NACAA Fall Meeting

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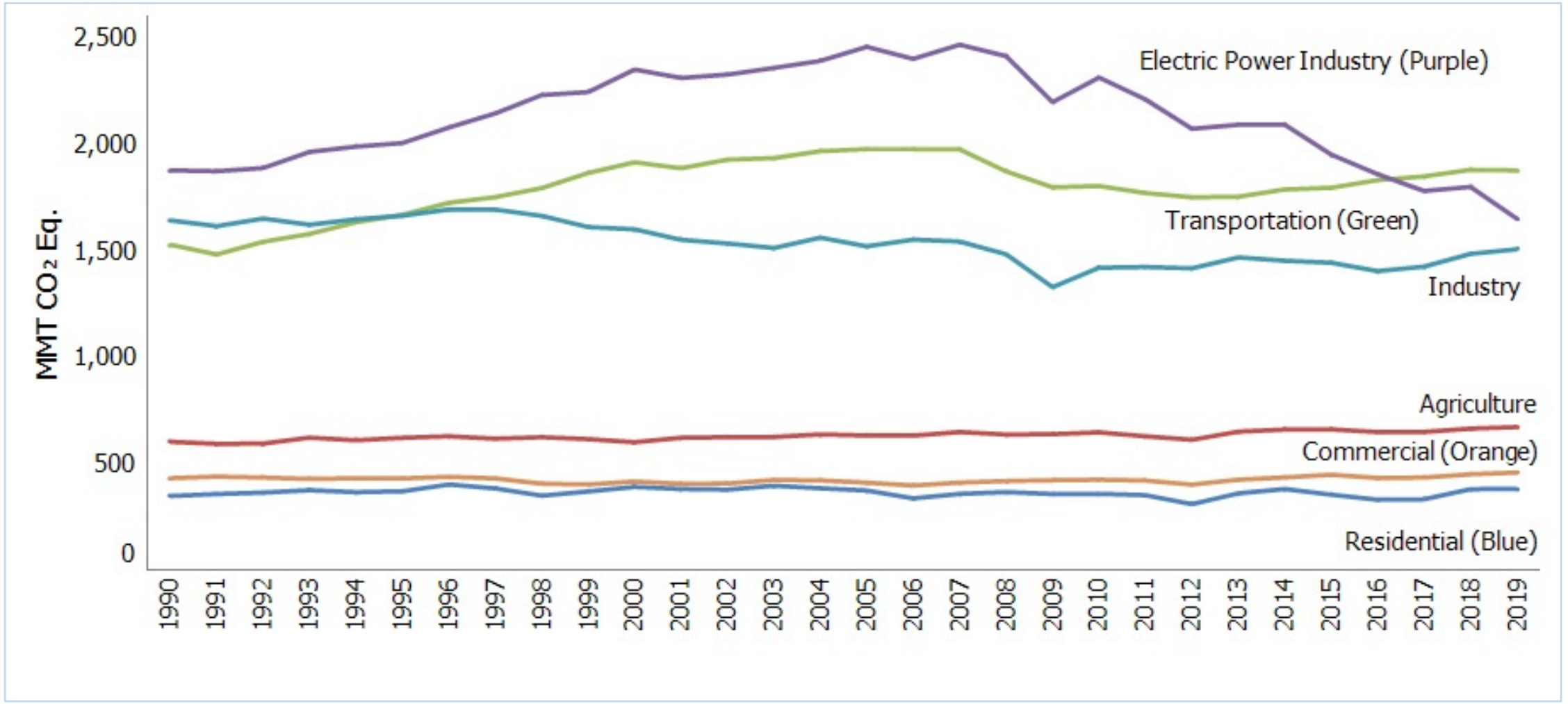
Overview

- Twin challenges of addressing climate change and local air pollution
- Administration priorities
- Standard setting
- Programs to reduce diesel emissions
- Tools to support state and local governments
- A look to the future

