Update on ACES Diesel Assessment Project

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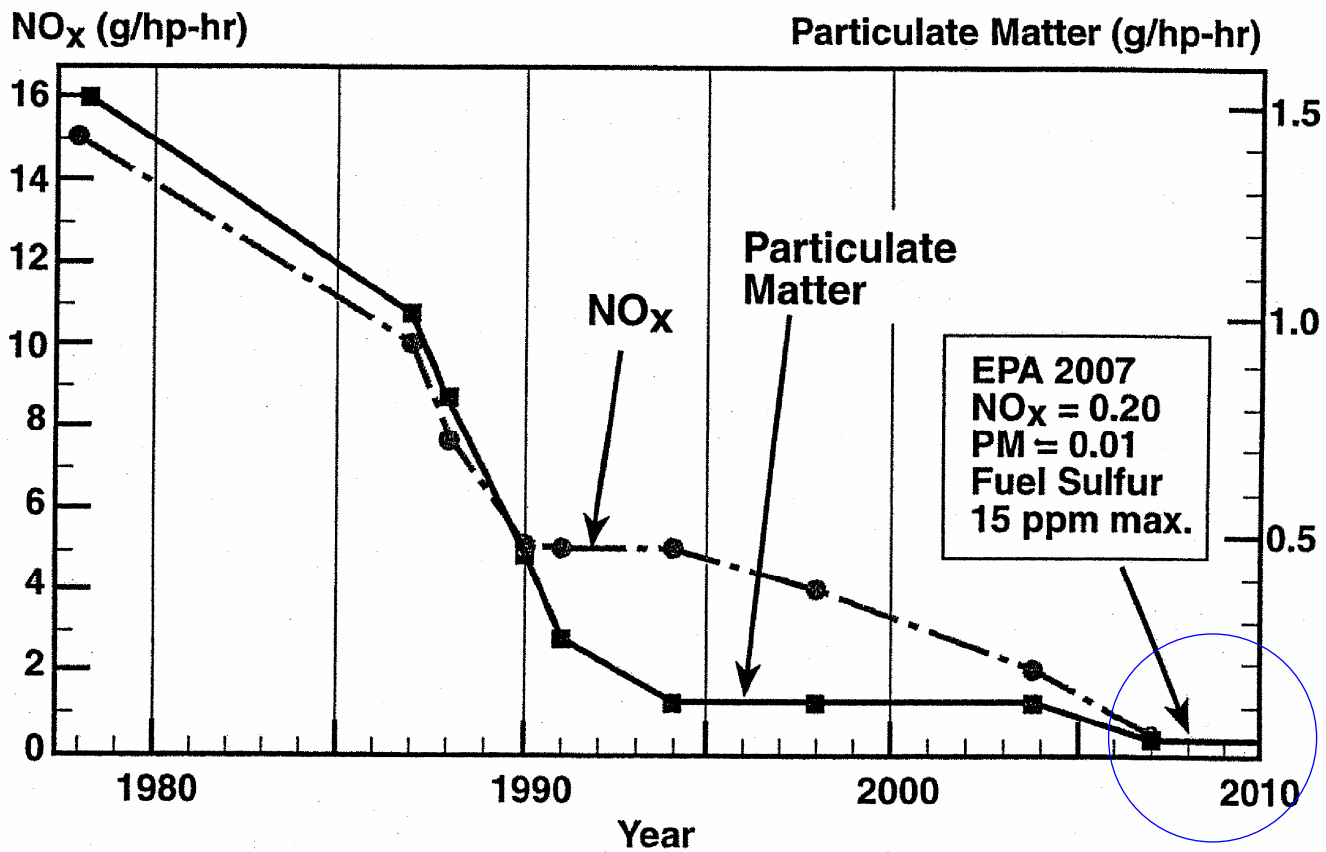
Overview

- Background on progress and challenges in the next five years for diesel

- Status and Next Steps for the Advanced Collaborative Emissions Study (ACES)

Improvements in PM and NOx Diesel Emission Standards



What Technologies Will Be Used in 2007 and 2010 Heavy-Duty Diesel Engines?

