CLIMATE CHANGE

PRESIDENT OBAMA'S ACTION PLAN and THE ROLE OF CLEAN DIESEL

U.S. Environmental Protection Agency

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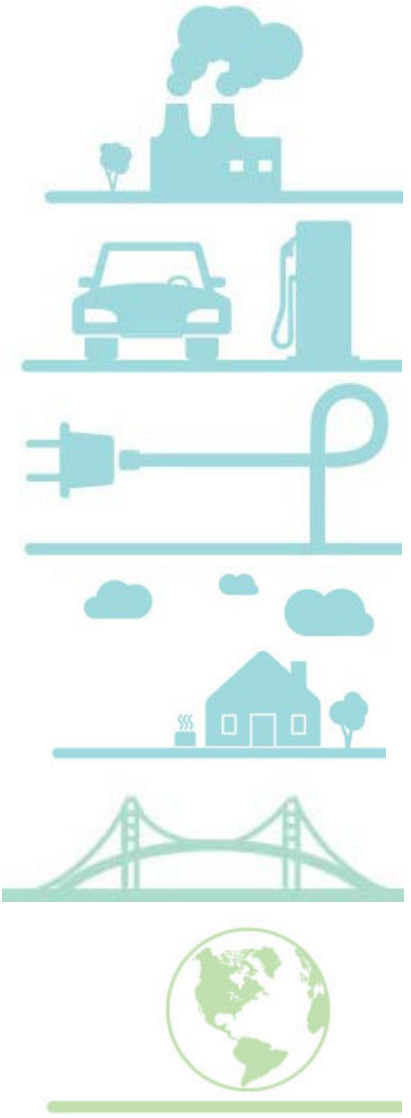
PRESIDENT OBAMA'S PLAN

- Calls on the federal government to work together with states, cities, industries, consumers and the international community to address one of the greatest challenges of our time.

- Reinforces the federal commitment to:
  - Cutting harmful pollution,
  - Protecting our country from the impacts of climate change, and
  - Leading an international effort to address a changing climate

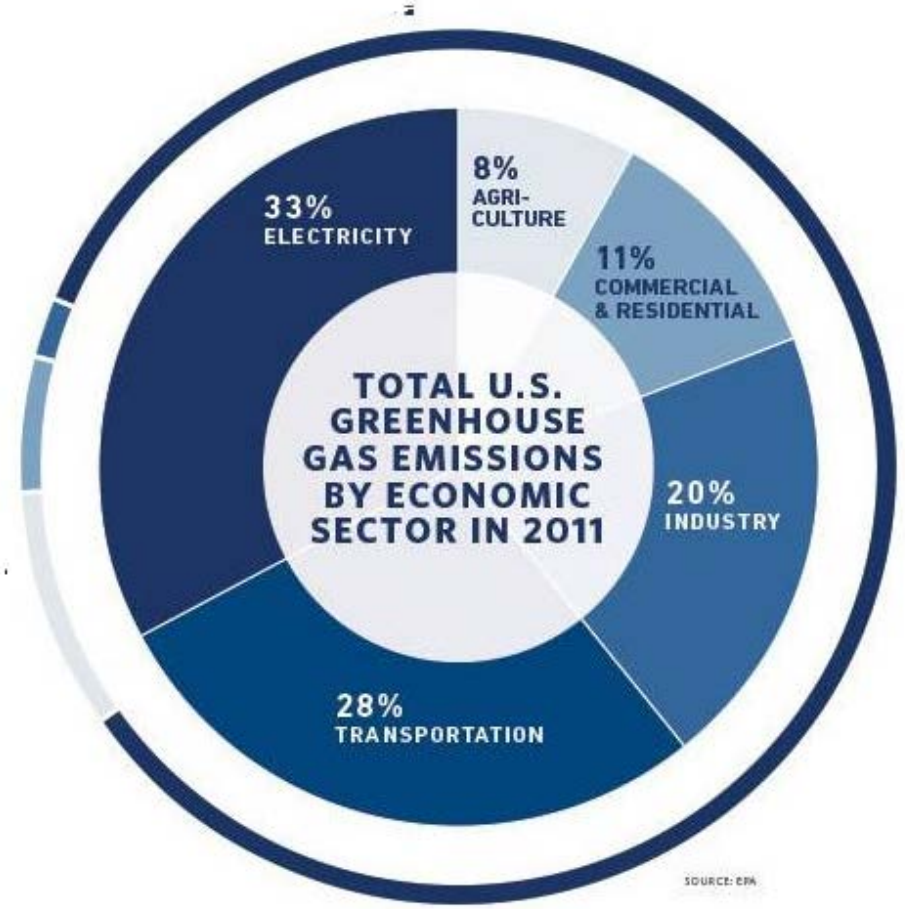
EPA ACTION UNDER PRESIDENT OBAMA'S PLAN

- Reducing carbon pollution from power plants
- Building a 21st century transportation sector
- Cutting energy waste in homes, businesses, and factories
- Reducing methane and HFCs
- Preparing the U.S. for the impacts of climate change
- Leading international efforts to address global climate change



