

Partnering with Industry to Shape the Future

NTEA Green Truck Summit

Michael A. Pacheco, PhD

March 6, 2013

NREL/PR-7A20-58090

The Future Comes in Many Shapes and Sizes

EVENT INFORMATION

GREEN TRUCK SUMMIT
The Future of Clean Commercial Vehicles

INDIANA CONVENTION CENTER • INDIANAPOLIS, IN

Tuesday, March 5, 2013 • 8:00am-6:15pm
Wednesday, March 6, 2013 • 8:00am-10:45am

REGISTER NOW!
Call: 1-800-441-6832
Visit: NTEA.com

THE WORK TRUCK SUMMIT
Held in conjunction with North America's Largest Work Truck Event

The Work Truck Industry's Latest Green Initiatives

- Hear real-world insights and solutions from nationally known experts on the deployment and application of sustainable technologies for commercial vehicles
- Learn fleet deployment experiences, data and analysis
- Benefit from 24 breakout sessions covering all aspects of green fleet technology and fuels

JOINTLY PRODUCED BY NTEA AND CALSTRAT

TUESDAY, MARCH 5, 2013
BREAKOUT SESSIONS 3:30PM-4:15PM

Early Deployment/Early Results
Sponsored by Volvo Trucks
Tuesday, March 5, 3:30pm-4:15pm
New Trucks Class 6-6000 100 diesel and 1000 diesel-electric CCE are reducing the delivery market in the U.S. New Trucks will provide an update on CCE trucks already deployed and how they are performing in the field.
Presented by: Glenn Bitt, Vice President of Marketing & Dealer Operations, Volvo Trucks (MN)

Maximizing Hybrid Expedited ROI
Sponsored by Emtc Corporation
Tuesday, March 5, 3:30pm-4:15pm
Learn about the latest advancements in hybrid technology, funding opportunities and how to expedite ROI. Updated information on all selection and the importance of fleet angle will also be provided.
Presented by: David Warren, Hybrid Power Sales, Planning Manager, American, Eaton Corporation (Philadelphia, PA)

Get Low: Reducing Emissions with Hydrogen Fuel Cells and Turbines
Tuesday, March 5, 3:30pm-4:15pm
Turbines and fuel cells can offer super-low and zero emissions, along with significant increases in being developed as well as those currently in use on vehicle today.
Presented by: Neil Orr, Chief Executive, Business Development, Power Systems Group, Hydrogenics Engineering (London, UK) and Dave Dwyer, Research (Waltham, MA)

Natural Gas - a Game-Changing Alternative for Your Fleet
Tuesday, March 5, 3:30pm-4:15pm
Natural gas, a popular alternative fuel among fleet managers, has the potential to change the entire about moving your fleet to natural gas and find out how to determine the lifecycle cost of this change.
Presented by: Donnie Harris, Director of Market Development, NGV Alliance (Birmingham, AL) and a Fleet Representative

Hydraulic Hybrid Technology - Will Your Fleet See a Return on Investment?
Tuesday, March 5, 3:30pm-4:15pm
Integrating braking energy and controlling how much energy is key to making the payoff on emerging technology a reality. Learn where the technology fits in the best results.
Presented by: David J. Blevins, Director - Sales & Marketing, Bosch Rexroth Corporation (Munich, Germany) and a Fleet Representative

Where's the Money? Finding State Funding for Clean Vehicle Funding and Growth
Tuesday, March 5, 3:30pm-4:15pm
Technology is not currently a viable option, as some states are picking up the slack with innovative programs. During this session, attendees will hear an overview of state funding opportunities and grant acquisition. Additional attention will be given to a few key states with effective funding programs underway.
Presented by: Carl Link, Board Member, Transportation Energy Partners (Columbus, OH) and San Bonifacio

WEDNESDAY, MARCH 6, 2013
BREAKOUT SESSIONS 10:00AM-10:45AM

Advancing Hybrid Technology to More than Powertrain Aspects
Sponsored by GLE Systems
Wednesday, March 6, 10:00am-10:45am
As the need for better fuel economy and cleaner air continues to grow, the market is requiring the further efficiency improvements, such as the advancement of hybrid technologies to include the electrification of accessories and on-board functions.
Presented by: Mike Manning, Director of Products and Technology, GLE Systems (Detroit, MI)

BI-Fuel CNG and LPG Systems - The Bridge to Stronger Infrastructure
Sponsored by IMPCO Automotive
Wednesday, March 6, 10:00am-10:45am
IMPCO Automotive will give a presentation on its BI-Fuel CNG and LPG systems, including how they can enable fleets to switch to switch to bi-fuel systems, even when the existing local infrastructure is not as robust as needed.
Presented by: Jay Sander, Director of Sales & Marketing, IMPCO Automotive (Chattanooga, TN)

Konoworth Truck Company Alternative Fuels Lineup
Sponsored by Konoworth Truck Company
Wednesday, March 6, 10:00am-10:45am
Konoworth Truck Company will present its latest alternative fuels truck lineup and how its products can benefit your business. Company representatives will cover the state-of-the-art alternative fuels and how they plan to grow with further enhancements in the future.
Presented by: Konoworth Truck Company Representative

Propane Autogas & Your Fleet: The Latest Product Offerings
Sponsored by Propane Education & Research Council
Wednesday, March 6, 10:00am-10:45am
Learn why propane autogas is a good alternative for your fleet. Also, hear from Todd Moore, Vice President of Sales and Marketing of PROSPAN, and a representative from Propane Education & Research Council on their latest Custom Chassis Corporation on their latest propane autogas offerings.
Presented by: Todd Moore, Vice President of Sales and Marketing, PROSPAN (Chattanooga, TN) and a Representative, Propane Education & Research Council (Birmingham, AL) and a Representative, Custom Chassis Corporation (Birmingham, AL)