U.S. Greenhouse Gas Emissions by Economic Sector, 1990-2019

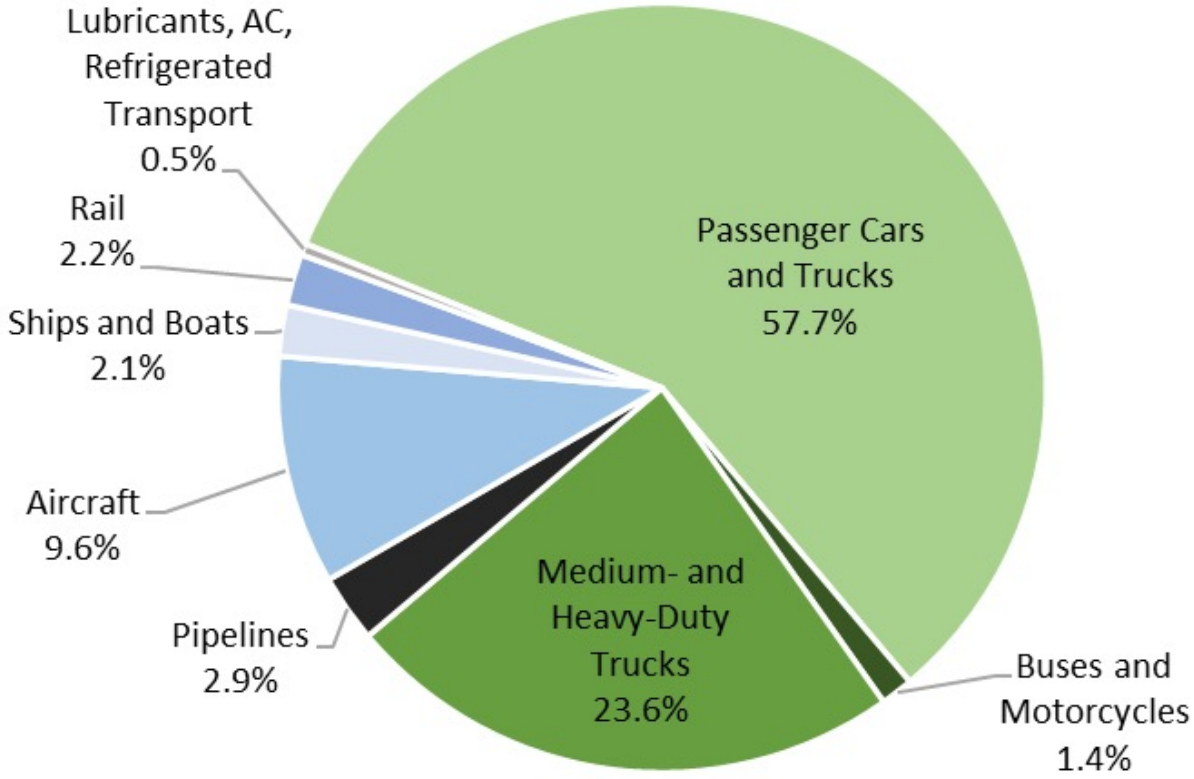


Source: *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019*

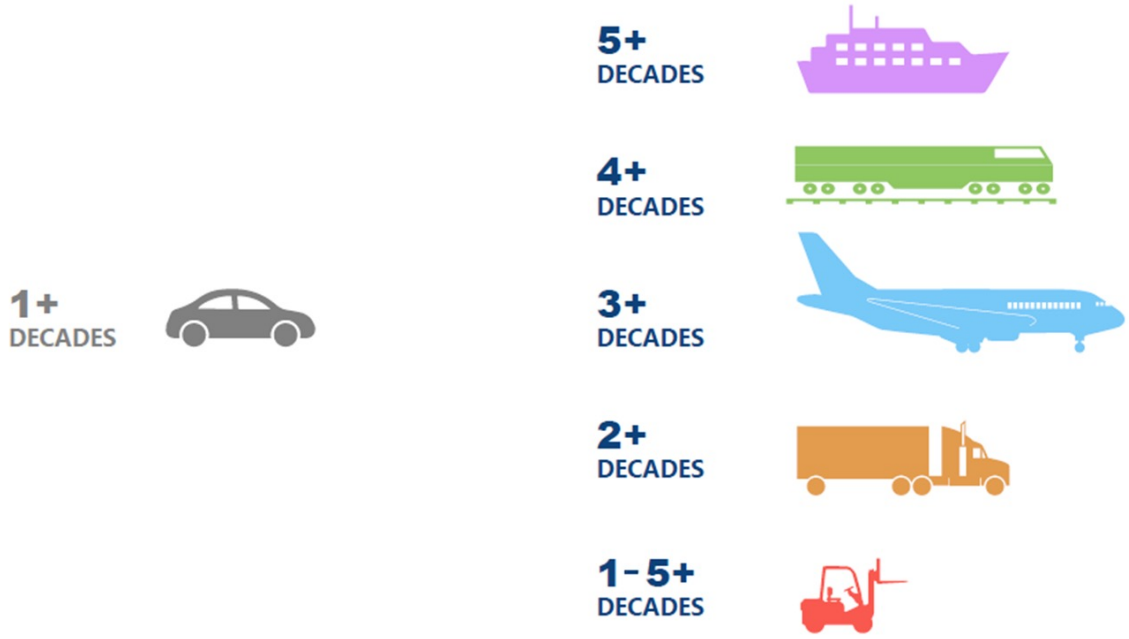
EPA

U.S. Transportation Sector Greenhouse Gas Emissions, 2019

Share of U.S. Transportation Sector GHG Emissions by Source, 2019



Transportation fleet turnover rates



Note: figures do not include CO_2 emissions from biofuel consumption and woody biomass. Additionally, in line with IPCC methodological guidance and UNFCCC reporting obligations, emissions from fuel purchased in the United States for international aircraft and marine travel – accounting for an additional 117.2 MMT CO_2 Eq. in 2019 – are not included.

