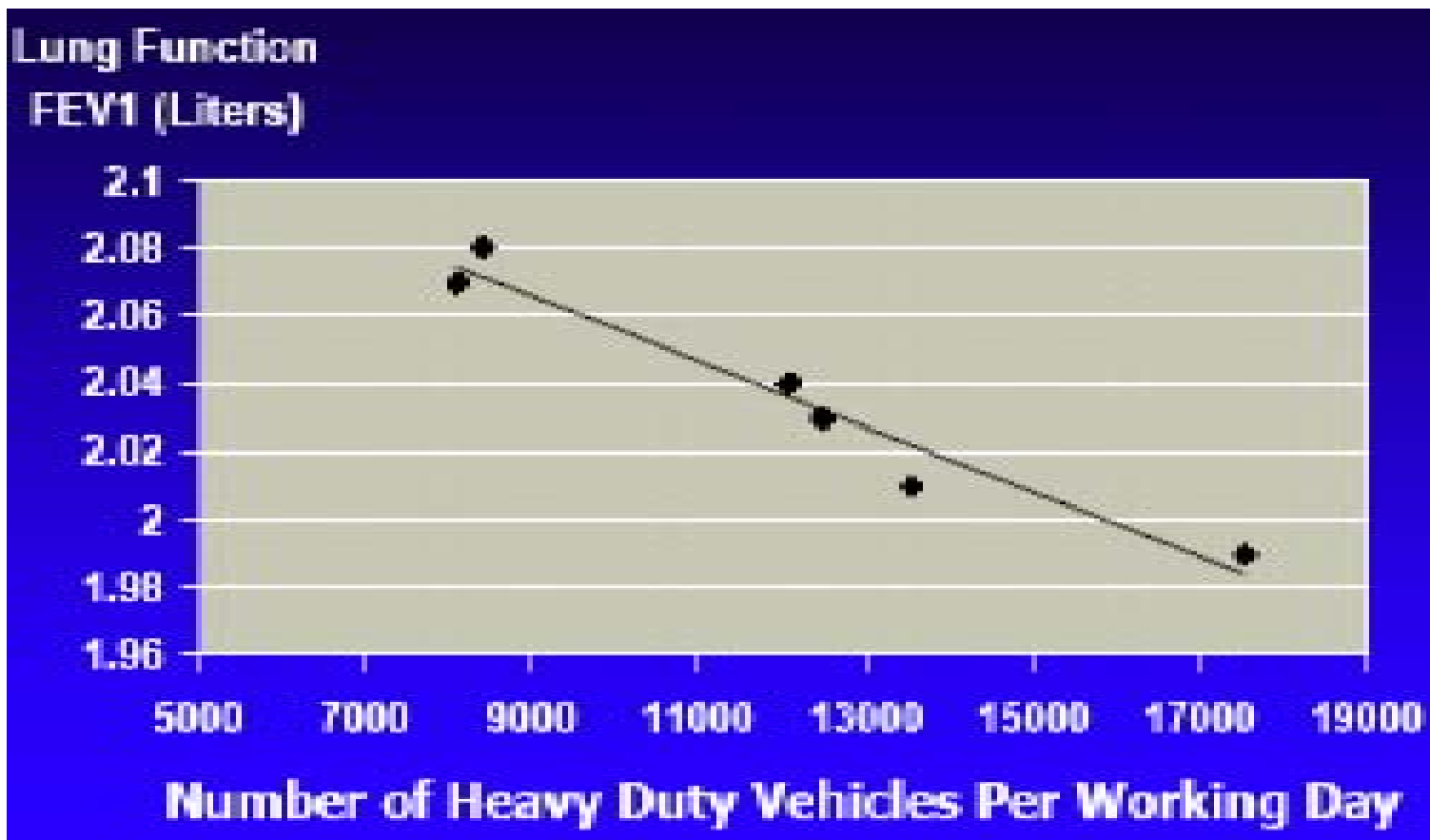
- Acute (short-term) exposures
- Chronic (long-term) exposures resulting in non-cancer effects
- Long-term exposures which could result in lung cancer

The bulk of the studies show impacts on the respiratory system resulting in short-term effects of:

- Eye, throat, lung irritation
- Increased cough, phlegm production
- Triggering asthma attacks

Health Effects of Diesel Emissions (continued)

- Living within 300 meters of local roadways affects FEV1 (forced expiratory volume) (Brunekreef et al., 1997)



