

California Environmental Protection Agency

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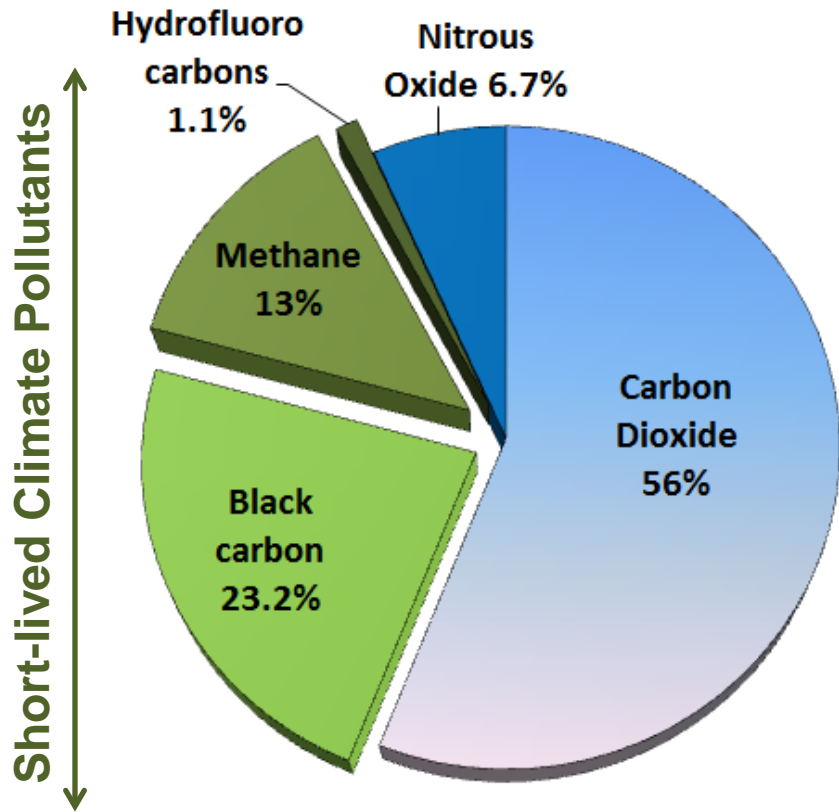


# **Black Carbon Research in California**

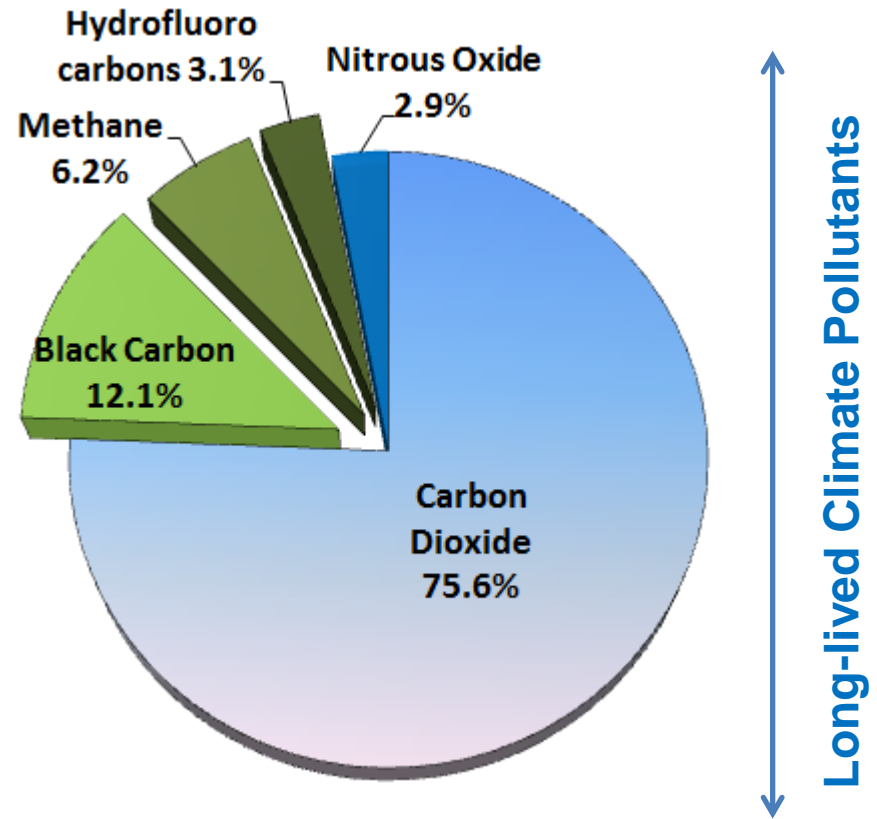
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# Climate Pollutant Emissions (current)



