

# Overview of the CAA

- **Air pollutants:**

“any air pollution agent or combination of such agents, including any physical, chemical, biological, radioactive (including source material, special nuclear material, and byproduct material) substance or matter which is emitted into or otherwise enters the ambient air”

- **Stationary sources:**

“generally any source of an air pollutant except those emissions resulting directly from an internal combustion engine for transportation purposes or from a nonroad engine or nonroad vehicle as defined in section 7550 of this title”

- **Motor vehicles:**

any self-propelled vehicle designed for transporting persons or property on a street or highway.

- **Nonroad engines:**

an internal combustion engine (including the fuel system) that is not used in a motor vehicle or a vehicle used solely for competition, or that is not subject to standards promulgated under section 7411 of this title or section 7521 of this title.

# CAA Fundamentals - Title I

## NAAQS

- The CAA directs EPA to establish National Ambient Air Quality Standards (NAAQS) for air pollutants that:
  - When emitted, cause or contribute to air pollution which may reasonably be anticipated to endanger public health or welfare; and
  - Are present in the ambient air due to stationary or mobile sources
- . To date, EPA has established NAAQS for six pollutants (criteria pollutants):
  - Sulfur dioxide, carbon monoxide, ozone, particulate matter (coarse (PM10) and fine (PM2.5)), nitrogen dioxide, and lead
- NAAQS come in two forms
  - Primary – designed to protect public health
  - Secondary – designed to protect public welfare
- NAAQS are expressed as a concentration (e.g., ppm)

# CAA Fundamentals - Title I

## NAAQS

Pollutant	Primary/ Secondary	Averaging Time	Level	Form	
<a href="#">Carbon Monoxide (CO)</a>	primary	8 hours	9 ppm	Not to be exceeded more than once per year	
		1 hour	35 ppm		
<a href="#">Lead (Pb)</a>	primary and secondary	Rolling 3 month average	0.15 µg/m <sup>3</sup> <sup>(1)</sup>	Not to be exceeded	
		primary	1 hour	100 ppb	98th percentile of 1-hour daily maximum concentrations, averaged over 3 years
<a href="#">Nitrogen Dioxide (NO<sub>2</sub>)</a>	primary and secondary	1 year	53 ppb <sup>(2)</sup>	Annual Mean	
		primary and secondary	8 hours	0.070 ppm <sup>(3)</sup>	Annual fourth-highest daily maximum 8-hour concentration, averaged over 3 years
<a href="#">Ozone (O<sub>3</sub>)</a>	primary	1 year	12.0 µg/m <sup>3</sup>	annual mean, averaged over 3 years	
		secondary	1 year	15.0 µg/m <sup>3</sup>	annual mean, averaged over 3 years
<a href="#">Particle Pollution (PM)</a>	PM <sub>2.5</sub>	primary and secondary	24 hours	35 µg/m <sup>3</sup>	98th percentile, averaged over 3 years
		primary and secondary	24 hours	150 µg/m <sup>3</sup>	Not to be exceeded more than once per year on average over 3 years
<a href="#">Sulfur Dioxide (SO<sub>2</sub>)</a>	primary	1 hour	75 ppb <sup>(4)</sup>	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years	
		secondary	3 hours	0.5 ppm	Not to be exceeded more than once per year