Special risk for school children from school buses

- On average, children spend more than an hour on, or waiting for, a school bus each school day.
 - Increased potential for exposure and children's higher rates of respiration may lead to higher exposure to diesel exhaust
 - Less likely to be able to expel or detoxify pollutants since their immune systems are immature.
- PM2.5 concentrations measured on buses found to be 5-10 times higher than average levels measured at monitoring stations.
- Smaller particles can penetrate children's narrower airways, more likely to be retained there.
- When children's airways are inflamed or constricted by asthma, allergies, or infections, diesel exhaust may make breathing more difficult

Health Effects of Diesel Emissions

- Two main categories of diesel exhaust:
 - Gases: non-toxic and toxic components
 - Volatile Organic Compounds (VOC)
 - Oxides of Nitrogen (NO_x)
- } Pollutants react with oxygen and make ozone
- Particles: fine/ultrafine and toxic chemicals absorbed onto them

More about particulates...

Health Effects of Diesel Emissions (continued)

Particulate Matter (PM)

- Small particles of dust, dirt, soot, smoke, liquid droplets, and organic chemicals
- EPA regulates PM in two categories:
 - PM10 (10 microns or less)
 - PM2.5 (2.5 microns or less)
 - PM2.5 is very small, 1/30th of the width of a human hair
 - Small size allows PM2.5 to get through the human body's airway defense mechanisms and enter deep into the lungs

2.5 Microns

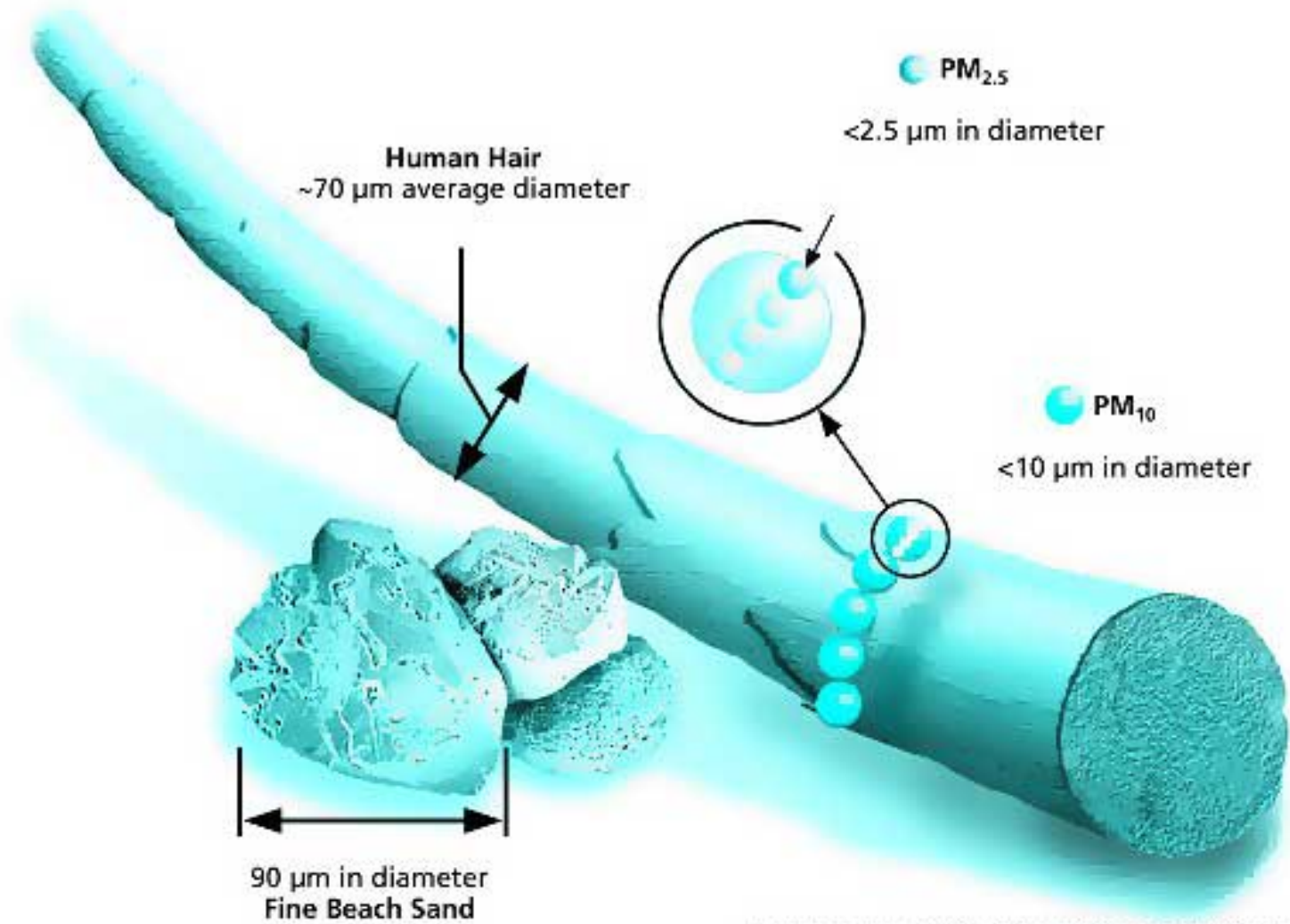


Image courtesy of EPA, Office of Research and Development

Health Effects of Diesel Emissions (continued)