CARBON POLLUTION IS THE BIGGEST DRIVER OF CLIMATE CHANGE

U.S. GREENHOUSE GAS POLLUTION INCLUDES:



REDUCING CARBON POLLUTION FROM POWER PLANTS

- **Progress**
  - Renewable energy accounts for about half of all new generation capacity installed in 2012
  - 35 states have renewable energy targets in place, and more than 20 have set GHG reduction targets
- **Continuing the momentum for the future**
  - EPA will work closely with states, industry, and other stakeholders to establish carbon pollution standards for both new and existing power plants

BUILDING A 21ST CENTURY TRANSPORTATION SECTOR

- **Progress**
  - Issued vehicle GHG and fuel economy standards for model years 2012-2025, requiring an average performance equivalent of 54.5 mpg in 2025
    - Combined savings for consumers of more than $1.7 trillion in fuel costs
    - Cuts 6 billion metric tons of CO2 over lifetimes of vehicles sold
  - In 2011, issued GHG standards for heavy- and medium-duty trucks for model years 2014-2018
    - Reduces about 250 million metric tons of GHGs
    - Provides $41 billion in net benefits over the lifetimes of model year 2014-2018 trucks

BUILDING A 21ST CENTURY TRANSPORTATION SECTOR

- **Continuing the momentum for the future**
  - In partnership with industry leaders and other stakeholders, EPA and DOT will issue GHG and fuel efficiency standards for post-2018 trucks
  - Continued support for renewable fuels standard
  - Continued support for public/private partnerships such as SmartWay

BUILDING A 21ST CENTURY TRANSPORTATION SECTOR

- On road heavy duty sector:
  - 20% of transportation GHGs
  - 6% of all US GHGs
- President's Action Plan calls for development of phase 2 standards for post-2018 HD vehicles
- Phase 1 standards in place for model year 2014 – 2018 vehicles
  - Fuel and GHG reductions: 9-23%
  - Three regulatory categories: HD pickups/vans, vocational vehicles and combination tractors

CLIMATE CHANGE AND BLACK CARBON

NEWS

NASA looks at soot's role in 1800s glacier retreat*

September 3, 2013

A NASA-led team of scientists has uncovered strong evidence that soot from a rapidly industrializing Europe caused the abrupt retreat of mountain glaciers in the European Alps that began in the 1860s, a period often thought of as the end of the Little Ice Age.

The research, published Sept. 3 in the Proceedings of the National Academy of Sciences, may help resolve a longstanding scientific debate.

In the decades following the 1850s, Europe underwent an economic and atmospheric transformation spurred by industrialization. *The use of coal to heat homes and power transportation and industry in Western Europe began in earnest, spewing huge quantities of black carbon and other dark particles into the atmosphere.*