Turbine-Electric Trucks: Cleaner and Save More Fuel than BEVs
Sponsored by Wipac
Wednesday, March 6, 10:00am-10:45am
Wipac CEO Ian Wright breaks down why Wipac's turbine engine is the future of electric propulsion because it is cleaner and saves more fuel. How can that be? Come find out.
Presented by: Ian Wright, CEO, Wipac (Chattanooga, TN)

Vanner Worksite Idle-Reduction Technology Update - Featuring IdleWatch and IdleGuard
Sponsored by Vanner, Inc.
Wednesday, March 6, 10:00am-10:45am
Hear an update on Vanner's idle reduction programs for diesel, gasoline and propane fuel vehicles. Also, learn how Vanner's IdleWatch and IdleGuard can save money, reduce emissions and improve safety and efficiency of the workplace with the engine off. Vanner's IdleWatch is a software that can be used on any vehicle to apply for and obtain federal tax credits and incentives for the purchase of idle-reduction technology for new vehicles and to retrofit existing vehicles.
Presented by: Bruce Baugh, Vice President - Truck & Heavy Duty, Vanner, Inc. (Pittsford, NY)

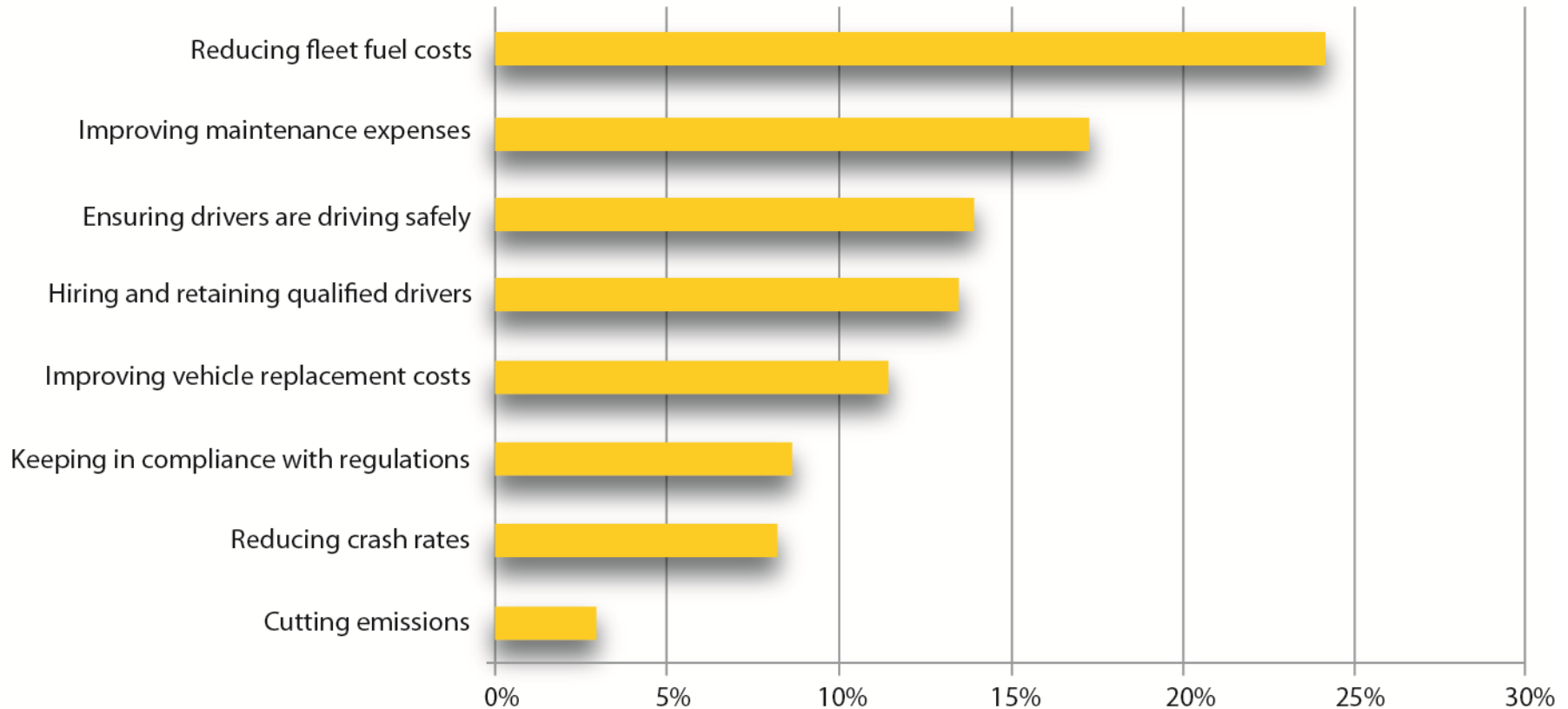
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Prioritization is a Must