What health and environmental effects have been linked to high PM concentrations?

- **Respiratory Problems**

- PM, especially PM_{2.5} can enter deep into the lungs and bloodstream
- Aggravated asthma, coughing, painful/difficult breathing, chronic bronchitis, decreased lung function, premature death

- **Visibility**

- Haze problems in national parks

- **Atmospheric deposition**

- Can cause high acidity in lakes and streams
- Can change soil nutrient concentration
- Can damage sensitive plants and crops

Health Effects of Diesel Emissions (continued)

What are EPA's standards for PM?

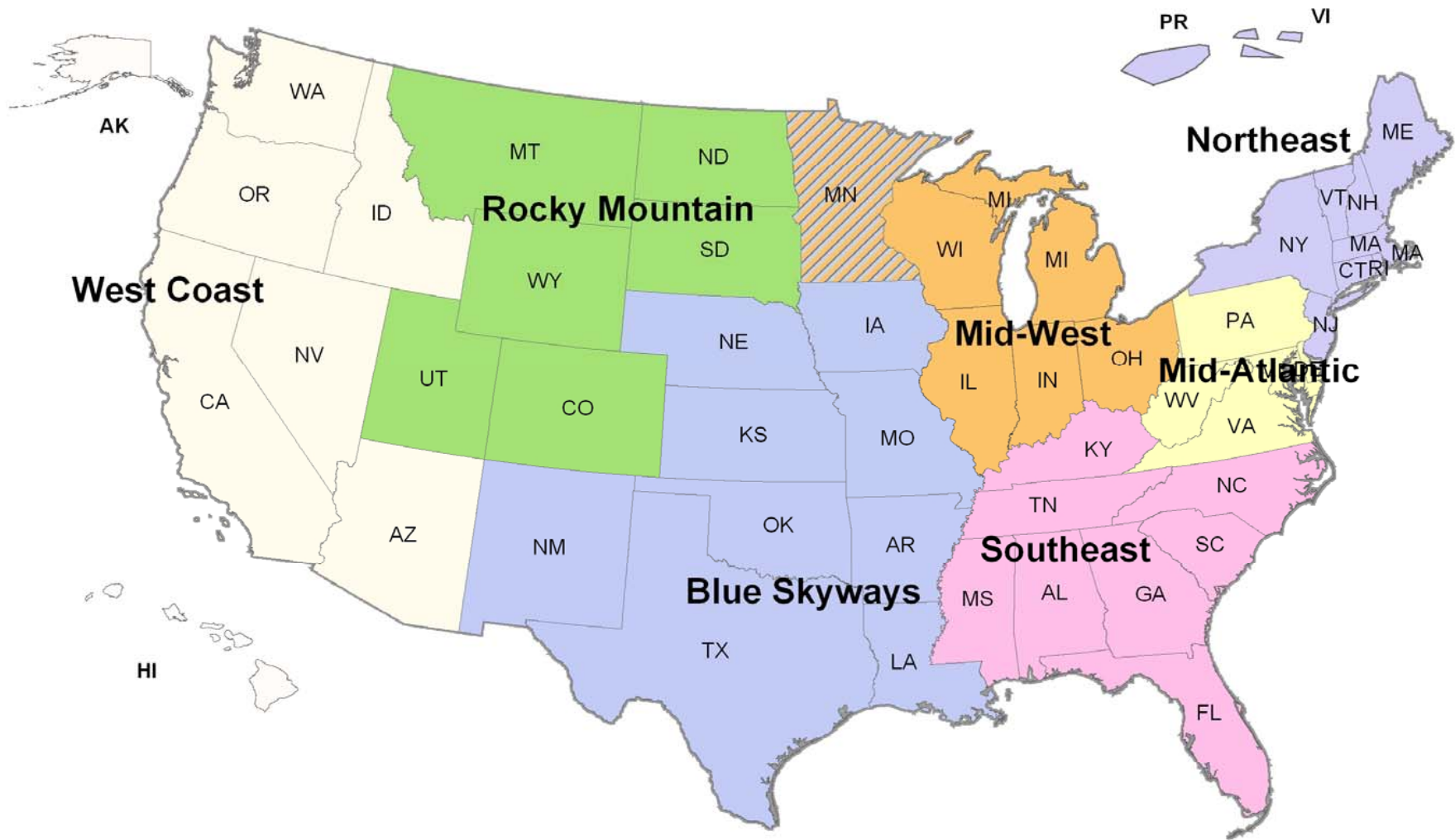
- Two standards for each category: **24-hour and annual**
- **PM_{2.5}**
 - 24-hour standard: 35 micrograms per cubic meter
 - Annual standard: 15 micrograms per cubic meter
- **PM₁₀**
 - 24-hour standard: 150 micrograms per cubic meter
 - Annual standard: Revoked in December, 2006