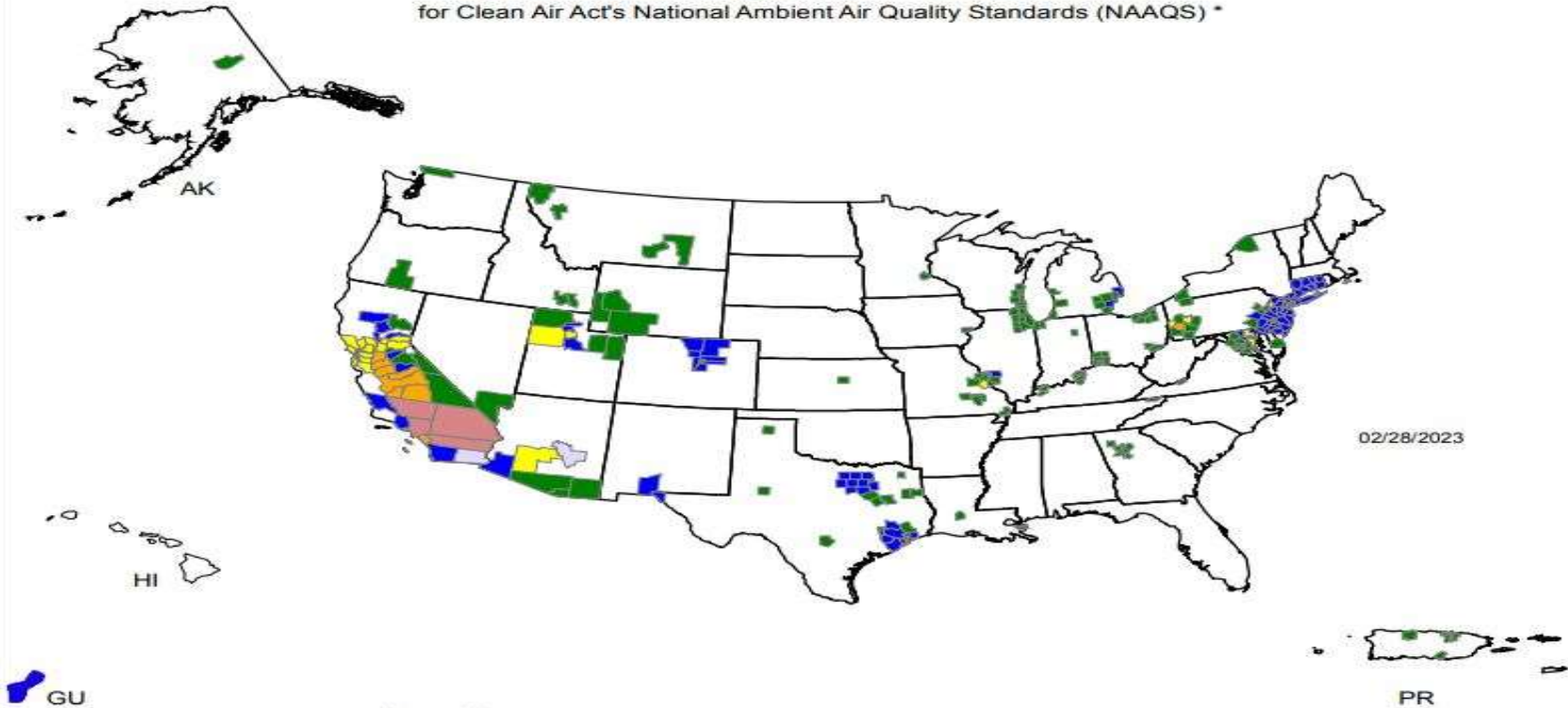
# CAA Fundamentals – Title I

## NAAQS

- NAAQS are periodically reviewed and may be revised
  - Five-year intervals
- All areas of the US are to be designated as in “attainment” or “nonattainment” with each of the NAAQS
  - Attainment – Area’s ambient air meets the NAAQS
  - Nonattainment – Area’s ambient air exceeds the NAAQS
    - There are several degrees of nonattainment (marginal, moderate, serious, severe, extreme)
- Area designations are made through data recorded from ambient air quality monitors

# Counties Designated "Nonattainment"

for Clean Air Act's National Ambient Air Quality Standards (NAAQS) \*



## Legend \*\*

- County Designated Nonattainment for 6 NAAQS Pollutants
- County Designated Nonattainment for 5 NAAQS Pollutants
- County Designated Nonattainment for 4 NAAQS Pollutants
- County Designated Nonattainment for 3 NAAQS Pollutants
- County Designated Nonattainment for 2 NAAQS Pollutants
- County Designated Nonattainment for 1 NAAQS Pollutant

\* The National Ambient Air Quality Standards (NAAQS) are health standards for Carbon Monoxide, Lead (1978 and 2008), Nitrogen Dioxide, 8-hour Ozone (2008), Particulate Matter (PM-10 and PM-2.5 (1997, 2006 and 2012), and Sulfur Dioxide.(1971 and 2010)

\*\* Included in the counts are counties designated for NAAQS and revised NAAQS pollutants. Revoked 1-hour (1979) and 8-hour Ozone (1997) are excluded. Partial counties, those with part of the county designated nonattainment and part attainment, are shown as full counties on the map.