2007

PM control (catalyst and/or trap)

Some NOx control (Exhaust Gas Recirculation only?)

2010

PM control (catalyst and/or trap)

NOx control (possible options NOx adsorbers or selective catalytic reduction)

Diesel Health Issues

Historically

- **Lung cancer –primary driver of diesel debate**
- **Contribution to PM exposures, effects**
- **Asthma and allergies –emerging issues**

New (2007-2010) Diesel

- **Most diesel health assessments based on 1980s and earlier technology. "As cleaner engines replace older engines.. the general conclusions will need to be reevaluated" (EPA 2002)**
- **Most pollutants will decrease, but new species may be formed. Although effects expected to be reduced new technologies should be evaluated before widespread introduction**

Advanced Collaborative Emission Study (ACES)

- A partnership of HEI and CRC supported by a wide range of key government, industry and environmental groups
- Designed to:
  - Produce health-relevant characterization of emissions from 2007- and 2010- compliant heavy-duty diesel engines/control systems (CRC)
  - Assess possible health effects in animals exposed to whole exhaust from one of these systems (HEI)
  - Provide a report of the results and a commentary (HEI)

Steering Committee

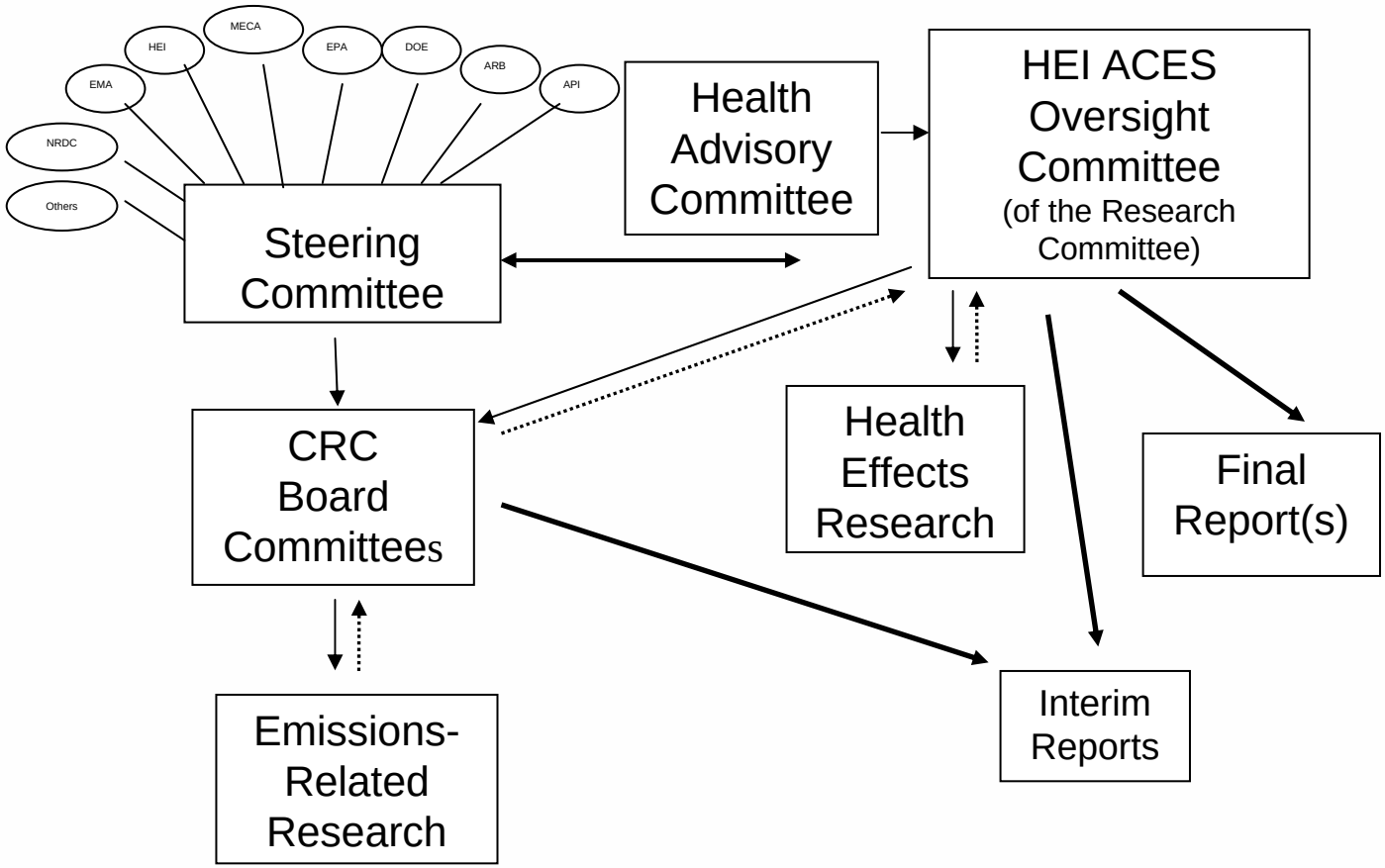
Role

Offers guidance during the planning stages and all Phases of the project

Members

API, CARB, CRC, Corning, DOE, EMA, EPA, HEI, NRDC, Others

Organizational Chart of ACES



Key Components of ACES

	New 2007 engines	New 2010 engines
Phase 1	Emission characterization (at dynamometer facility); possible biological screening	
Phase 2		Emission characterization (at dynamometer facility); possible biological screening
Phase 3A		Emission characterization (at health testing facility)

Key Components of ACES (cont.)

	New 2007 engines	New 2010 engines
Phase 3B		Chronic bioassay and associated studies - in vivo genotoxicity - respiratory function - inflammation, immune changes - resistance to infections
Phase 3C		Short-term noncancer studies using selected animal models - allergic response - resistance to infections - cardiovascular changes

Main Hypotheses