Source: *Inventory of U.S. Greenhouse Gas Emissions and Sinks: 1990-2019*

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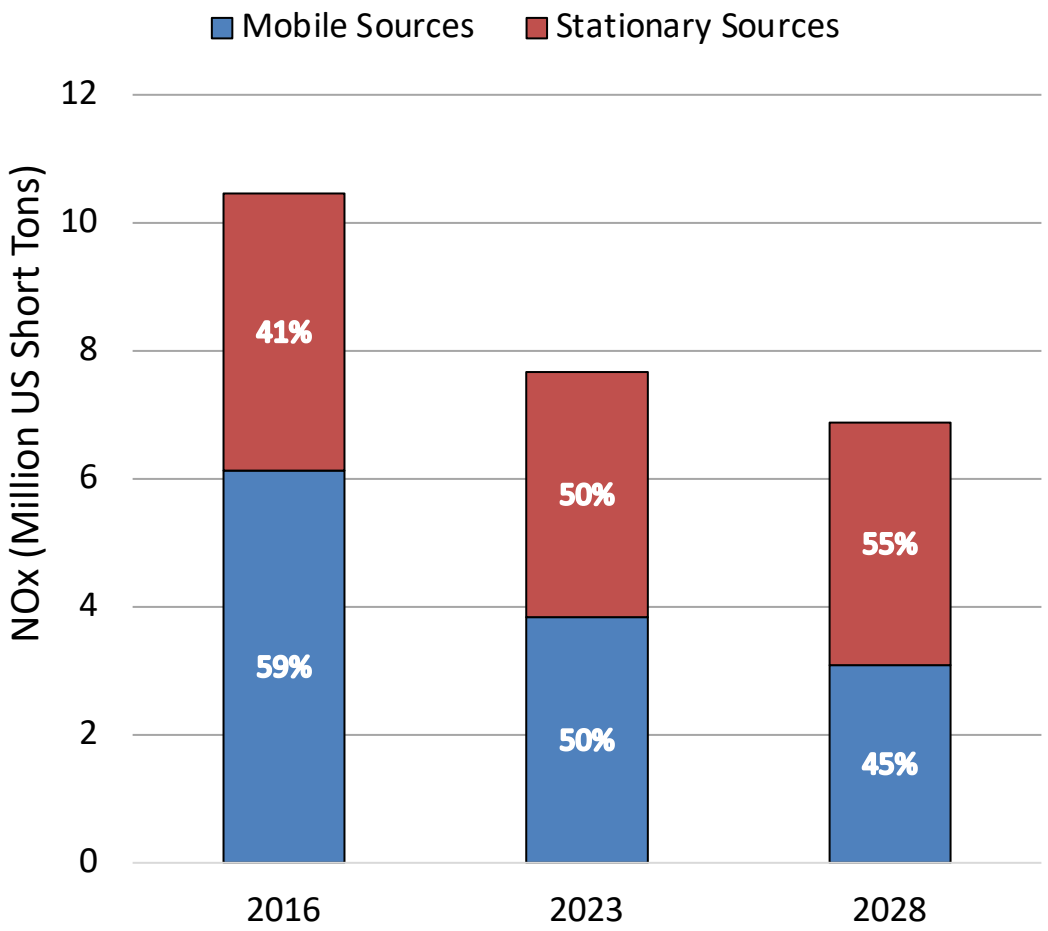
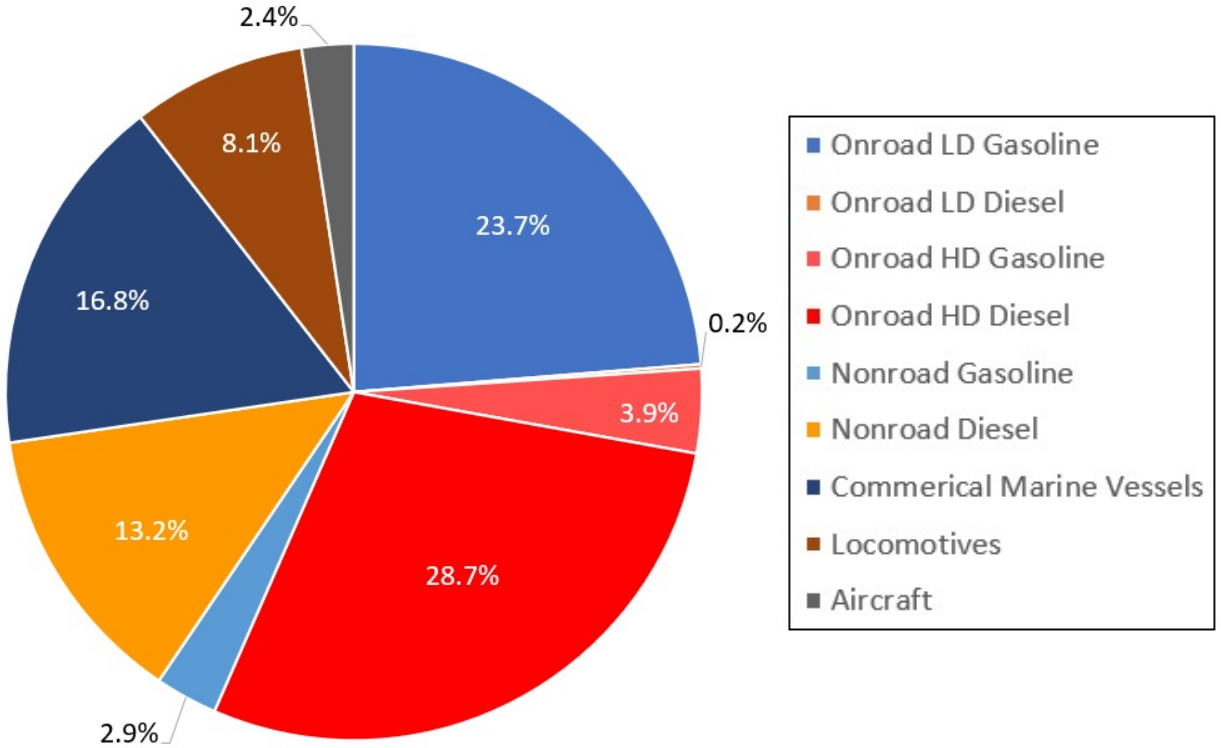
NOx Emissions (2016)