Setting Priorities and Overcoming Challenges

Most Important Challenge for 2013



Source: GreenRoad's Fleet Leader 2013 Outlook

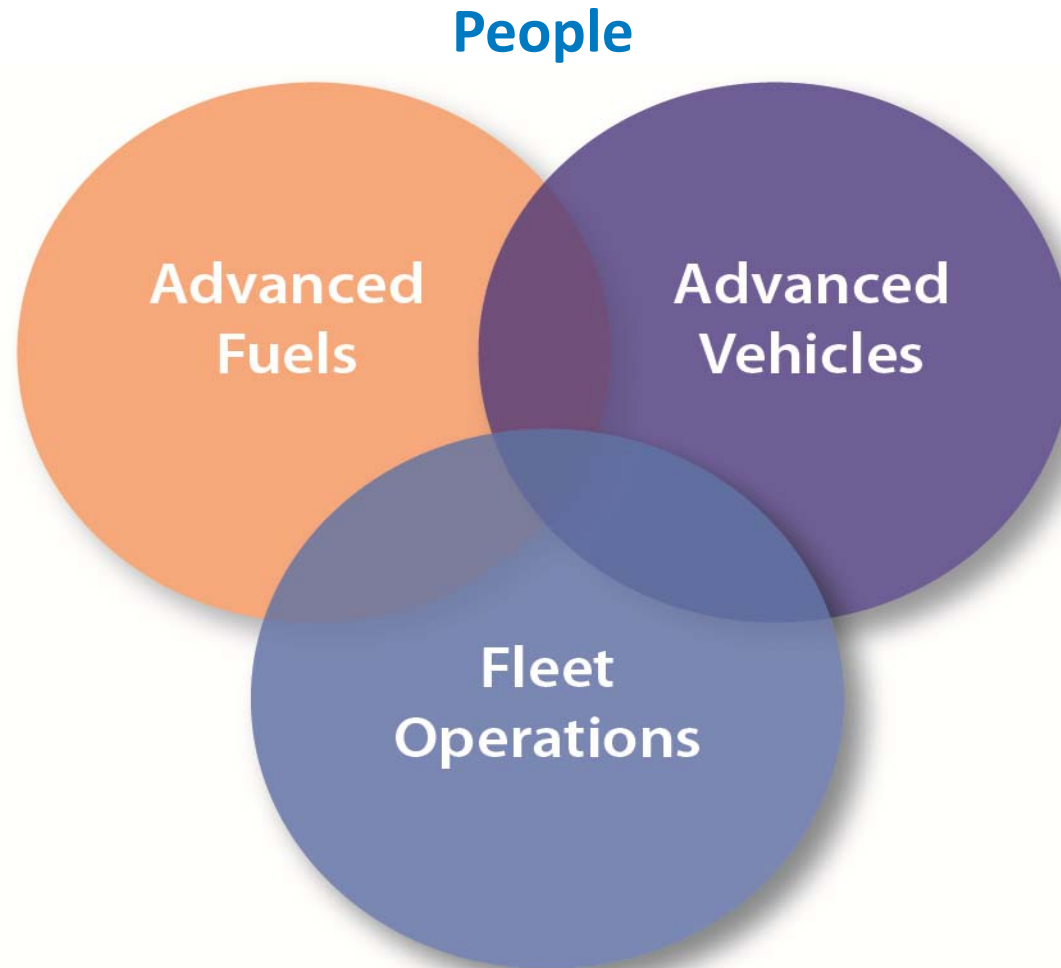
Courtesy of Automotive Fleet; December 11, 2012 (www.automotive-fleet.com)