Global



California

# California Research

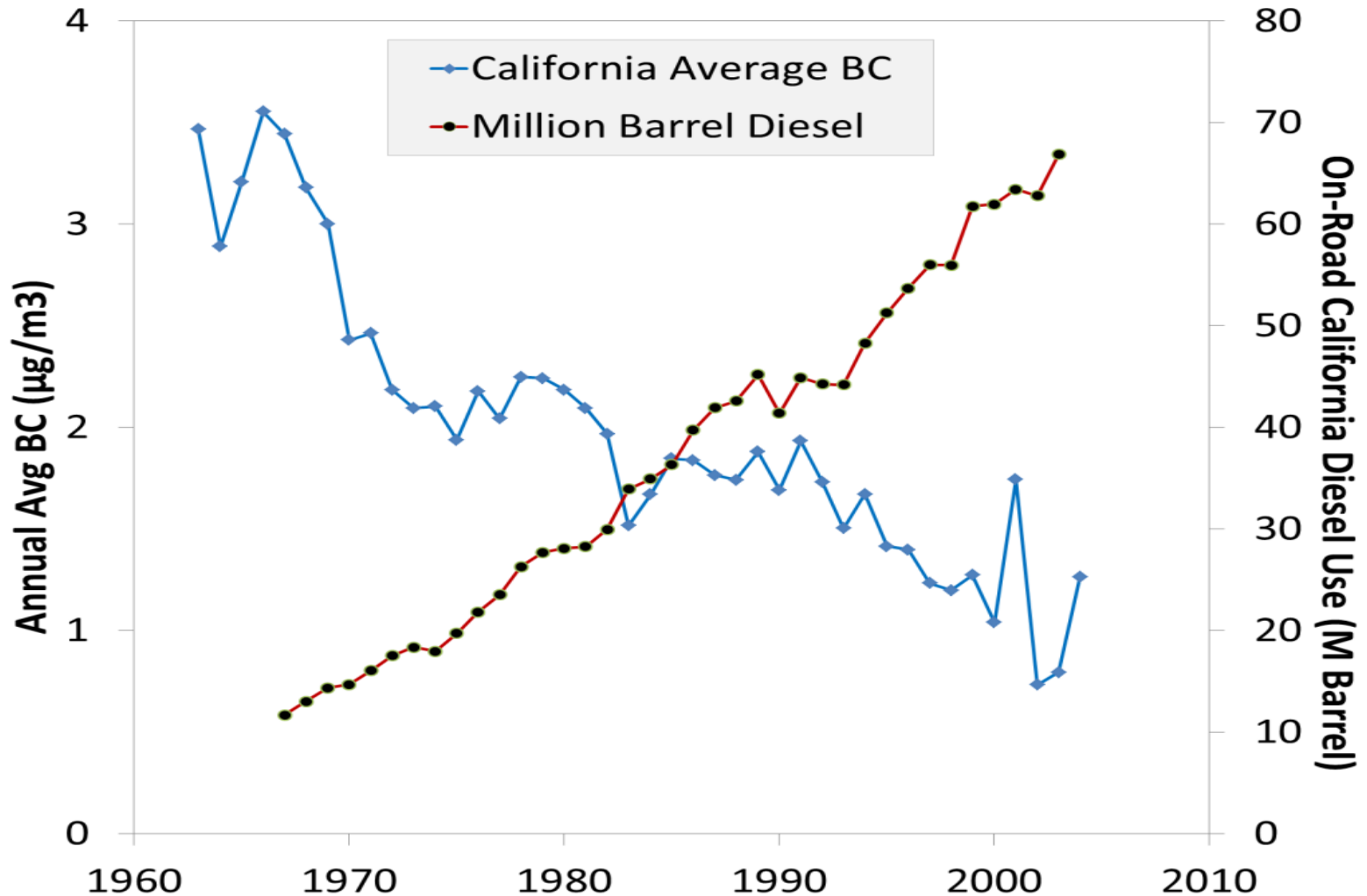
- Emissions
  - ✓ Cars and trucks, control effectiveness
  - ✓ Statewide inventory
- Measurements
  - ✓ Method evaluation
  - ✓ Historical trends
- Climate Impacts
  - Impact on clouds
  - Impact on warming

# 2006 Emissions in California

Emission Category	Black Carbon	Organic Carbon
Total	52,000 tons/yr	108,000 tons/yr
On-Road Transport	20%	9%
Off-Road Transport	23%	13%
Residential	8%	16%
Managed Burning	14%	18%
Wildfires	29%	27%
Miscellaneous	6%	17%

Chow et al. (2009) Climate Change – Characterization of Black Carbon and Organic Carbon Air Pollution Emissions and Evaluation of Measurement Methods, CARB Contract No. 04-307.