Health Effects of Diesel Emissions (continued)

What steps are being taken to reduce the PM_{2.5} problem?

- States gave EPA their plans last year
- Measures to be taken:
 - Air quality plans: State shows how it will achieve attainment as reasonably and expeditiously as possible
 - New source review: Ensures that new industry will not cause further problems
 - Transportation conformity: Federally funded transportation projects (highways, etc.) cannot cause increases in PM_{2.5} emissions
 - Reasonable controls: EPA proposes measures that industries can take to control PM_{2.5} cheaply and effectively
 - Voluntary programs component growing

Regional Clean Diesel Collaboratives



Birth And Growth of EPA Voluntary Approaches to Diesel Emissions (continued)

Midwest Clean Diesel Initiative (MCDI)

- Public-private partnership to accelerate diesel emission reductions in the Midwest
- Region 5 diesel engines
 - Approximately 3.3 million
- MCDI Goal:
 - reduce emissions from 1 million diesel-powered engines by 2010
- <http://www.epa.gov/midwestcleandiesel>

The logo for the Midwest Clean Diesel Initiative features a blue wavy line that curves over the text. The words "MIDWEST CLEAN DIESEL" are in a bold, dark blue, sans-serif font. Below them, the word "INITIATIVE" is written in a green, sans-serif font, with each letter separated by a small gap.

MIDWEST CLEAN DIESEL INITIATIVE

- MCDI Formally Started in 2004
- Leadership Group
 - 33 Members Signed Collaborative Principles
 - Co-Chairs: Cummins, Illinois EPA, American Lung Association of Upper Midwest, US EPA
- Progress (As of November 2008)*
 - Over 570,000 Engines Impacted
 - Over \$87 Million (Federal and Non Federal) Spent
 - Tens of millions allocated and in process of being spent
 - Over 4,000 tons of emissions per year reduced
 - 200+ Smartway Partners, 25% of national partners
 - Built clean diesel coalitions in each state to generate funding sources and implement projects

MCDI Goal: Develop and Support State Clean Diesel Coalitions

MCDI partners have created networks of clean diesel partners within each state to:

- Educate each other and develop educational opportunities for others.
- Develop funding mechanisms for clean diesel actions.
- Communicate opportunities.
- Identify interested fleets for clean diesel actions.
- Implement clean diesel projects.
- Track and report results to MCDI Leadership Group.

MCDI Goal: Award EPA funds/generate non-EPA funding sources

- DERA and ARRA funding.
- Continued efforts to educate participants on Congestion Mitigation and Air Quality funding opportunities and assistance with partnering and application development.
- Generate state and local funding source for clean diesel actions.
- Connect participants with state and federal supplemental environmental project funds.
- Create innovative financing mechanisms to scale up impacted number of vehicles.
- Engage private sector in clean diesel opportunities.

MCDI Goal: Address common issues across the Region

- Integration of clean diesel actions into PM and ozone planning and mitigation activities.
- Integration of idle reduction options and other efficiency measures into state and local climate change plans.
- Track and report projects, emissions reductions and fuel saving from clean diesel actions.

MCDI Goal: Create Actions that Stir the Imagination

- Create innovative finance programs.
- Target high profile projects for implementation.
- Implement projects with emerging technologies.
- Implement projects on new applications/sectors.
- Develop non-federal funding mechanisms.
- Publicize and communicate efforts.
- Work across programs, agencies and countries to partner on new areas of concern or emerging areas of common interest.

What?



WHAT IS PROJECT GREEN FLEET?

- Installs emission reduction retrofit equipment on diesel vehicles, including schools buses
- Allowing older buses to run clean and green

What?



WHAT IS PROJECT GREEN FLEET?