# CAA Fundamentals – Title I

## SIPs

- A congressional finding of the 1970 CAA is that “air pollution prevention ... and control at its source is the primary responsibility of states and local governments”.
- At the same time, Congress also found that federal leadership “is essential for the development of cooperative Federal, State, regional, and local programs to prevent and control air pollution.”
- Each state must submit to EPA a “State Implementation Plan” (SIP)
  - The SIP is the state’s plan for attaining and maintaining the NAAQS.
- SIPs must contain:
  - Enforceable emission limits and other emission controls
  - Schedule for compliance
  - A demonstration that the control strategy or strategies selected will lead to attainment of the NAAQS

# CAA Fundamentals – Title I

## SIPs

- EPA must approve a SIP. If no satisfactory SIP is provided to EPA, a Federal Implementation Plan (FIP) will be imposed for that area. There are also other punitive measures imposed.
- SIPs are generally revised numerous times to achieve NAAQS as they are ratcheted down, and as new sources are constructed or as existing sources change.

# CAA Fundamentals – Title I

## New Source Performance Standards

- The CAA directs EPA to establish performance standards (NSPSs) for new, modified and reconstructed sources in certain source categories that are deemed to “cause or contribute significantly to air pollution which may reasonably be anticipated to endanger public health”.
- Such standards are required to reflect the “best system of emission reduction” that is “adequately demonstrated” (taking into account costs, energy requirements and nonair quality health and environmental impacts).
- The CAA also directs EPA to establish regulations requiring states to submit a “state plan” that would establish performance standards on existing sources for which there is an NSPS.



# CAA Fundamentals – Title I

## Hazardous Air Pollutants

- The CAA also establishes standards for hazardous air pollutant (HAP) emissions from certain sources.
  - Examples of HAPs – BTEX
- These standards can be both “technology-based” or “risk-based”
  - Technology-based standards (MACT) are based on control technology reflecting the maximum degree of reduction in emissions determined to be achievable for new or existing sources in the applicable source category.
    - Has to be not less stringent than the emission control achieved in practice by the best controlled similar source for new sources.
    - For existing sources, must be the average of the best performing 12 percent of existing sources.
  - Risk-based standards are determined within 8 years of setting the MACT standards, upon which EPA must assess remaining health risks from each source category to determine whether MACT standard protects public health with an ample margin of safety.

# CAA Fundamentals – Title I

## New Source Review Permitting

- Beginning with CAA 1977, a permitting program called New Source Review (NSR) was added to address instances where a major emitting facility is newly constructed, reconstructed, or modified.
  - Major source threshold is dependent on the source category. For certain types of sources or sources in nonattainment areas, the threshold is a potential to emit (PTE) of 100 tons/year of a regulated NSR pollutant. For all others, it is 250 tons/year.
- NSR permitting is triggered when a major source is newly constructed or reconstructed, or when a major source undergoes a major modification
  - Major modification – Depends on what action is being taken and the degree of emissions increase associated with the modification
- If triggered, an NSR permit must be obtained before beginning construction or undertaking modification.
- Separate permitting programs for attainment areas and nonattainment areas.