Total Inventory

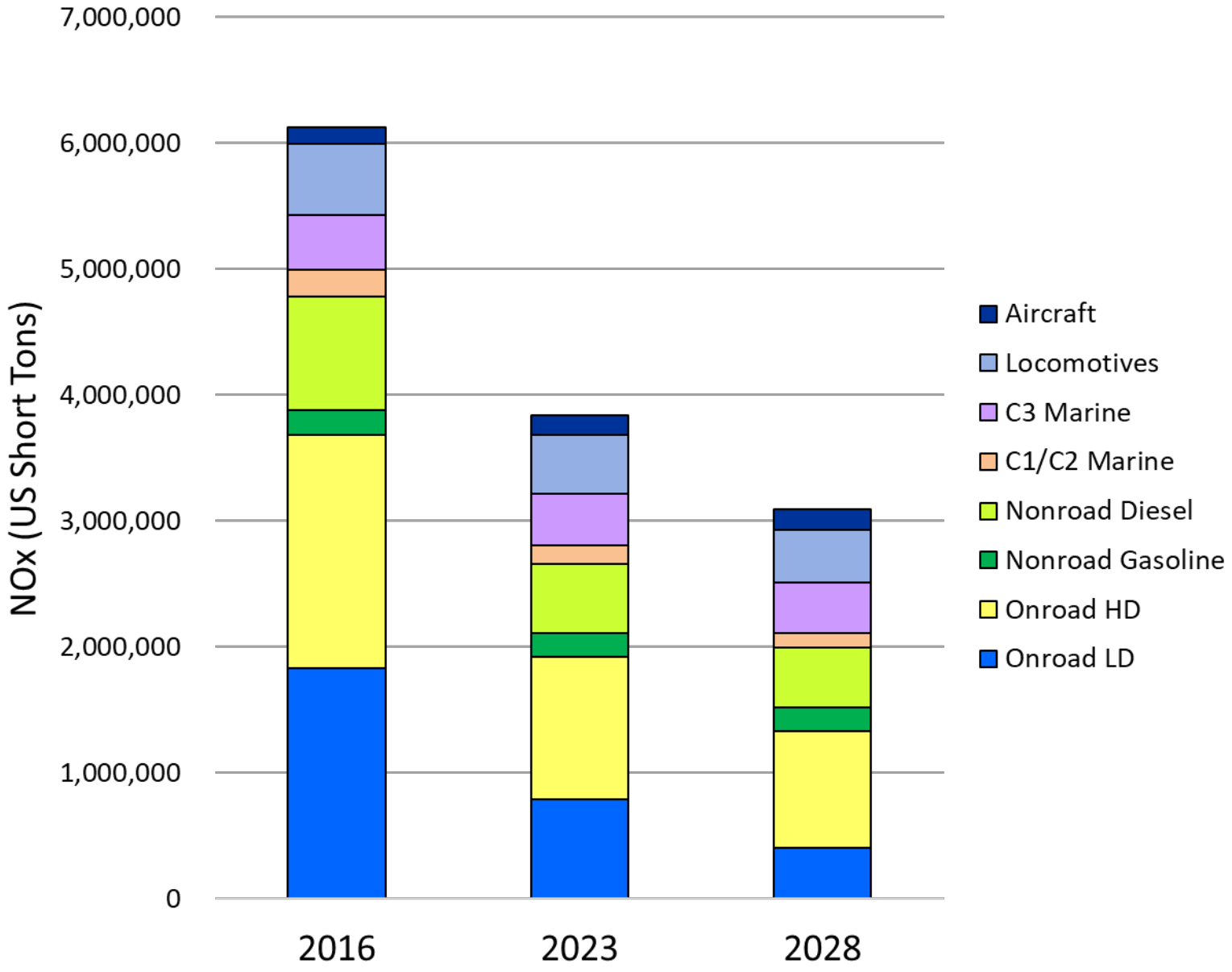


NOx Emissions by Transportation Sector



NOx – Mobile Sources

- Onroad LD contribution reduced by 80% driven by Tier 3
- Onroad HD reduced by more than half by 2028 due to 2007/2010 HD rule, but still the largest single sector