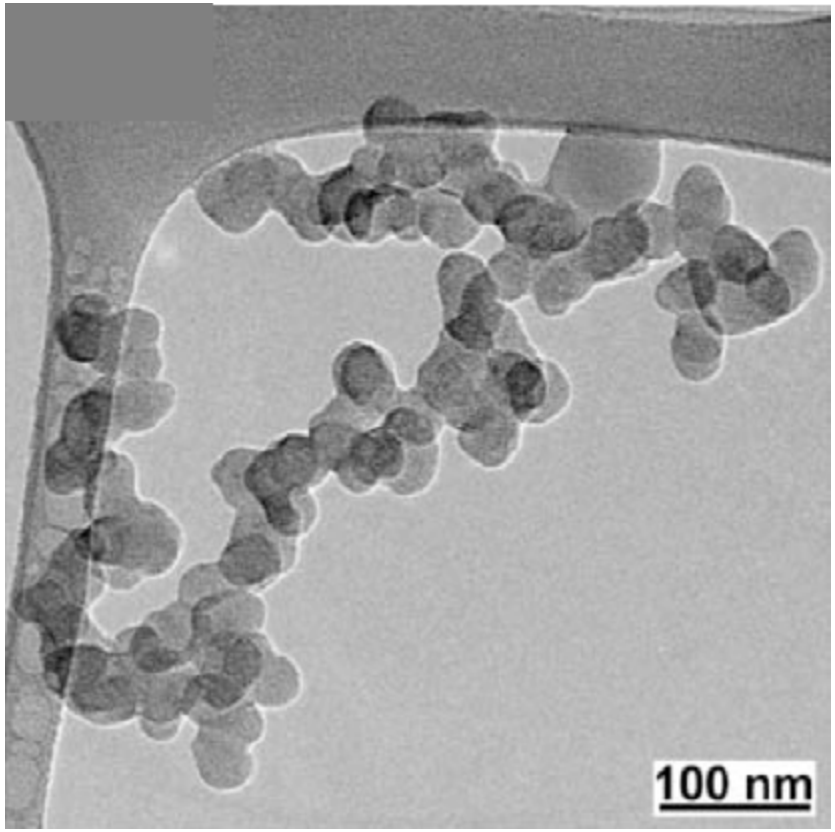
***http://climate.nasa.gov/news/979**

CLIMATE AND CLEAN AIR COALITION

- **The first global effort to treat short-lived climate pollutants as an urgent and collective challenge**

- The Coalition's diesel initiative is also building on the U.S. EPA's Smart Way program, which has become a global model for increasing efficiency and reducing pollution from freight through a portfolio of readily available technologies and practices.

WHAT IS BLACK CARBON?

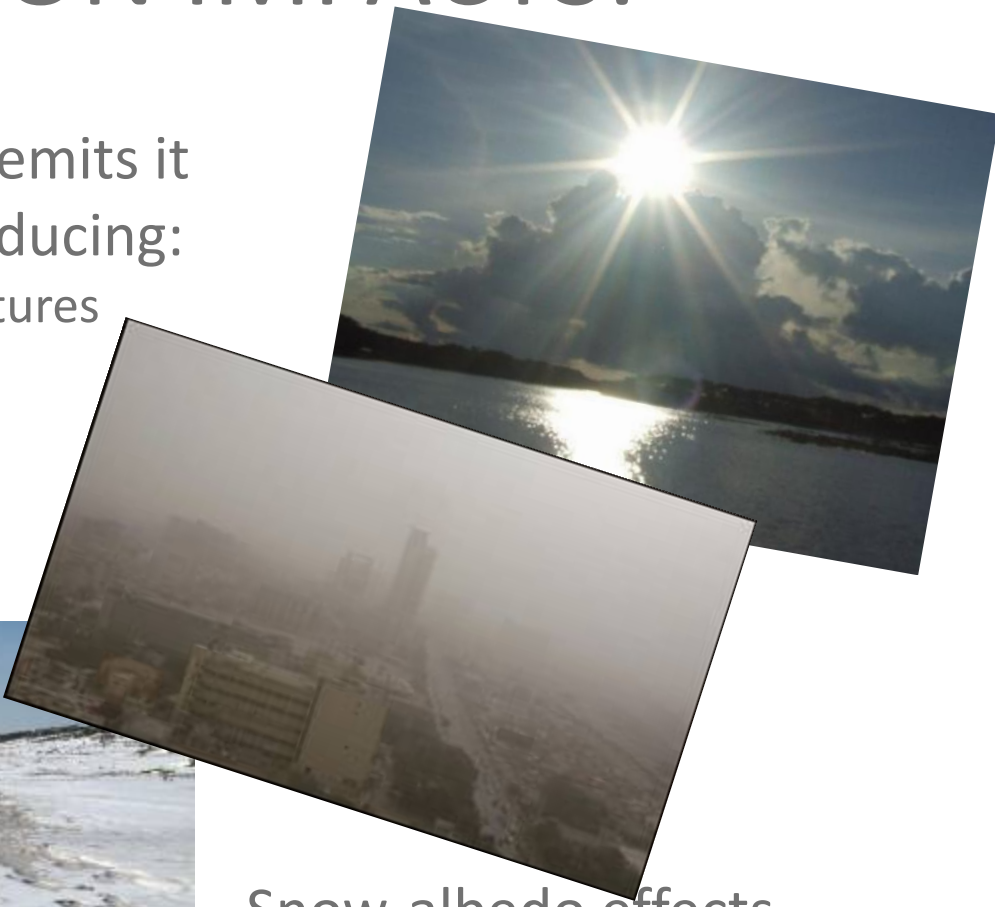


- Product of incomplete combustion
- Emitted as a particle
- The visible component of soot (gives diesel emissions their dark color)
- Regional pollutant
  - CO2 is well-mixed around globe
- Lifetime in atmosphere of days to week
  - CO2 lifetime is on the order of 100 years

