



CONTACT REPORT

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SUBJECT: Northeast Advanced Vehicle Consortium Conference on Climate Change and Transportation held on May 20, 2002 and Air Pollution as a Climate Forcing: A Workshop held April 29 – May 3, 2002

PURPOSE: Background and context of conference presentations and discussions

- SUMMARY:**
- Per-capita (US) GHG emissions have been flat over the last decade.
 - Environmental non-governmental organizations (NGO) are beginning to acknowledge fuel economy is not a strong factor in new car purchases.
 - Transportation is the fastest growing source of GHG emissions.
 - New research suggests that black carbon (BC), a constituent of diesel particulate matter (PM), is a powerful global warming agent.
 - Some research suggests that the global warming threat from diesel BC more than offsets the reduction in global warming due to fuel economy advantages.
 - Intergovernmental Panel on Climate Change (IPCC) predictions of increases in methane emissions (21 times greater global warming impact than CO₂) disagree with measurements indicating stabilization.

- IMPLICATIONS:**
- The IPCC is overestimating future global warming from methane.
 - PM emissions from diesel could become targets of more stringent emission standards reflecting both potential climate change and perceived health concerns.
 - Controlling BC, methane and ozone might be as important as controlling CO₂ in mitigating global warming over the next 20 to 40 years.
 - Diesel, despite fuel economy improvements over gasoline vehicles, could eventually be perceived as contributing to global warming, rather than reducing it, if BC emissions are determined to be as important to global warming as estimated by some researchers.

SOURCE ASSESSMENT: Attendance at the one-day NAVC conference. Input from an attendee of the Climate Forcing Workshop and its abstracts.

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ATTACHMENTS: Conference Summary and Implications

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Introduction

On May 20, 2002, the Northeast Advanced Vehicle Consortium (NAVC) conducted a one-day conference entitled “Climate Change and Transportation”. This report will review the information presented at the conference and its implications. An addendum also contains a report on a separate conference, entitled "Air Pollution as a Climate Forcing: A Workshop".

Subsequent sections of this report will cover each of the following:

- NAVC Conference Notes and Interpretation
- About NAVC
- NAVC Conference Program and Agenda
- Summary and Conclusions
- Addendum: a report on a separate conference entitled “Air Pollution as a Climate Forcing: A Workshop” that took place from April 29 through May 3, 2002 and attended by Alan Dunker.

A list of attendees of the NAVC conference is available upon request.

This report will utilize the following abbreviations:

BC – Black Carbon

GDP – Gross Domestic Product

GHG – Greenhouse Gas

IPCC – Intergovernmental Panel on Climate Change

NASA – National Aeronautics and Space Administration

NAVC – Northeast Advanced Vehicle Consortium

NOAA – National Oceanic and Atmospheric Administration

NRDC – Natural Resources Defense Council

NSF – National Science Foundation

PM – Particulate Matter

ULEV – Ultra Low Emission Vehicle

VMT – Vehicle Miles Traveled

NAVC Conference Notes and Interpretations

GHG emissions on a per capita basis have been flat over the last decade and have been decreasing on a GDP basis. Transportation GHG emissions are the fastest growing of any sector and have increased over the same period by 27%. Of the many greenhouse gases, N₂O was specifically mentioned as also being transportation related, at 14% of total. The latest data suggests that worldwide methane emissions have stabilized. The IPCC estimates of global warming are based on continued increases in methane emissions. Methane as a GHG is approximately 21 times stronger than CO₂, on a mass basis, so the stabilization of methane emissions have an important impact on the potential for global warming.

Discussions around the topic of the GHG emissions inventory included questions from the audience concerning BC (e.g. diesel emissions), which is considered to be a strong contributor to global warming. It has been suggested that the greatest opportunity for mitigating global warming within the next 50 years might be achieved by reducing emissions of BC, O₃ precursors, and methane. This is a recent conclusion from research done by James Hansen. More information on BC and global warming can be found at:

<http://www.giss.nasa.gov/research/forcings/altscenario/>

BC's contribution to global warming has important implications to the future use of diesel-powered vehicles and/or the control technologies they employ. Some estimates of the global warming potential of BC indicate that there might be a greater global warming impact from diesel vehicles than gasoline because the impact of BC emissions more than offset the CO₂ emissions reductions from diesels. However, there is a great deal of uncertainty about the magnitude of the global warming impact of BC. Despite these uncertainties, concerns over the global warming impact of BC will probably increase the pressure to control BC emissions from both diesel and gasoline vehicles.

Global vehicle growth was projected to be 4.5% per year, versus approximately 2.5% per year in the U.S. Worldwide, there are approximately 800M vehicles, with 30% in the U.S. China has established a goal of increasing vehicle ownership in their country to one vehicle per family by the year 2020.