One Size Does NOT Fit All



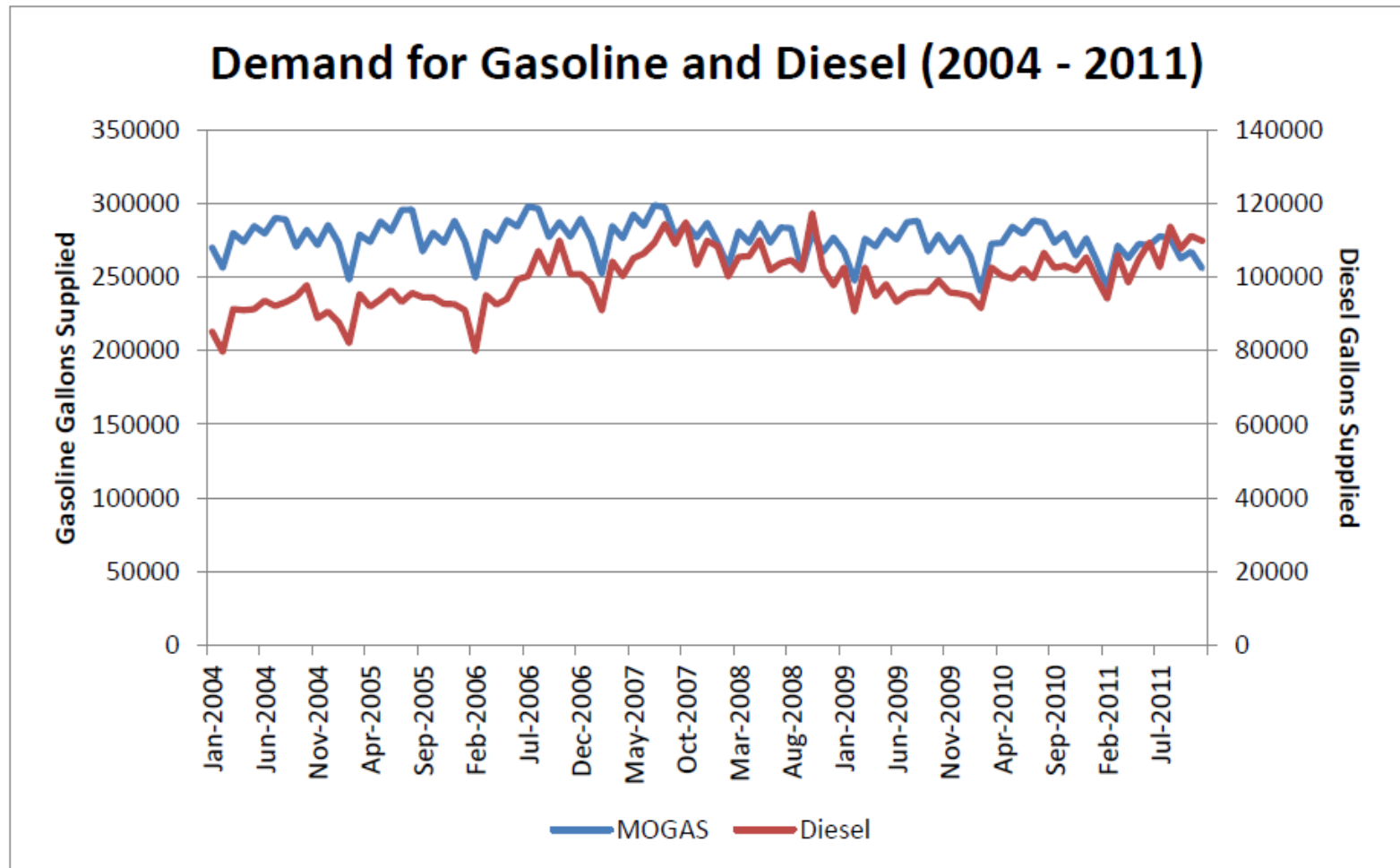
Image Credit: iStock 18160758

NREL's Role in Making Calculated Decisions



Compliance & Regulations

Intersection of Gasoline and Diesel Demand

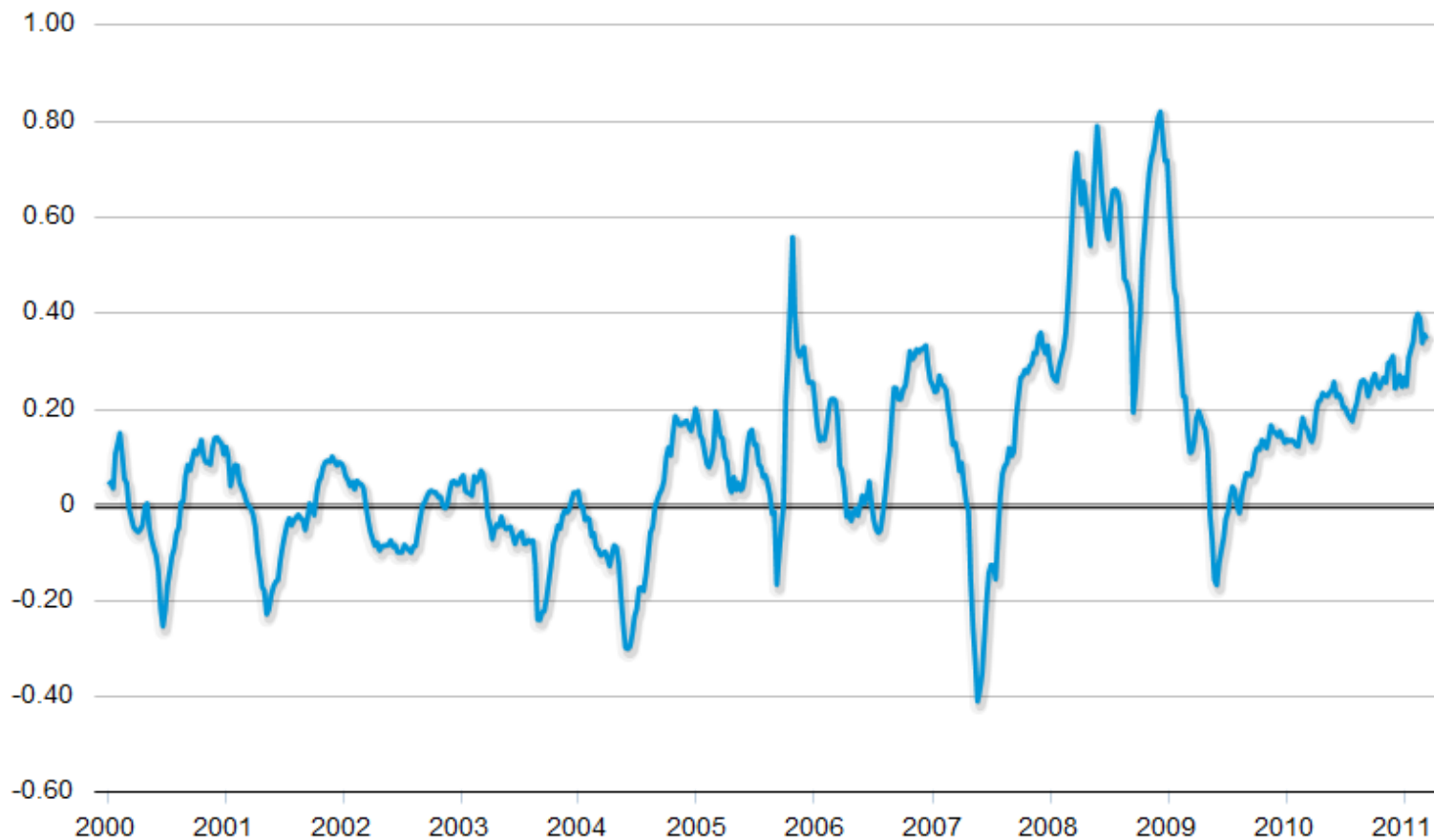