BLACK CARBON IMPACTS:

Directly absorbs sunlight and re-emits it into the atmosphere as heat producing:

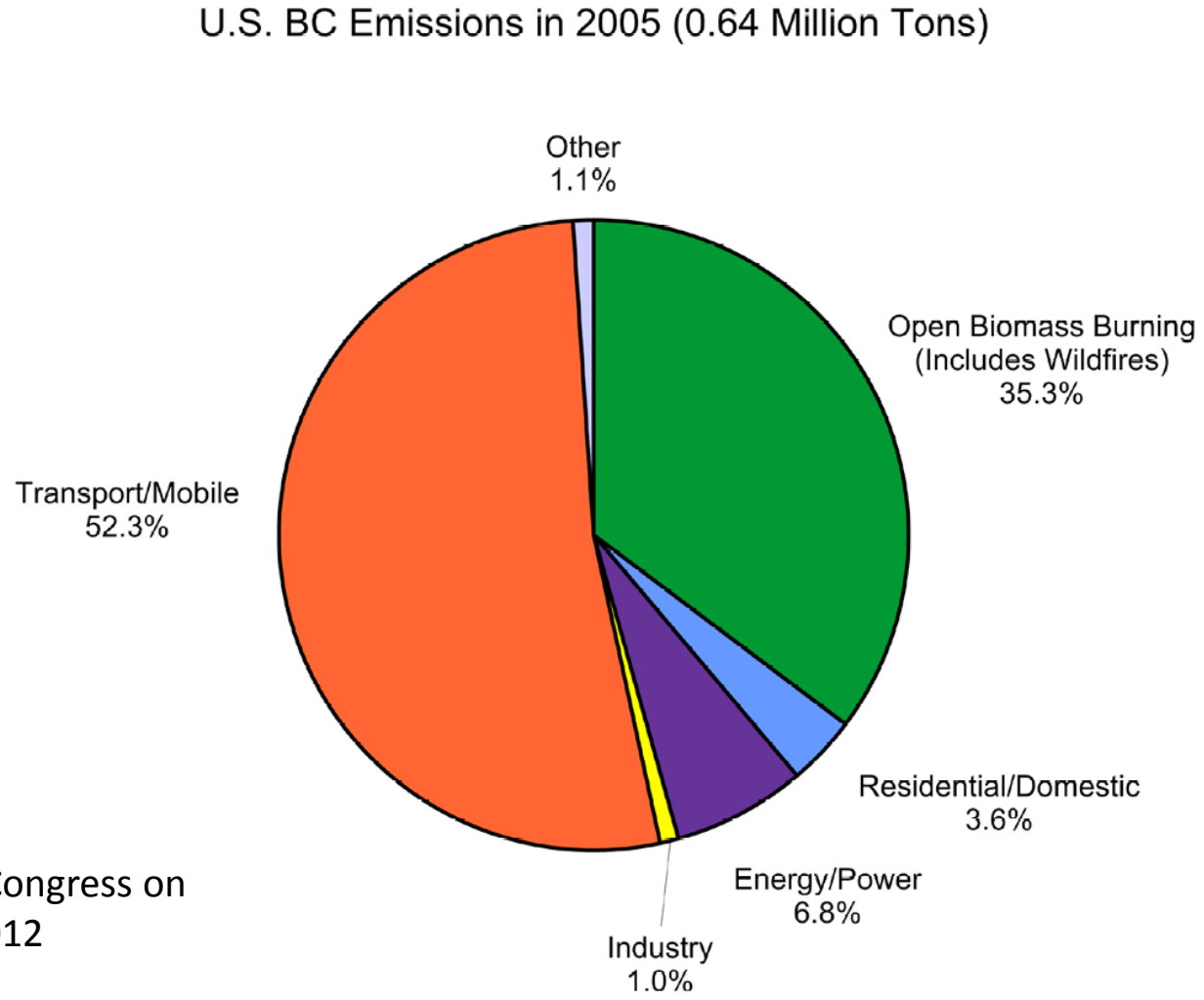
- An increase in atmospheric temperatures
- Changes in precipitation
- Surface dimming