It is reported that the discoveries of new oil reserves are dropping. It is predicted that peak worldwide oil production will occur in the period between 2010 and 2020, and decrease thereafter, with the potential for price increases. A number of speakers presented figures to show that the cost of fuel, per mile, has decreased from approximately 7 cents/mile in the 1970's to less than 3 cents/mile currently (corrected for inflation) and that this is a major factor in the rise of VMT.

Currently, California uses more gasoline than is refined there. There is consideration being given to having a gasoline pipeline built between the gulf coast and California to assist in filling demand. The representative from the NRDC strongly supported California bill AB1058, proclaiming that there is "no doubt that CO₂ is a pollutant" and the state has the right and obligation to control these emissions. He also accused the automobile industry of undertaking a \$3M advertising campaign to spread lies in an effort to prevent this bill from being enacted.

There were two speakers who presented survey data indicating that fuel economy was very low on a list of customer preferences in new car purchases.

The representative for Environmental Defense admitted that CAFE is a failed policy and that customer attention is directed to other vehicle amenities and not fuel economy. He also stated that there is no business case for producing bioethanol.

The Honda representative proclaimed their marketplace responsibility is to provide vehicles with low emissions and high fuel economy. Their response to "Why be Green?" is that it leads to leadership in quality and value by being ahead of regulation. He went on to cite a number of

environmental “firsts” by Honda, and mentioned that Honda now has three different versions of the Civic: ULEV gasoline powered, CNG powered, and hybrid powered. Honda’s release of the Civic hybrid is a marketing experiment, and if successful, will lead to the introduction of other hybrids, with five more ready to go into production. He also announced that Honda has a \$1,000 CNG fueling station available for home use. He also mentioned that U.S. fuel economy would currently average approximately 35 mpg if vehicle performance (e.g. 0 to 60 mph acceleration time) had not been adjusted, but that these performance adjustments were market driven.

The DCX representative said DCX is committed to the development of technologies to minimize vehicle impact on global climate. He strongly advocated diesel technology as the best way to achieve this in the midterm (though this was not defined). He provided estimates that the U.S. fleet fuel economy would be approximately 3.0 mpg better if the U.S. had the same diesel penetration as the E.U. (approximately 40%).

The Toyota representative was less specific about near and mid-term technological solutions to transport related GHG inventories, but pointed out that Toyota had more vehicles at the top of their classes in fuel economy than any other manufacturer. He indicated that hybrid fuel cell vehicles will represent the future in personal transportation.

The luncheon speaker indicated that UTC will be providing fuel cell powered buses to the state of California for \$3M each.

About NAVC

The following information about NAVC was extracted directly from their website at: <http://www.navc.org/About.html>.

NAVC is a non-profit association of private and public sector firms and agencies working together to promote advanced vehicle technologies in the Northeast U.S. Established in 1993, NAVC is now the principal multi-state, non-profit funding mechanism for advanced transportation research, technology development and demonstration in the region. Research, design and commercialization of clean-fuel vehicles is essential to the environment, the economy and energy security.

NAVC staff includes:

Sheila Lynch, Executive Director

Lisa Callaghan, Project Director, lisacal@navc.org

Mark D'Amico, Finance Director, mdamico@navc.org

NAVC's Board of Directors is appointed by the six New England Governors, the Governors of New York and New Jersey, and the Mayor of New York City. Each appointment consists of one private participant and one public participant. They are as follows:

William A. Gildea, New England Governors' Conference, Inc., *NAVC President*
Jason Grumet, Northeast States for Coordinated Air Use Management, *NAVC*

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Deborah Schachter, New Hampshire Governor's Office of Energy and Community

Services:

Conrad Schneider, Northeast Clean Power Campaign (Maine)
James Sime, Connecticut Department of Transportation
Karen Songhurst, Office of Policy, Vermont Agency of Transportation
Richard Watts, Vermont
Robert F. Young, New Jersey Office of Sustainability

NAVC's mission is to strengthen the Northeast economy through the creation of highly skilled technology jobs, reduce the region's serious air quality problems by promoting the use of clean-fuel vehicles, foster transportation technologies that are sustainable, and reduce U.S. dependence on foreign oil. NAVC provides funding for technology innovation and serves as a hub of advanced transportation activity in the Northeast. Through NAVC, manufacturers, researchers, utilities, universities, government agencies and environmental advocates are linked, sharing information and ideas and collaborating on projects. NAVC is not only an invaluable resource for funding and information, but also a much-needed advocate for clean-fuel technologies.