Source: NACS Retail Fuels Report 2012

Diesel Retail Prices Outpace Gasoline

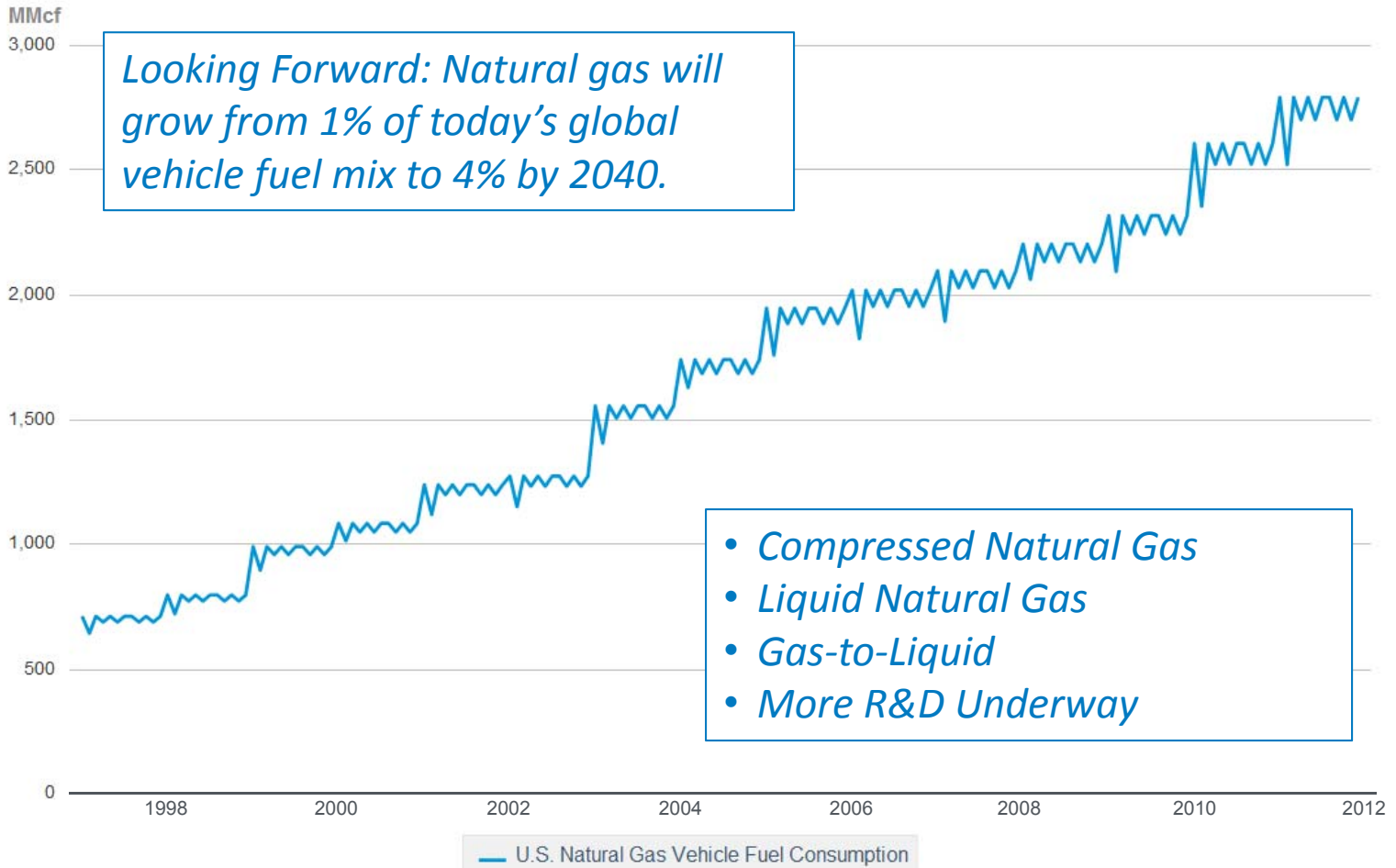
Retail diesel price minus retail gasoline price

\$ per gallon



Source: U.S. Energy Information Administration, Weekly Retail Gasoline and Diesel Prices