# 40 Years of Progress on Diesel Soot



Kirchstetter et al. (2011) Black Carbon and the Regional Climate of California, CARB Contract No. 08-323.

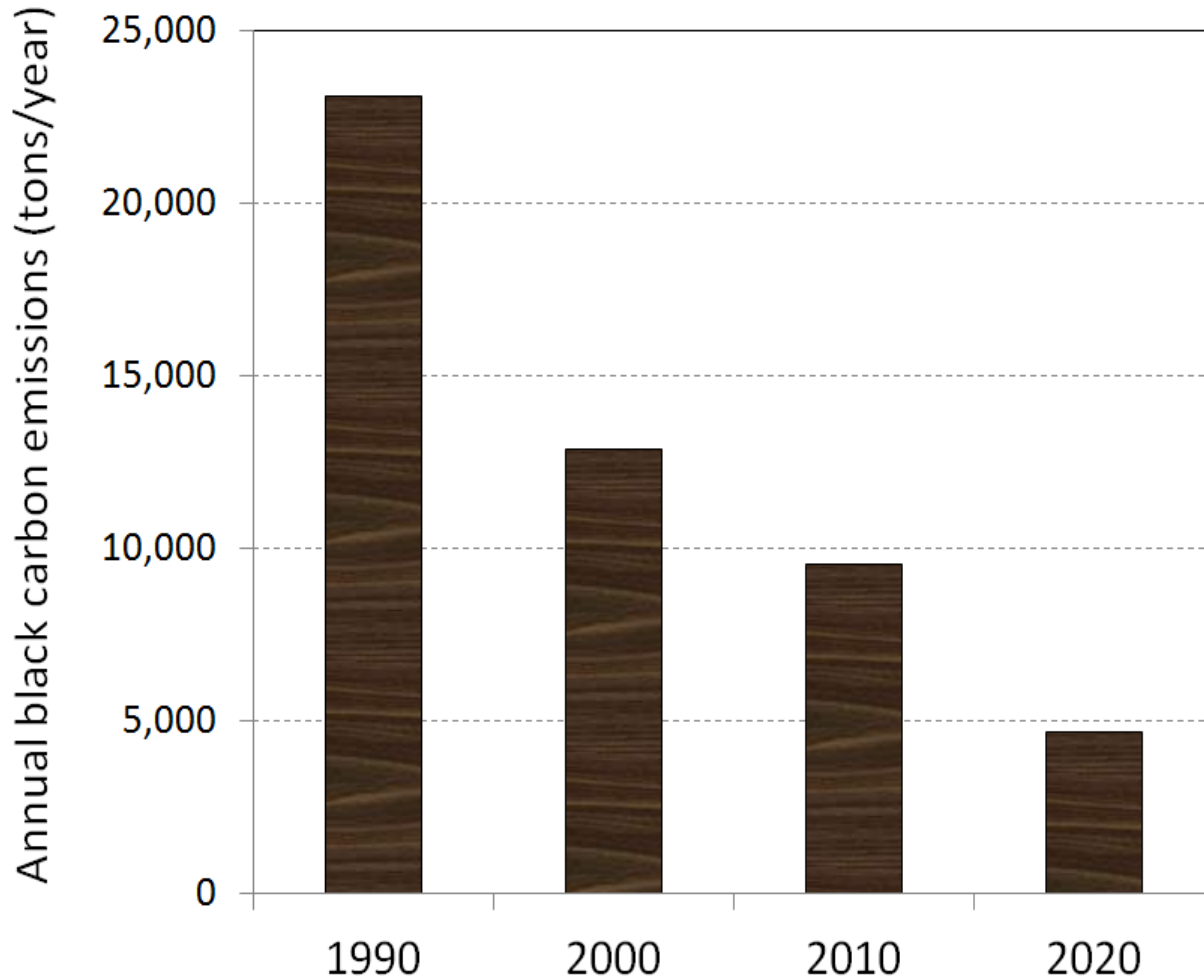
# High Emitters

- 226 heavy-duty truck plumes measured
  - Caldecott Tunnel (near San Francisco)
  - 4% grade
- 10% of heavy-duty trucks responsible for ~40% of total black carbon emissions