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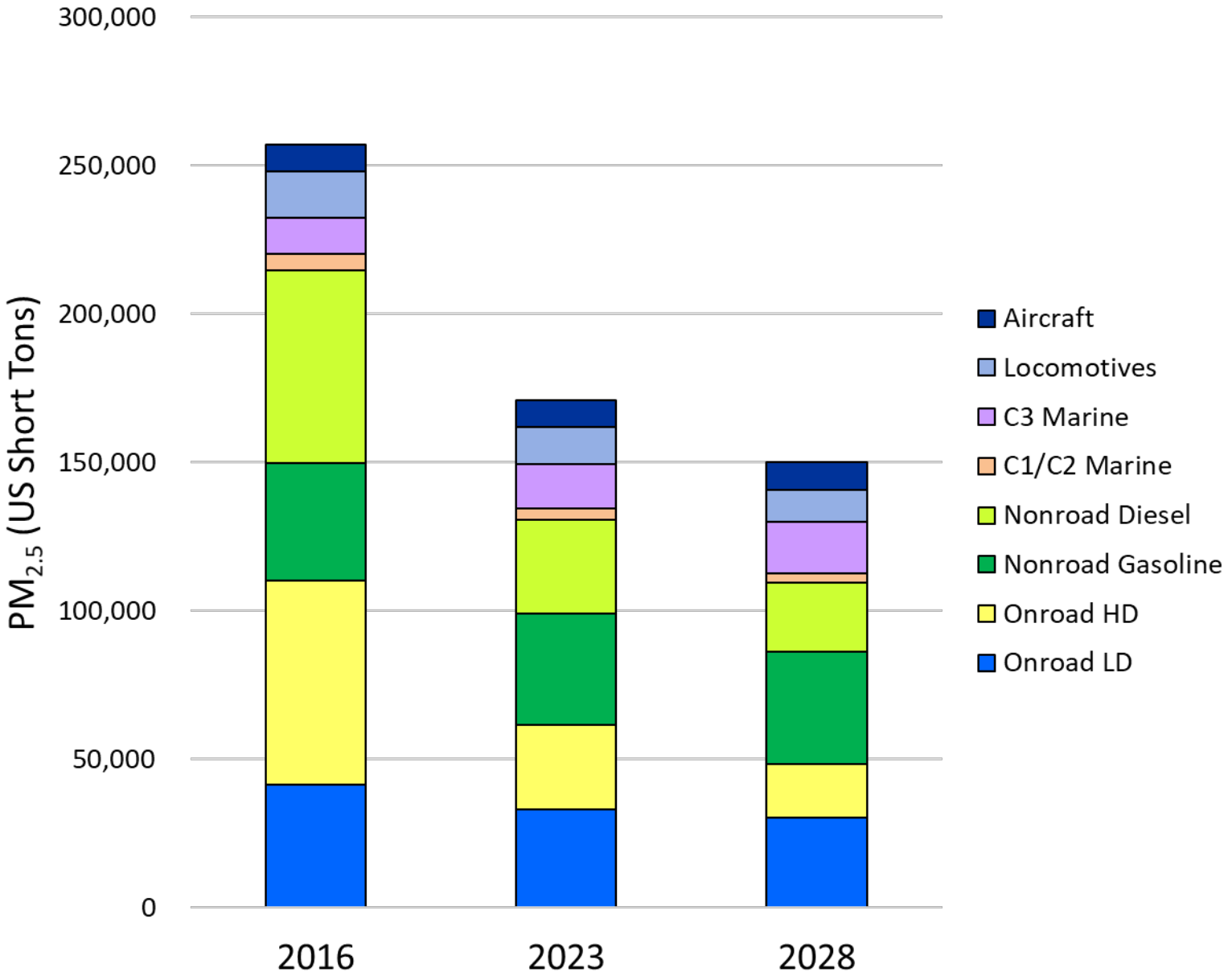
$PM_{2.5}$ – Mobile Sources

- Onroad HD contribution to direct $PM_{2.5}$ reduced by 75%, by 2028, driven by 2010 HD rule
- Onroad LD continues to be a significant source of direct $PM_{2.5}$
- Nonroad gasoline becomes the largest contributor in 2028



Executive Orders on Transportation and Climate Change

- **Protecting Public Health and the Environment and Restoring Science To Tackle the Climate Crisis (January 20, 2021)**
  - Directed EPA to reconsider the California Waiver; and to reconsider the Light Duty GHG Standards

- **Tackling the Climate Crisis at Home and Abroad (January 27, 2021)**
  - U.S. to deploy the full capacity of its agencies to combat the climate crisis to implement a Government-wide approach that reduces climate pollution in every sector of the economy.
  - Path to achieve net-zero emissions, economy-wide, by no later than 2050.
  - Environmental Justice – Federal agencies to develop programs, policies, and activities to address the disproportionate health, environmental, economic, and climate impacts on disadvantaged communities.
  - Justice40 -- deliver 40 percent of the benefits of federal investment to disadvantaged communities