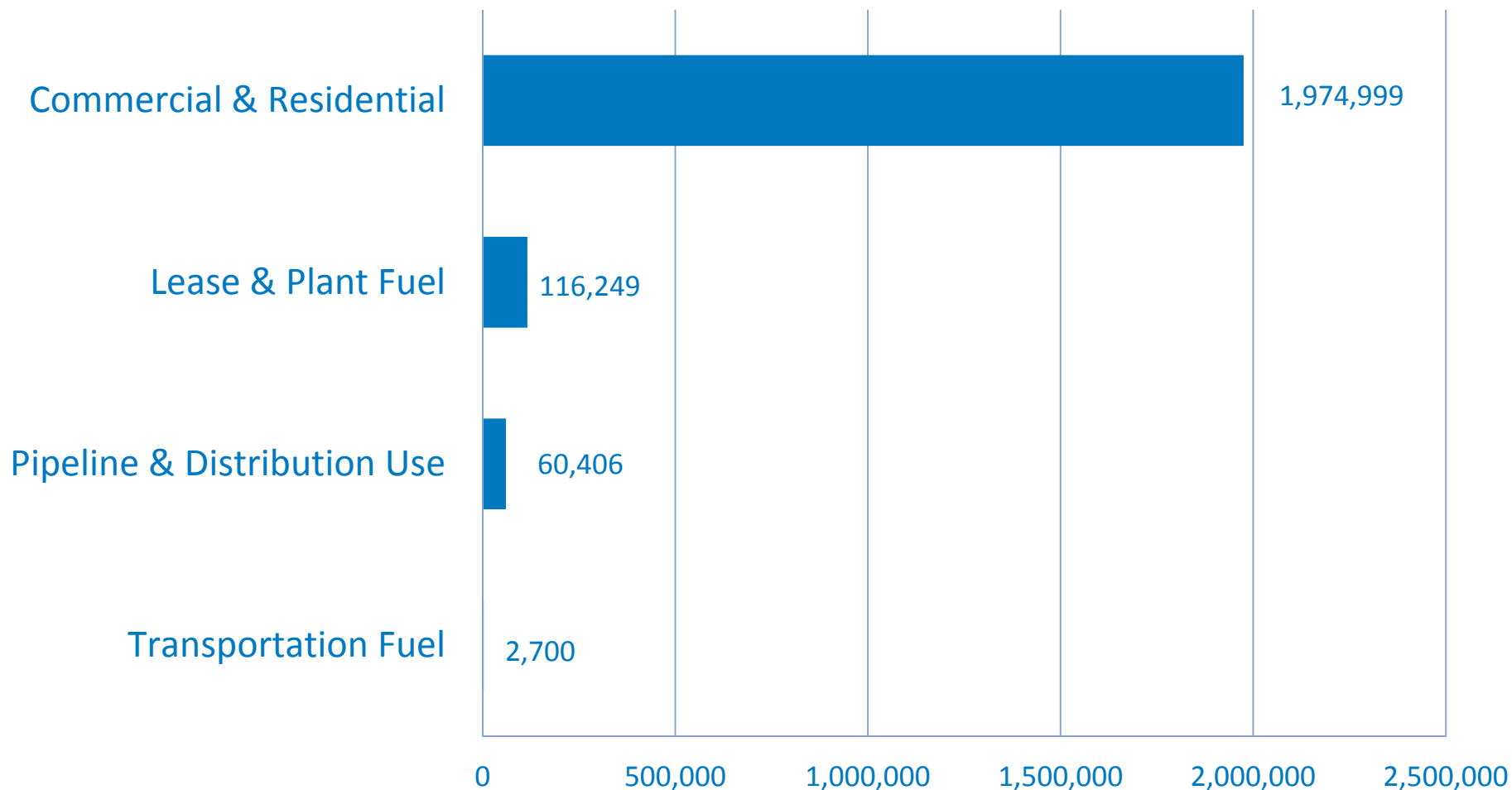
The Rise of Natural Gas Use in Transportation



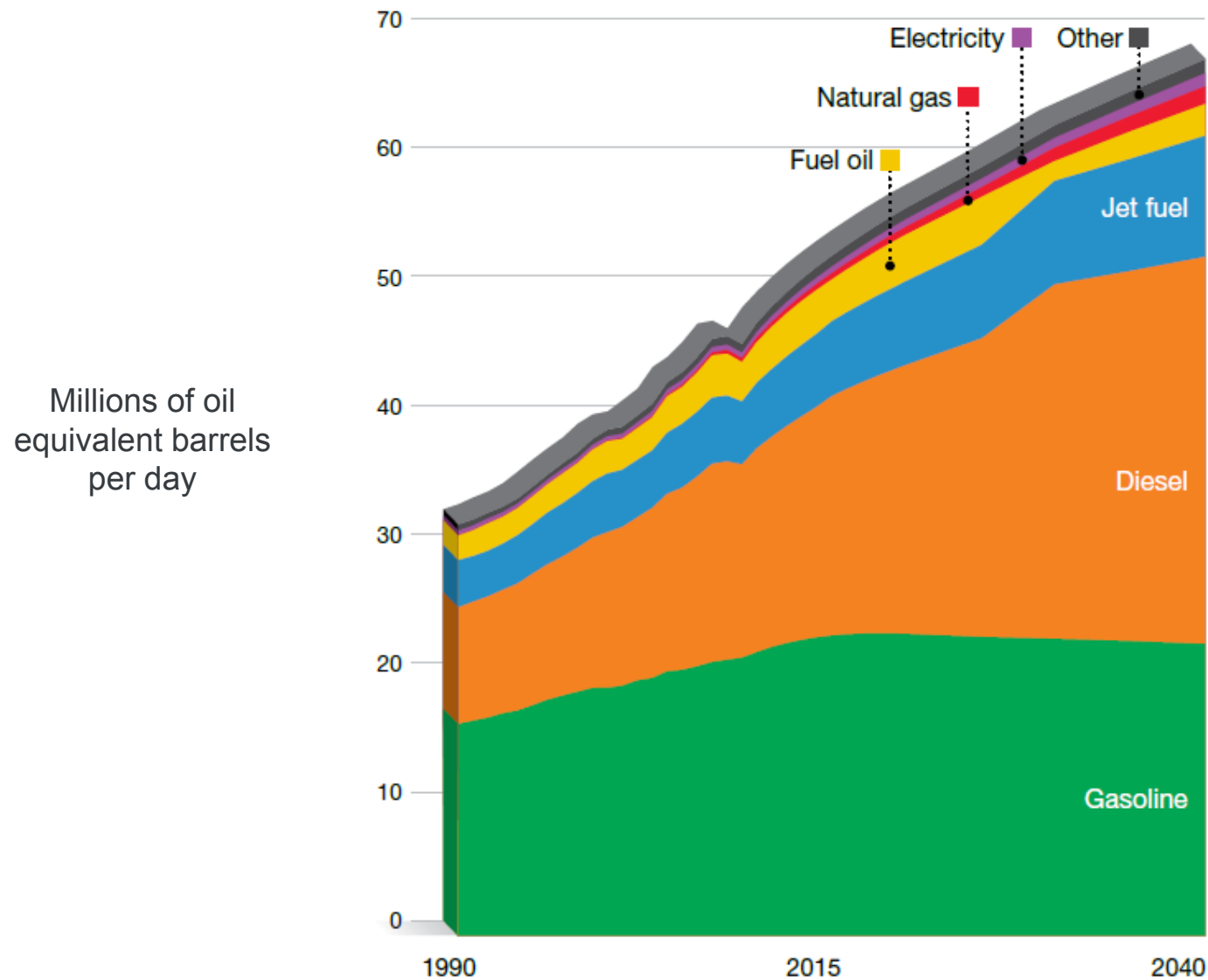
Source: U.S. Energy Information Administration