# California Actions

- Diesel engine controls
- Burning restrictions
- Advanced Clean Cars PM standard

# Black Carbon Reductions from California Transportation



80% reduction  
in black carbon

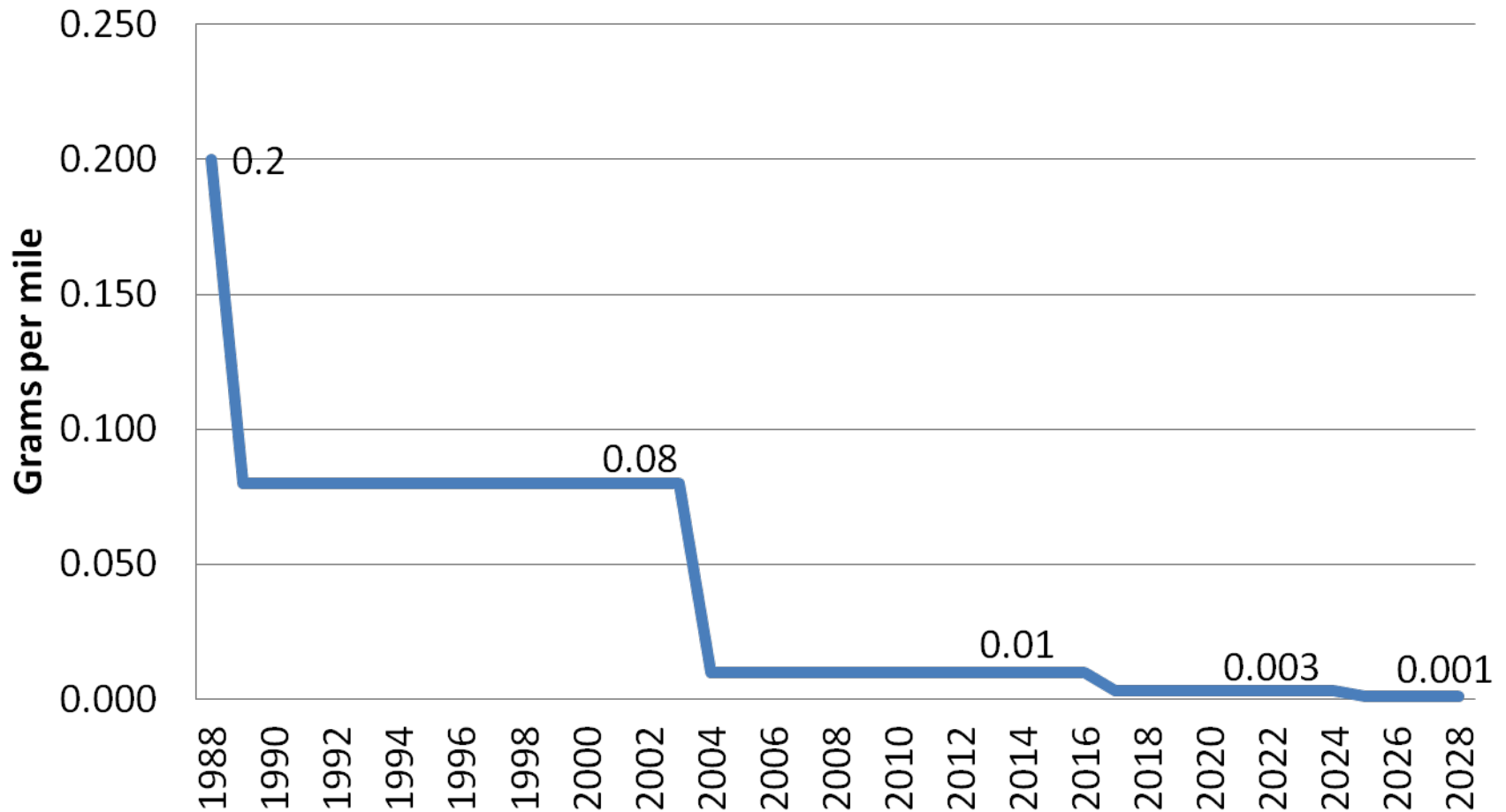


# California Burning Restrictions

- Agricultural burning
  - Sacramento Valley reduced 90% since 1990
  - San Joaquin Valley reduced 80% since 2002
- Residential burning
  - Mandatory programs in most urban areas

# California PM Standards

(passenger cars, light trucks < 8,500 lbs. GVW)



Gasoline vehicles subject to PM standard beginning in 2004