Emissions from combined new heavy-duty diesel engines, aftertreatment, lubrication, and fuel technologies designed to meet the 2010 NOx and PM emission standards will have very low pollutant levels.

They will not cause an increase in tumor formation or substantial toxicity to any organ or other serious health effects in rats and mice at the dilution ratios used compared to animals exposed to filtered air, although some biologic effects may occur

ACES Time Line

Timing	Emissions Characterization	Health
2005-2006	Finalization of plans and funding Solicitation of facilities and investigators	
	2007 emission characterization (Phase 1)	Final plan of health effects measures
2007-2008	Construction and evaluation of exposure set up at health facility 2010 emission characterization (Phase 2.) 2010 engine selection for Phase 3	Solicitation and selection of additional investigators to implement health measures. Health protocols finalized
2009-2011		24-month bioassay (Phase 3B) Short-term health effects studies (Phase 3C)

Progress and Remaining Decisions

- Steering Committee has agreed on major elements of ACES and is securing funding

- Some Technical Decisions still to be made in course of project:
  - Whether to add some type of biological screening to the emission characterization phases (1 and 2)
    - a Working Group is considering options
  - How to proceed with health testing if substantially different emissions are found from different 2010 technologies
  - What will be the PM levels in the animal chambers after exhaust dilution to reduce temperature and CO levels

Summary

- ACES offers the opportunity of obtaining timely data on new diesel technologies
  - Detailed and health relevant emission characterization
  - Data on effects of chronic exposures on cancer and noncancer health endpoints
- Progress has been made regarding the project funding and the development of a joint project plan (CRC and HEI) for all Phases of the research
- The current plan provides a framework for the work to be conducted and will be finalized by HEI and CRC Committees through future workshops and in consultation with the selected investigators