Executive Orders on Transportation and Climate Change (con't)

- **Strengthening American Leadership in Clean Cars and Trucks (August 5, 2021)**
  - Set a goal that 50 percent of all new passenger cars and light trucks sold in 2030 be zero-emission vehicles, including battery electric, plug-in hybrid electric, or fuel cell electric vehicles.
  - Set clear standards, expanding key infrastructure, spurring critical innovation, and investing in the American autoworker. EPA directed to set:
    - New multi-pollutant emissions standards, including for greenhouse gas (GHG) emissions, for light- and medium-duty vehicles for model year (MY) 2027 and beyond
    - New multipollutant (GHG and Nox) standards for heavy-duty engines and vehicles for MY2027 and beyond. (Final rule by Dec. 2022)
    - New GHG emissions standards for heavy-duty engines and vehicles to be implemented as soon as MY 2030.
- https://www.whitehouse.gov/briefing-room/presidential-actions/2021/08/05/executive-order-on-strengthening-american-leadership-in-clean-cars-and-trucks/

California Waiver – Safer Affordable Fuel-Efficient Vehicles Rule
Part 1 (SAFE) Reconsideration

- The first action the Agency took to implement the EOs addressed reconsideration of the withdrawal of California's ability to enforce State level GHG standards and zero emissions sales mandate.
- This Spring solicited comment on reconsideration of the 2019 *The Safer Affordable Fuel-Efficient Vehicles Rule Part One: One National Program Rule*.
  - Was the Agency's decision to withdraw California's LDV waiver a valid and appropriate exercise of authority?
  - Public hearing on June 2
  - Comment period closed July 6
- Now reviewing over 100,000 comments and will issue a final decision later this year