NAVC's Public/Private Partnership: In 1999, NAVC and the Department of Transportation's [Advanced Vehicle Program](#) (AVP) launched a partnership to spur development of cleaner, quieter and more fuel-efficient vehicles. Four new NAVC projects received funding through the AVP in FY 99 (see [announcement](#)).

The AVP continues the successful public/private partnership model used by the Defense Advanced Research Projects Agency (DARPA) Electric Vehicle/Hybrid Electric Vehicle (EV/HEV) Program. Under the [DARPA EV/HEV](#) program, NAVC participants initiated over 40 projects, spanning a wide range of technology areas including electric, hybrid-electric and fuel cell propulsion systems, electric and natural gas refueling, energy storage and management, and lightweight structural composites.

NAVC has also managed projects funded by the Advanced Technology Program of NIST and by foundations and private corporations, and works closely with the other [regional consortia](#) around the country, to serve as an advocate for advanced vehicle technology development throughout the U.S.

NAVC's address is:
Northeast Advanced Vehicle Consortium
112 South St., Fourth Floor
Boston, MA 02111
Phone: (617) 482-1770
Fax: (617) 482-1777

NAVC Conference Program and Agenda

Northeast Advanced Vehicle Consortium Conference on Climate Change and Transportation

8:00 Registration and continental breakfast

9:00 Welcome:

Dr. Richard R. John, Director John A. Volpe Transportation Systems Center

Sheila Lynch, Executive Director, Northeast Advanced Vehicle Consortium

9:15 Keynote:

Linda Lawson, Director of Transportation Policy Development for the Office of the Secretary, U.S. Department of Transportation

9:30 Greenhouse Gas Inventory:

Michael Gillenwater, Head of U.S. Greenhouse Gas Inventory U.S. Environmental Protection Agency

10:00 Industry Panel

John German, Manager, Environmental & Energy Analysis, American Honda Motor Co.

Reginald Modlin, Director, Environmental & Energy Planning, Daimler Chrysler Corp.

David Hermance, Executive Engineer, Environmental Engineering, Toyota Technical Center USA, Inc.

11:00 Break

11:15 Environmental Panel

John DeCicco, Ph.D, Senior Fellow, Automotive Strategies, Environmental Defense

Roland Hwang, Senior Policy Analyst, Natural Resources Defense Council

Dr. William Moomaw, Director, International Environment & Resource Policy Program, Fletcher School of Law & Diplomacy, Tufts University, IPCC Member

12:30 Lunch & Speaker:

Daniel Kelly, Vice President, Transportation Business, UTC Fuel Cells

2:00 Concurrent Break-Out Sessions

Light Duty Vehicles Panel Members

Linda Lawson (Chair) Director of Transportation Policy Development for the Office of the Secretary, U.S. Department of Transportation

Rogelio Sullivan, Program Manager, Office of Advanced Automotive Technologies, U.S. Dept. of Energy

Peter Lidiak, American Petroleum Institute

Gregory Dana, Vice President, Environmental Affairs, Alliance of Automobile Manufacturers

John DeCicco, Ph.D, Senior Fellow, Automotive Strategies, Environmental Defense

Heavy-Duty Engines (Vehicle, Marine, & Rail) Panel Members

Margaret Blum (Chair), Assoc. Administrator for Port, Intermodal & Environmental Activities, Maritime Administration, U.S. Department of Transportation

Robert Larson, U.S. EPA – Transportation & Regional Programs Division, OTAQ

Sidney Diamond, Office of Heavy Vehicle Technologies, U.S. Department of Energy

Jim Corbet, Professor, University of Delaware

Shang Hsiung, Program Manager, Federal Transit Administration

Matt Winkler, Vice President, Seaworthy Systems

Aviation Panel Members

Howard Wesoky (Chair), Former Chief and Technical Advisor for Environment, Office of Environment & Energy, FAA

Cindy Newberg, U.S. EPA Office of Atmospheric Programs

Sonia Hamel, Director of Air Policy and Planning, Massachusetts Executive Office of Environmental Affairs

Richard Altman, Manager, Business Development, Pratt & Whitney

Curtis Holsclaw, Office of Environment & Energy, Federal Aviation Administration

States Initiatives Panel Members

John Shea (Chair), Director of Environment & Energy Programs, New England Governors' Conference, Inc.

Roland Hwang, Senior Policy Analyst, Natural Resources Defense Council

James Brooks, Director, Bureau of Air Quality, Maine Department of Environmental Protection

Seth Kaplan, Senior Attorney, Conservation Law Foundation

3:45 Closing Plenary

Summary and Conclusions

Representatives from government agencies and environmental NGOs are beginning to recognize that there is a low priority given to fuel economy by new car purchasers. This might lead to further support for tax policies and/or government incentives to promote the purchase of more fuel-efficient vehicles.