# CAA Fundamentals – Title I

## New Source Review Permitting

- For attainment areas, the NSR permitting program is called “Prevention of Significant Deterioration”.
- The PSD permitting requirement applies to construction or reconstruction of a major source, as well as a major modification:
  - A non-exempt modification of a major source that results in a significant emissions increase
  - What modifications are excluded? Routine maintenance, repair, and replacement (RMRR)
- What is a significant emissions increase?
  - Compare baseline actual emissions to projected actual emissions, apply adjustments, determine if over applicable threshold
  - Threshold is pollutant-specific (e.g., 40 tons/yr for sulfur dioxide, ozone precursors, 25 tons/year for total PM)

# CAA Fundamentals – Title I

## New Source Review Permitting

- What happens if PSD permitting is triggered? The permit must include the following requirements:
  - The source must perform an air quality analysis to demonstrate, among other things, that any emissions will not cause or contribute to exceedance of the NAAQS.
  - The source must install Best Available Control Technology (BACT):
    - Maximum degree of reduction of each pollutant, taking into account energy, environmental, and economic impacts and other costs, determined to be achievable for such facility through application of production processes and available methods, systems, and techniques, including fuel cleaning or treatment or innovative fuel combustion techniques for control of each such pollutant.

# CAA Fundamentals – Title I

## New Source Review Permitting

- For nonattainment areas, construction or reconstruction of new major sources or major modifications proceeds under a similar permitting framework called nonattainment NSR. Key differences with PSD include:
  - Lower significant emission increase thresholds (e.g., 25 tons/yr vs 40 tons/yr for ozone precursors)
  - If triggered, requirement for use of lowest achievable emission rate (LAER) controls
  - Requirement for minimum emission offsets

# CAA Fundamentals – Title V

- CAA 1990 requires states to implement through their SIPs operating permit programs
- Operating permits would integrate all applicable requirements to covered facilities in a single federally-enforceable document, subject to a five-year term.
  - Must include applicable emission limits, monitoring, deviation reporting and annual compliance certification.
- Applies to “major sources”
  - >100 tons/year of criteria pollutants and > 10 tons/year for a single HAP or 25 tons/year for all HAPs combined.

# CAA Fundamentals – Title I

## Inspection and Enforcement

- EPA has broad authority to enter and inspect facilities to determine compliance. States have similar authority.
- CAA gives EPA several enforcement mechanisms for violations.
  - File civil lawsuit in federal court seeking injunctive relief and penalties (in conjunction with DOJ)
  - File criminal complaint in federal court for willful or knowingly-committed violations (DOJ)
  - Issue an order to pay penalties and/or undertake injunctive measures to fix violations
- Five-year statute of limitations at federal level (may be longer at state level)
- States may have different options based on their own laws.

# CAA Fundamentals - Title I

## Enforcement

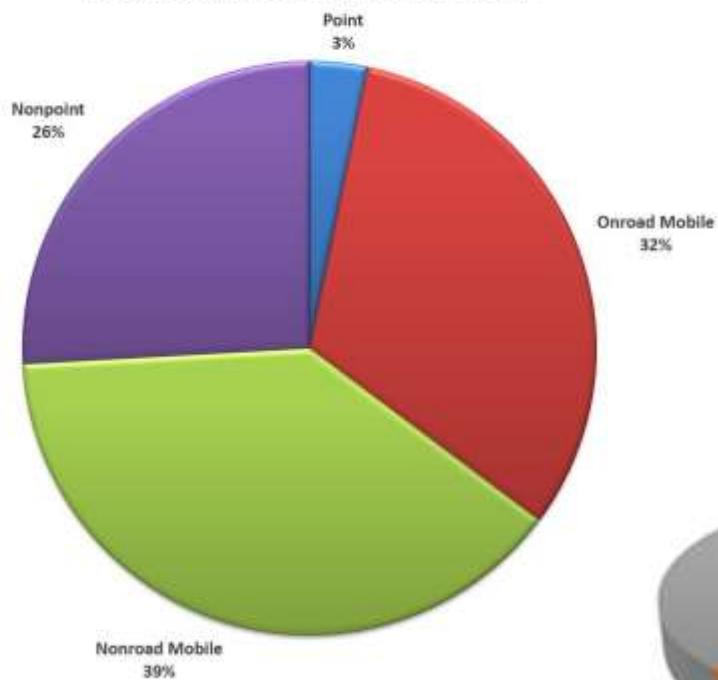
- The CAA also includes a mechanism for members of the public to sue entities, EPA or states for violations of the CAA.
  - Citizen suits can seek injunctive relief or penalties, but penalties would be paid to US treasury/
  - Subject to certain procedural limitations, including standing, advance notice, and various other bars.
  - In some cases can recover attorneys' fees.