U.S. Natural Gas End Consumption

Mcf: November 2012



World Transportation Fuel Demand by Type



Source: Exxon Outlook for Energy 2012: A View to 2040

Spectrum of Advanced Biofuel Technologies

Near
Term

Ethanol: Grain or cellulosic material

Biodiesel: Transesterified vegetable and seed oils

Green Diesel: Hydrogenated fats, waste oils, or virgin oils

Other Fermentation Products: Butanol, acetates, lactates, etc.

Pyrolysis Liquids: Alternative feedstock to refinery

Synthesis Gas: Fischer-Tropsch liquids, methanol, dimethyl ether, or mixed alcohols.

Algae-Derived Fuels: Source of triglycerides and carbohydrates

Long
Term

Hydrocarbon Fuels: From hydrogenation or produced in-situ.

Looking Beyond Liquid Fuels

Vehicle technologies are advancing beyond liquid fuels, like these electric hybrids.

Electric vehicles, however, come with their own challenges.



Image Credits NREL (Clockwise from Top): 22259, 17631, 19816, 19684, 19544, 18148

Let's Talk Operations

NREL Approach to Support Fleet Operations

1

Analyze Your Fleet: Obtain data to deeply understand your fleet. How are you using your fleet now; What do you really need your fleet to do?

2

Analyze Your Options: Simulate potential fuel and vehicle technology applications against captured duty cycles.

3

Select Your Solution Portfolio: Understand what is right for entire fleet, depot, or route.

Spectrum of Analysis Tool



Calculators



Vehicle Cost Calculator

Compare cost of ownership and emissions for most vehicle models. [mobile](#)



Petroleum Reduction Planning Tool

Create a plan for your fleet to reduce petroleum consumption and emissions.



REET Fleet Footprint Calculator

Calculate your fleet's petroleum use and greenhouse gas emissions footprint.



PEV Readiness Scorecard

Assess your community's readiness for the arrival of plug-in electric vehicles.



Interactive Maps



Alternative Fueling Station Locator

Locate alternative fueling stations and get maps and driving directions. [mobile](#)



TransAtlas

Analyze vehicle densities and locations of fueling stations and production facilities.



BioFuels Atlas

Compare feedstocks and analyze biofuel production by location.



Truck Stop Electrification Sites

Locate truck stops with electrification sites to reduce the need for idling. [mobile](#)



Coalition Locations

Find Clean Cities coalitions and contact information for coordinators.



Data Searches



Light-Duty Vehicle Search

Compare light-duty alternative fuel vehicles, electric vehicles, and hybrids.



Heavy-Duty Vehicle and Engine Search

Find medium- and heavy-duty alternative fuel vehicles, engines, and hybrid systems.



Fuel Properties Comparison

Compare alternative fuel properties and characteristics.



Laws and Incentives Search

Search for laws and incentives related to alternative fuels and advanced vehicles.



Find a Car

Compare fuel efficiency, costs, carbon footprints, and emissions. [mobile](#)



State Information

Find state information about alternative fuels and advanced vehicles.

10 Ways to Get Started

U.S. DEPARTMENT OF
ENERGY

Energy Efficiency &
Renewable Energy

EERE Home | Programs & Offices | Consumer Information

Alternative Fuels Data Center

FUELS & VEHICLES

CONSERVE FUEL

LOCATE STATIONS

LAWS & INCENTIVES

Maps & Data

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Ten Ways You Can Start to Cut Petroleum Use Right Now

There are hundreds of ways vehicle fleets and individual drivers can reduce petroleum use – and reap the benefits of lower emissions, cost savings, and energy security. Knowing where to start and selecting the options that work best for your needs and goals can be daunting, so the Alternative Fuels Data Center (AFDC) has compiled a list of actions you can take today, along with longer-term strategies for the future.

Behave yourself

Small changes in driver behavior can have big impacts on fuel economy. By breaking bad habits like jackrabbit starts, speeding, aggressive driving, and carrying unnecessary cargo, drivers can reduce fuel use by 10% to 20%. Check out the [Driving Behavior](#) section on the AFDC to find tips for fleets and individual drivers.

[+ Go the Distance](#)

Follow the leaders

Thousands of fleet managers, business owners, state and local officials, and other transportation decision makers across the country have blazed the trail toward petroleum-free transportation, so there's no need to reinvent the wheel. Before you undertake an initiative of your own, find out how others have successfully deployed alternative fuels, pushed the envelope on fuel economy, and achieved fleet efficiencies. The AFDC features dozens of [case studies](#), which you can search by geographic location, fuel or technology type, or fleet type.