- A partnership among businesses, government agencies, and nonprofits
- Funding from various sectors...
- ... and FREE for fleets

How?



HOW DOES IT WORK?

- Equipment is CARB- or EPA-verified
- Diesel oxidation catalyst (DOC)
- Closed crankcase emissions control system (CCECS)



How?



HOW DOES IT WORK?

- No affect on vehicle warranty
- Minimal impact on performance and fuel economy
- DOC requires no maintenance
- CCECS requires filter change – about \$50 each (first year is provided)

How?



HOW DOES IT WORK?

- Provide MEI with your fleet list
- Vendor reviews and determines equipment needed
- MEI places order, parts shipped in 4-6 weeks
- Installations done by fleet mechanics or by other trained installers
- MEI and vendor available for assistance, questions throughout and after process

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Why?



WHY PROJECT GREEN FLEET?

- Health
- Economy
- “Going green”



Why?



WHY PROJECT GREEN FLEET?

- Health
 - Diesel engines: more than 50% of traffic-related air pollution
 - Soot linked to heart and lung disease, other health problems
 - Exhaust inside 5x more concentrated than outside



Why?



WHY PROJECT GREEN FLEET?

- Health
- Economy
 - MN in attainment with federal Clean Air laws
 - Cost of compliance would be more than \$200 million/yr (MN Chamber of Commerce)
- Jobs

Why?



WHY PROJECT GREEN FLEET?

- Health
- Economy
- “Going green”
 - By 2008 – more than 1200 buses retrofitted
 - Duluth, Rochester, Bemidji, Twin Cities
 - Competitive edge
 - EPA Clean Air Excellence Award in 2008, Governor’s Award for Pollution Prevention in 2009

Who?



WHO IS PROJECT GREEN FLEET?

Members of MSBOA who have partnered with Project Green Fleet include...

- Benjamin Bus
- First Student
- Koch School Bus Service
- Lake City Bus Lines
- M&M Bus Service
- Riggles Bus Company



SmartWay Transport Partnership

- **What is SmartWay?**

- Successful government/industry collaboration
- Voluntarily achieves improved fuel efficiency
- Reduces environmental impacts from freight transport

- **Partnership Categories**

- Carriers
- Shippers
- Logistics
- Rail

- **Partners use models:**

- Benchmark freight operations
- Measure transportation footprint
- Identify technologies & strategies to reduce emissions
- Track emissions reductions and project improvement

- **Equipment Manufacturers**

- SmartWay certified cars & trucks
 - Auto manufacturers
 - Tractor manufacturers
 - Trailer manufacturers

How Does SmartWay work?

Shippers:

- **Top of the supply chain, drive marketplace demand**
- **Give preferred status to SmartWay Carrier Partners**
- **Get better data to improve their own shipping operations**
- **Modify logistics operations to improve efficiency and reduce emissions, for example:**
 - Inter-modal Shipping
 - Full Truck Loads
 - Warehouse Improvements
 - Idle-Reduction at Docks
- **Get recognition and PR value with SmartWay brand**

Carriers:

- **Gain competitive advantage:**
 - Preferred status, plus
 - Fuel efficiency, savings
- **Reduce emissions**
- **Integrate fuel saving technologies and strategies into fleets, such as:**
 - Idle Reduction
 - Improved Aerodynamics
 - Efficient Tire Systems
 - Driver Training
 - Renewable Fuels
 - Advanced Lubricants
- **Get recognition and PR value with SmartWay brand**

SmartWay Partner Results

- Over 1,640 Partners, as of 3/17/09
- Drive approximately 600,000 trucks (7% of industry)
- Travel over 51 billion miles per year (24% of industry)
- Consume over 12 billion gallons of fuel (24% of industry)
- Are on track for 2009 to:
 - reduce greenhouse gas and pollutant emissions by:
 - 6 million tons of CO₂ (carbon dioxide);
 - 800 tons of PM (particulate matter);
 - 30,000 tons of NOx (oxides of nitrogen);
 - Save over 540 million gallons of diesel fuel this year;
 - Save the freight industry over \$2 billion in annual fuel and maintenance costs.

Actions SmartWay Partners Take Include:

Carriers:

- Idle Reduction Technologies/policies
- Exhaust after-treatment devices
- Low rolling resistance tires
- Trailer aerodynamics
- Advanced Truck Stop Electrification
- Accelerated fleet turnover

Shippers:

- Benchmark operations w/FLEET model (6 months)
- Determine % of goods shipped using SmartWay carriers
- Ship at least 50% of goods using SmartWay carriers
- Report progress toward 50% goal annually (3 years to achieve goal)