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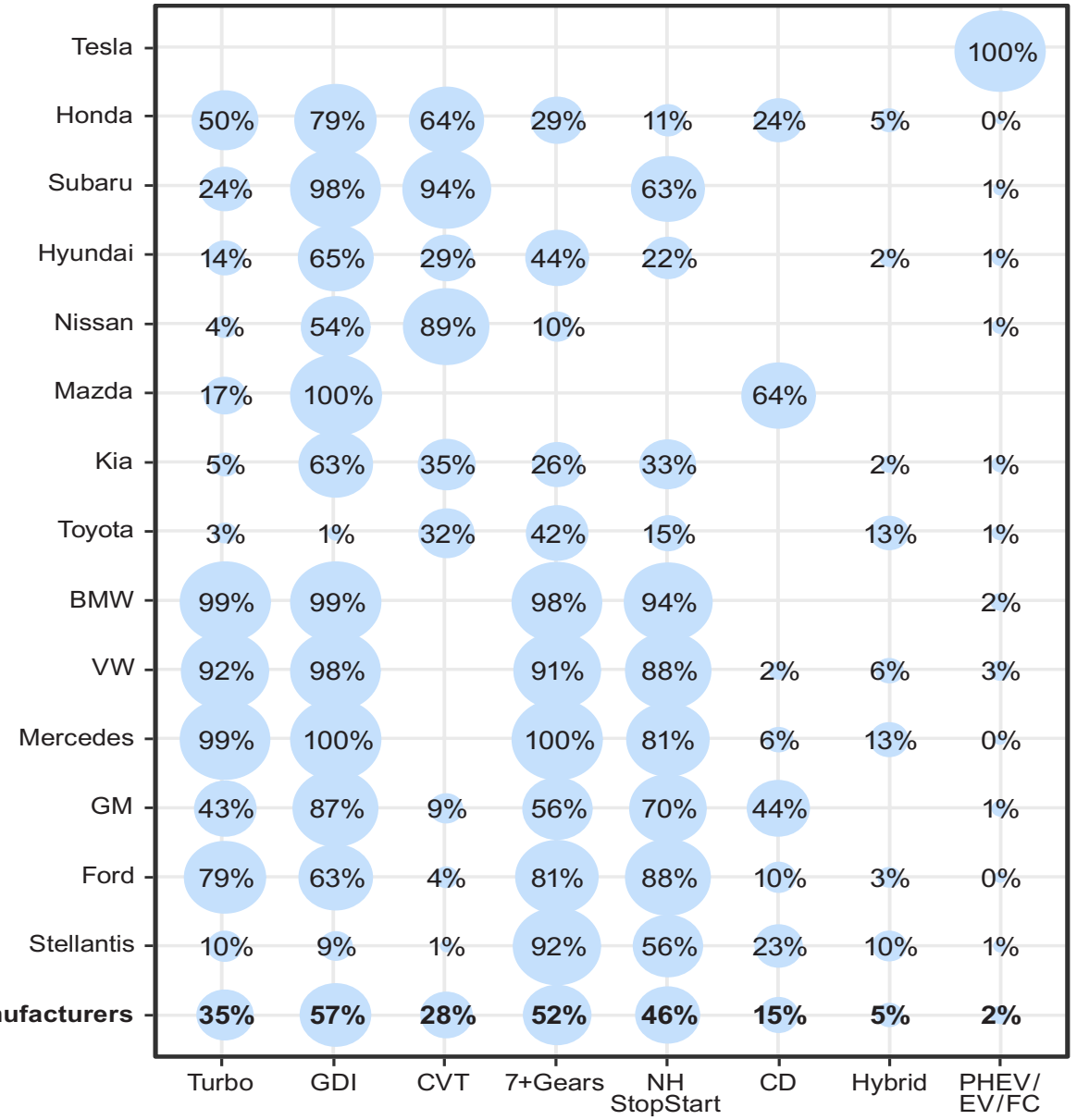
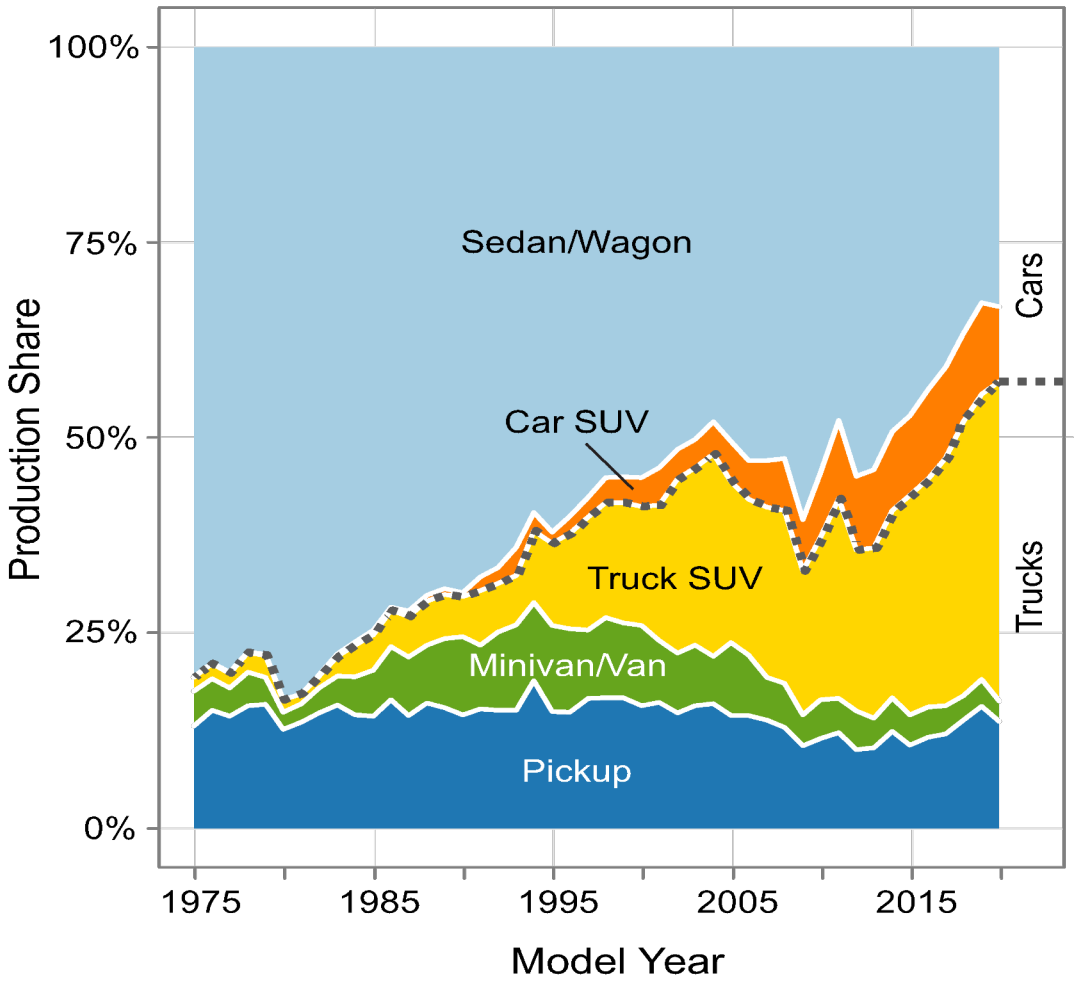
Automotive Trends: Fuel Efficiency Technologies used in 2020