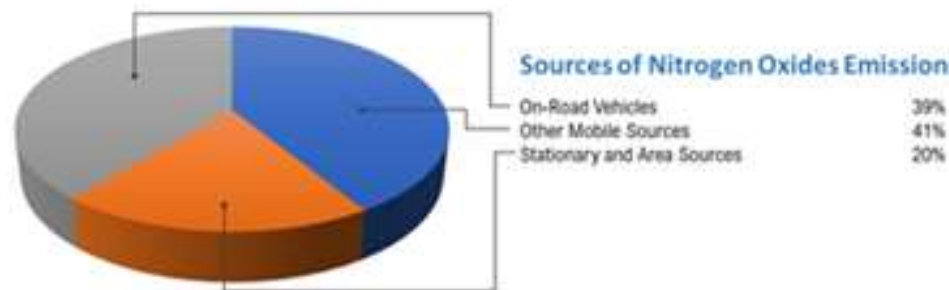
# CAA Fundamentals – Title II

Title I gets more attention, but mobile source emissions are significant!

Sources of Air Toxics in New Jersey  
Based on USEPA's 2014 Air Toxics Inventory



Sources of Nitrogen Oxides Emissions:



# CAA Fundamentals – Title II

## Overview

- Unlike with Title I, EPA, rather than states, is the agency principally responsible for implementing standards.
  - Exception: California
- Who must comply?
  - Manufacturers of vehicle engines
  - Those involved in the manufacture of fuels/additives
  - Consumers or operators are generally not targeted
- Overall process
  - EPA/California establishes emission standards
  - Manufacturer must perform emission testing on prototype vehicle or engines
  - Manufacturer applies for certificate of conformity
  - EPA issues certificate

# CAA Fundamentals – Title II

## Emission Standards - LDVs

- Light Duty Vehicle - <8500 lbs GVWR
- With the 1990 Amendments, Congress established “Tier 1” standards, but also contemplated Tier 2 standards.
- Under Tier 2, manufacturers can certify under different “bins” with different standards, but the overall fleet must meet an aggregate standard.
- Tier 3 standards – 2014 for MY 2017-25
- Standards also include:
  - Evaporative and refueling emissions
  - Cold CO and air toxics standards
  - Onboard diagnostics

# CAA Fundamentals – Title II

## Emission Standards - HDVs

- Heavy Duty Vehicles – Trucks, Buses, etc.
- Standards must reflect greatest degree of emission reduction achievable from available technology, with appropriate consideration of cost and other factors
  - Different standards for vehicle classes based on weight, horsepower, fuel, and other factors

# CAA Fundamentals – Title II

## Testing

- To obtain a certificate, manufacturers must perform their own emissions testing, although sometimes EPA also does confirmatory testing.
- Testing is done on a prototype, built to same specifications
- EPA relies on a test protocol known as the Federal Test Program (FTP)
- Current testing factors in additional test cycles to account for aggressive driving
- What about engine performance as it ages?
  - EPA now requires manufacturers to test in-use vehicles
- Defeat devices prohibited – Can't cheat the test

# CAA Fundamentals – Title II

## Preemption

- CAA preempted states with existing emission standards from applying them, subject to a waiver.
  - Standard for waiver:
    - At least as stringent as federal standards
    - Necessary to meet compelling and extraordinary conditions
    - Not inconsistent with CAA with respect to technical feasibility and lead time given to manufacturers
  - Only state with waiver: California
- California's GHG standards were initially denied a waiver of preemption, but EPA eventually reversed course in 2013.
  - EPA under the Trump Administration revoked the waiver, which was rescinded

# CAA Fundamentals – Title II

## Fuels

- CAA also includes several provisions authorizing EPA to regulate fuels used in mobile sources.
- For an entity to sell a motor vehicle fuel or additive, it has to be registered with EPA.
- CAA Section 211(c) gives EPA generalized authority to regulate fuels when it determines:
  - Fuel or additive causes or contributes to air pollution that may reasonably be anticipated to endanger public health or welfare, or
  - Fuel or additive will significantly impair the performance of emission control equipment in general use
- Renewable Fuels