There is evidence to suggest that near to midterm changes (within the next 50 years) in the potential for global warming might be best addressed by controlling emissions of O₃ precursors, CH₄, and BC, as well as CO₂. This will probably lead to increased pressure to control BC emissions from both diesel and gasoline vehicles. There is also evidence that emissions of methane are not increasing as rapidly as predicted by the IPCC (and have possibly stabilized), hence the potential for future global warming has probably been overestimated. It is possible that this will lead to less pressure to control other, non-methane GHG emissions, particularly if other GHG emissions (e.g. BC) are decreased through better emission controls.

One researcher reports that the global warming potential of BC emissions from diesel vehicles, even with current PM standards, will more than offset the reductions in CO₂ emissions. However, the uncertainty in the global warming potential of BC is too high to be certain that this is so.

Transportation is the fastest growing source of GHG emissions. As such, the automobile industry is likely to continue to face pressure to reduce CO₂ emissions.

Addendum

Air Pollution as a Climate Forcing Workshop Notes and Interpretation (Alan Dunker)

I recently attended a workshop titled "Air Pollution as a Climate Forcing," organized by James Hansen of the NASA Goddard Institute for Space Studies. Hansen has published papers in the past two years emphasizing the effects of tropospheric ozone (O₃), black carbon (BC), and methane (CH₄) on climate change. He has proposed an alternative and somewhat more positive future scenario than the IPCC scenarios. In Hansen's scenario, reductions in tropospheric air pollution that are already planned or possible within the next 20-30 years will provide a near-term reduction in the radiative climate forcing. Though he still supports reducing CO₂ emissions, he argues that reducing air pollution would allow a more gradual phase-in of technologies to reduce CO₂ emissions than suggested by the IPCC report and scenarios.

The workshop was sponsored by NASA, NOAA, EPA, NSF, California Air Resources Board (CARB) and California Energy Commission. About 130 people attended, including 9 from EPA, 4 or more from environmental organizations, numerous individuals from U.S. universities and government labs, and various numbers from universities and government agencies in Europe, South America, China, India, and Japan. One individual from the U.S. Government Accounting Office (GAO) attended. A U.S. House Committee has asked the GAO to assess the credibility and implications of Hansen's scenario. Based on the attendance at the conference, the presentations, and the discussions, Hansen's proposed scenario is being taken seriously.

Some items of special interest:

There will likely be increased pressure to reduce particulate emissions from diesels. Mark Jacobson (Stanford) presented a very high value for the global warming potential of BC. He concluded that even with a 10 mg/mi PM emissions standard, diesel vehicles enhance global warming compared to gasoline vehicles because the impact of the BC offsets the greater fuel economy of diesel vehicles. The uncertainty of the global warming potential of BC is probably a factor of 4, so Jacobson's result is not definitive. Nevertheless, there was general concern about BC from diesels and other sources.

One set of simulations with a climate model suggests that the high aerosol concentrations over China and India may modify rainfall patterns. The simulations are consistent with the recent pattern of increased rainfall in the south of China and decreased rainfall in the north.

China and India are participating in large-scale measurement programs to determine the impact of aerosols on radiative forcing in Southeast Asia. Analyses of some of these data and historical data suggest that the aerosols may have regional climate impacts. Stoves fueled by biomass appear to be an important source of BC in China and India.

Recent atmospheric data show a stabilization of CH₄ emissions whereas the IPCC scenarios all predict that CH₄ emissions continue to increase. Several individuals criticized the IPCC

scenarios for CH₄; no one defended them. The reason(s) for the stabilization of CH₄ emissions is unclear.

CO is an indirect, weak greenhouse gas because it reduces tropospheric OH radicals and lengthens the lifetime of CH₄.

Tropospheric NO_x emissions increase the global-average O₃ concentration (increased radiative forcing) but decrease the lifetime of CH₄ (decreased radiative forcing). These two effects tend to cancel. Separate work suggests that the direct radiative forcing of nitrate aerosols is a larger negative number (cooling) than previously obtained. Hence, the total effect of tropospheric NO_x emissions seems to be radiative cooling. Stratospheric (aircraft) NO_x emissions lead to radiative warming.

Changes in O₃, BC, CH₄, NO_x, and SO_x produce more immediate effects on climate because these species are short-lived in the atmosphere compared to CO₂.

Mike Scheible (deputy to Alan Lloyd at CARB) said that the connection between air pollution and climate change will affect their priorities and gain greater public support for controls on air pollution.

The plan is to prepare a report summarizing the consensus from the presentations and panel discussions at the workshop.