Snow-albedo effects

- Diminished reflectivity
- Warming and melting
- Feedback loop

U.S. BLACK CARBON EMISSIONS BY SOURCE



Source: EPA Report to Congress on Black Carbon, March 2012

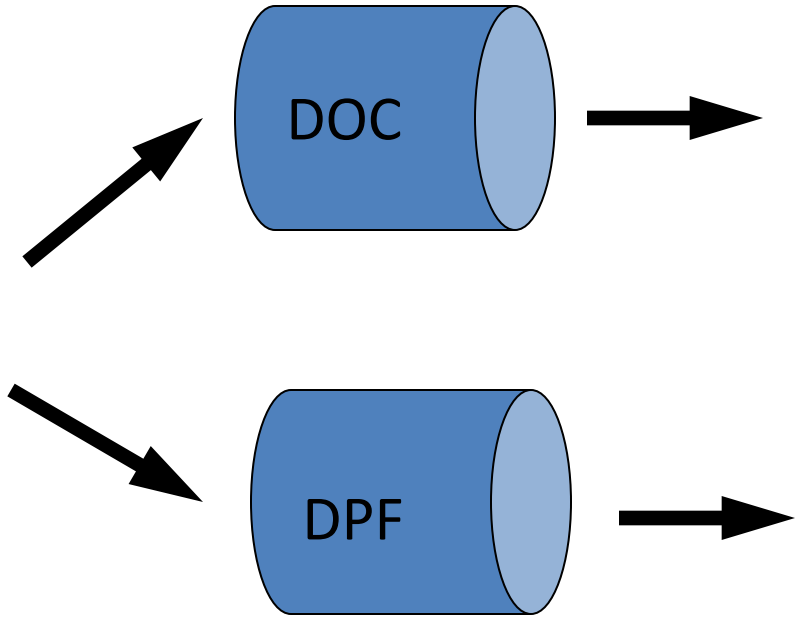
WHAT IS DIESEL PM

- Soot (black carbon)
  - 75% of PM, solid phase in the exhaust, also climate warmer
- Semi-volatile organic compounds (large hydrocarbons)
  - 19% of PM
  - primarily from engine oil, some diesel fuel contribution
  - gas phase in the exhaust
- Sulfate, Nitrate
  - 1% of PM
  - primarily from sulfur in diesel fuel, some from sulfur in engine oil, gas phase in the exhaust
- Inorganic metals (ash)
  - 2% of PM, solid phase in the exhaust

Ways to Reduce PM Emissions

- Reduce sulfur content (reduce sulfate/SOx)
  - Primarily in diesel fuel but, also in diesel engine oil
  - Lowers both directly emitted PM and secondary PM
- Re-circulate crankcase vapor to combustion chamber; Closed crankcase ventilation
- Oxidize organic gas-phase components (i.e., oxidize HCs)
  - Diesel Oxidation Catalyst (DOC)
  - No reduction or slightly reduce soot portion of PM
- Upgrade engine to cleaner standards
- Filter out solid components (soot and ash)
  - Diesel Particulate Filter (DPF)
  - Soot must be burned off (regenerated)