# CAA Fundamentals – Title II

## Enforcement

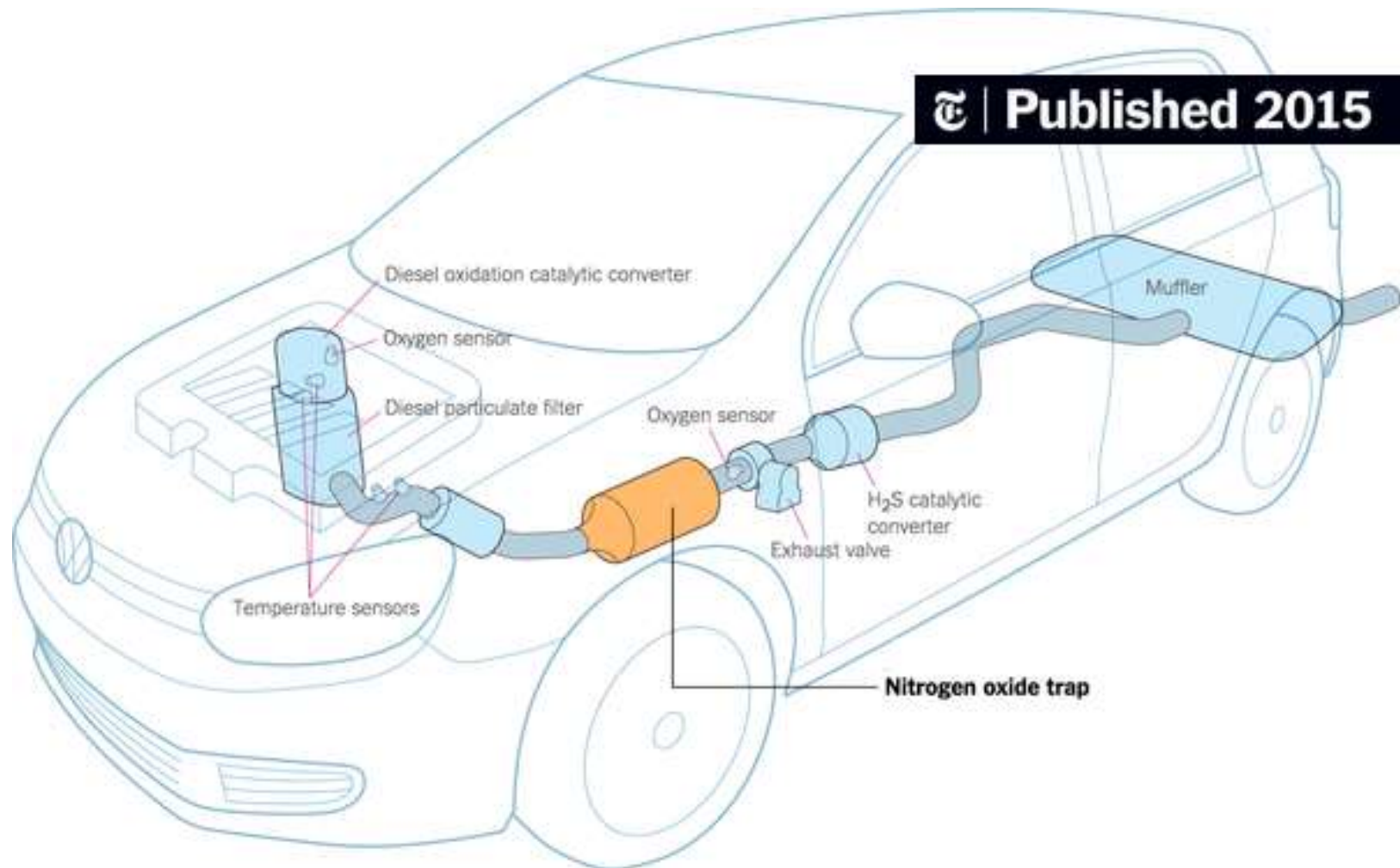


Image credits: New York Times 2015