[+ Go the Distance](#)

Explore the alternatives

When it comes to fueling your fleet, gasoline and diesel aren't the only options out there. It's possible to achieve emissions reductions and/or cost savings by using alternative fuels like [propane](#), [natural gas](#), [electricity](#), [biodiesel](#), and [hydrogen](#).

Connect with Clean Cities

If you're looking to leave petroleum in the rearview mirror, don't go it alone. The U.S. Department of Energy's [Clean Cities](#) program has nearly 100 local coalitions of fleets, fuel providers, businesses, utilities, and government agencies all working together to reduce petroleum use.

Don't sit idle

An idling vehicle gets 0 mpg. Yet drivers in the United States waste billions of gallons of fuel every year by running their engines while going nowhere. Reducing idling time has many benefits, including reductions in fuel use, fuel costs, and emissions.

NATIONAL RENEWABLE ENERGY LABORATORY

15

Transportation

Bringing Advanced NGVs to Market

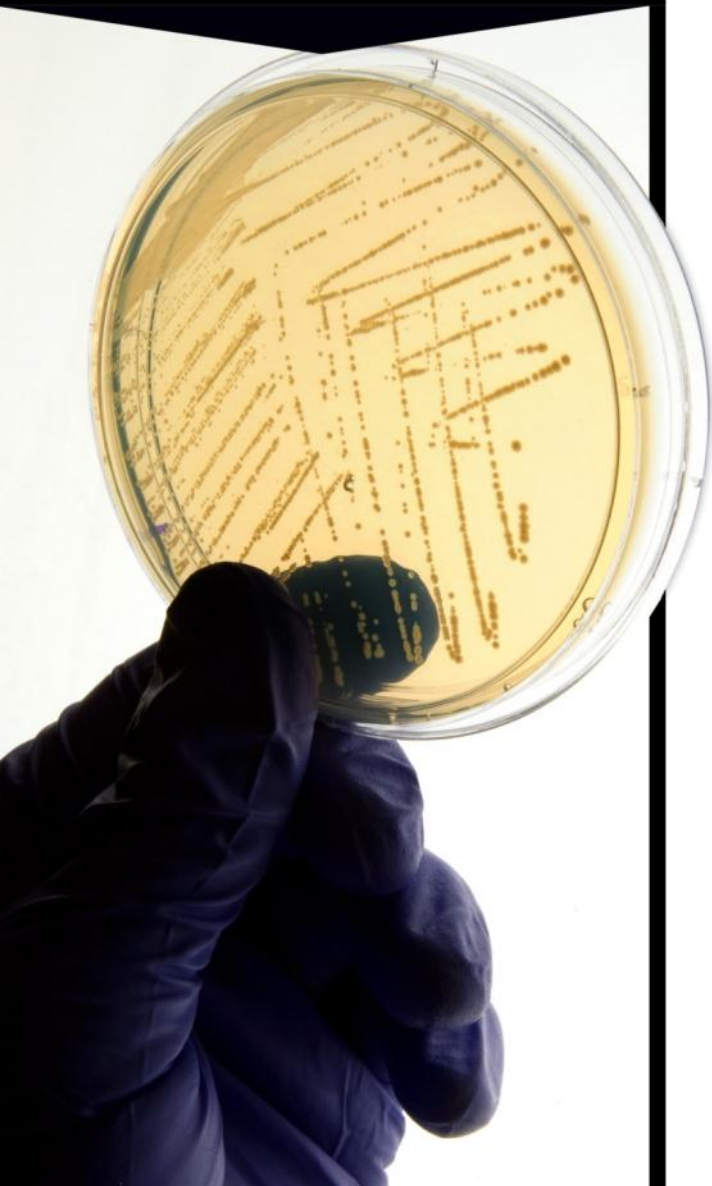
- Partnering with California Energy Commission
- Driving innovation to make more efficient, robust NG engines
- Expanding market offerings for NGVs
- Identifying challenges across the sector
 - Policy
 - Technology
 - Behavior
- Engaging with stakeholders to solve problems



Biofuels

Driving Down the Cost of Biofuels

- Cellulosic ethanol prices tied to cost of enzymes used to convert biomass into fermentable sugars
- NREL partnered with Novozymes and Genencor to engineer new low-cost enzyme production
- Collaborated on biomass characterization, pretreatment, and process integration research
- Exceeded enzyme cost-reduction goal by 10x
- DOE and NREL shifting focus to hydrocarbon fuels to redirect focus to replacing diesel and jet fuel (vs. gasoline)



Transportation

Enabling Heavy Hybrids

- Developed new hybrid propulsion system
- Doubles efficiency of heavy-duty trucks and buses while improving emissions
- Partnering with UPS, Coca-Cola, FedEx
- Projected savings of more than 250 million barrels of oil in 2020





Transportation

Tripling Lithium Battery Performance

- NREL patented a unique thin-film lithium battery
- Potential to triple performance at half the cost of today's lithium-ion batteries
- Licensed by Planar Energy to commercialize for electric and plug-in hybrid vehicle market
- NREL partnering with Planar in research and process development to bring to market

Transportation

Vehicle Efficiency Research - ADAM



- Built ADAM, the “sweaty, shivering” manikin to measure human thermal comfort in cars
- Air conditioning consumes 7 billion gallons of gasoline annually - 10% of imported crude oil
- NREL researchers goal is to reduce fuel used for air conditioning
- ADAM used by most major car manufacturers to test new efficient cooling systems

Questions and Follow Up