DIESEL EMISSION REDUCTION TECHNOLOGIES



BC P BC

BC BC BC

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BC BC

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BC BC P

All BC remains

20% removal – all other particles

P

90% removal

All BC removed

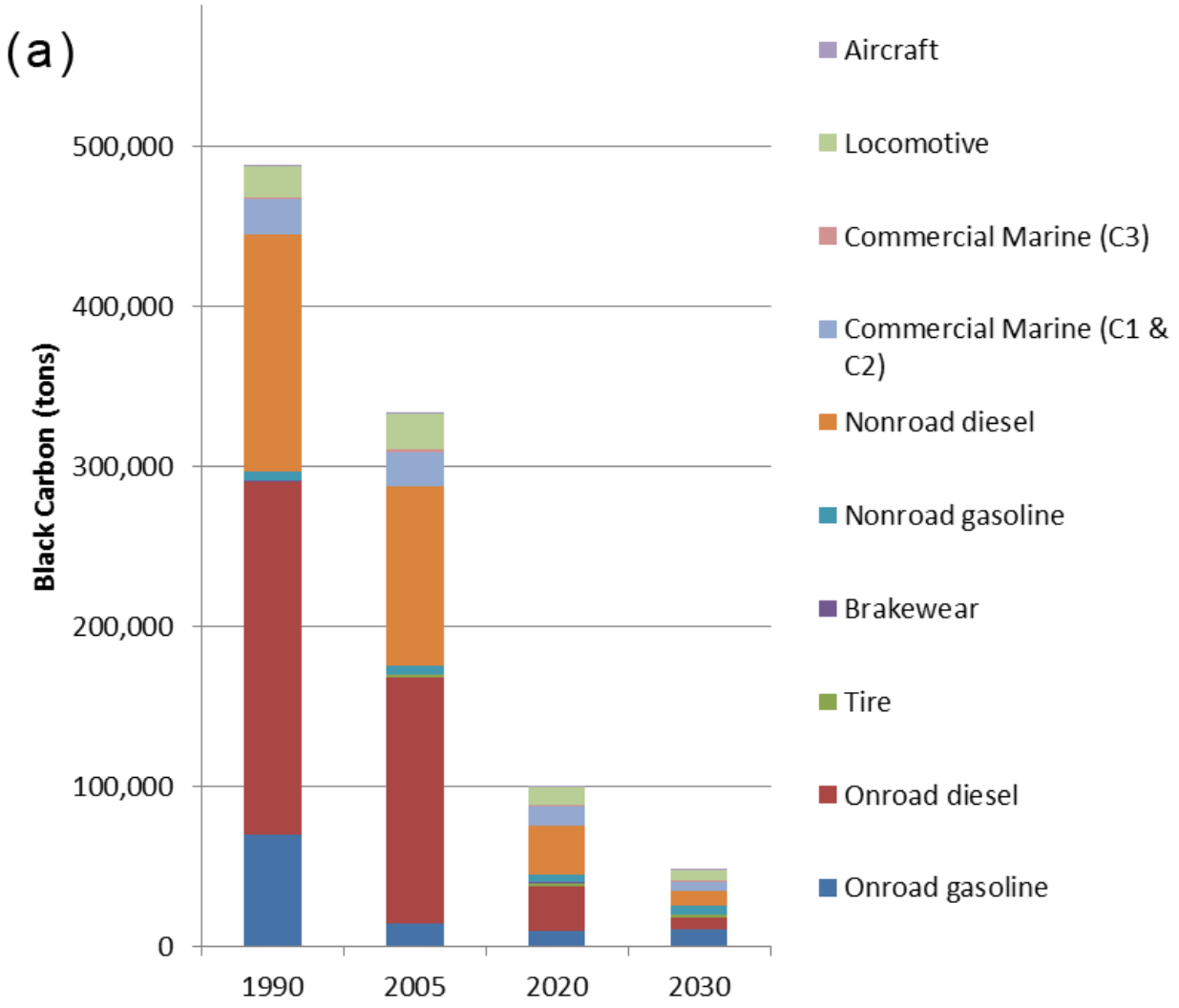
70 % BC

30% Other particles

KEYS TO MITIGATION

- Reductions in BC will result in immediate benefits
- Benefit to public health is large and certain
- Climate benefits may result in some regions
- However…
  - magnitude of BC's climate forcing effects are still uncertain
  - BC is emitted with other particles and gases, many of which exert a cooling influence on climate
  - No substitute for mitigating CO2

Projected Decline in BC Emissions from Mobile Sources



Emissions from U.S. Mobile Sources

Total U.S. mobile source BC emissions are projected to decline by 86% by 2030 due to regulations already promulgated.

LEADING INTERNATIONAL EFFORTS TO ADDRESS GLOBAL CLIMATE CHANGE

- **Progress**
  - Copenhagen Accord
- **Continuing the momentum for the future**
  - Expand bilateral cooperation
  - Combat Short-Lived Climate Pollutants
    - Climate and Clean Air Coalition
    - Arctic Council
    - Global Alliance for Clean Cookstoves
  - Global Methane Initiative (GMI)
  - Partner to implement ENERGY STAR internationally

U.S. EPA CLEAN DIESEL PROGRAMS LEADING THE WAY

- National Clean Diesel Campaign and SmartWay
- Diesel emission reductions can significantly reduce black carbon and its impacts on public health.
- Improved fuel economy or idle reduction strategies can help address climate change, improve our nation's energy security, and strengthen our economy.

BLACK CARBON SYMPOSIUM

www.epa.gov/region9/climatechange/blackcarbon/

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