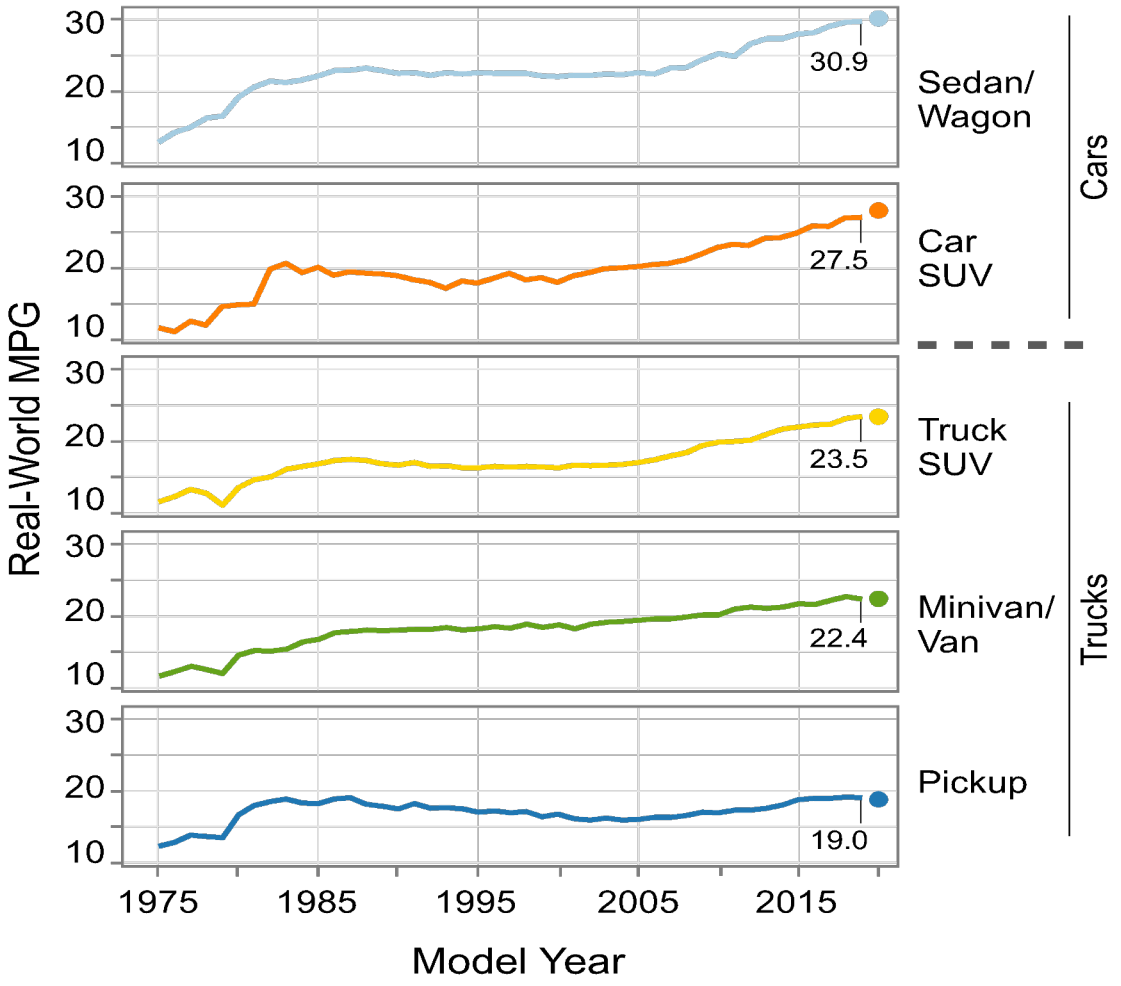
- Manufacturers are making the technology choices that work for them
- Technologies that improve internal combustion engine (ICE) fuel efficiency are heavily relied on
  - Turbo, GDI, Stop/Start, Cylinder Deactivation
  - Many of these technologies also improve driving performance
- Hybrids, Plug-in Hybrids, and Electric Vehicles are poised to grow, but are currently at low adoptions levels



Circle size reflects % technology share

Automotive Trends: Production Share and Fuel Economy by Vehicle Type, 1975-2020





Source: EPA Automotive Trends Report

Light-duty Standards

- **Near Term Rule: Model Years 2023 –2026**
  - EPA proposed revised standards in August that would get the LD GHG program “back on track” and set the stage for continuing reductions into the future
  - Public hearing August 25-26: 175 testifiers
  - 180,000+ comments, ~125 stakeholder organizations
  - Final rule expected by the end of this year
- **Long Term Rule: Model Years 2027 and beyond**
  - Standards to be set at least through 2030.
  - Opportunity to rethink how to achieve GHG emissions in this space

Heavy-duty GHG Phase 1 Compliance: **MY 2014-2018**

- First-ever program to reduce greenhouse gas (GHG) emissions and improve fuel efficiency of heavy-duty trucks and buses was finalized in 2011 for MY 2014-2018.
    - Optional early credit program in 2013 and with mandatory standards started in 2014.
    - Diverse vehicles tractors, semi-trucks, delivery, refuse, utility, dump, cement, transit bus, shuttle bus, school bus, emergency vehicles, motor homes, tow trucks, and others.
- We are following through a commitment to sharing compliance data with the public by publishing a comprehensive report summarizing manufacturer compliance.
- The report shows that all manufacturers are in compliance, and many have reduced GHG emissions further than required – resulting in banked GHG credits through model year 2018.
- As the Agency works to set new more ambitious standards for this sector, we will build on the success of this first program.

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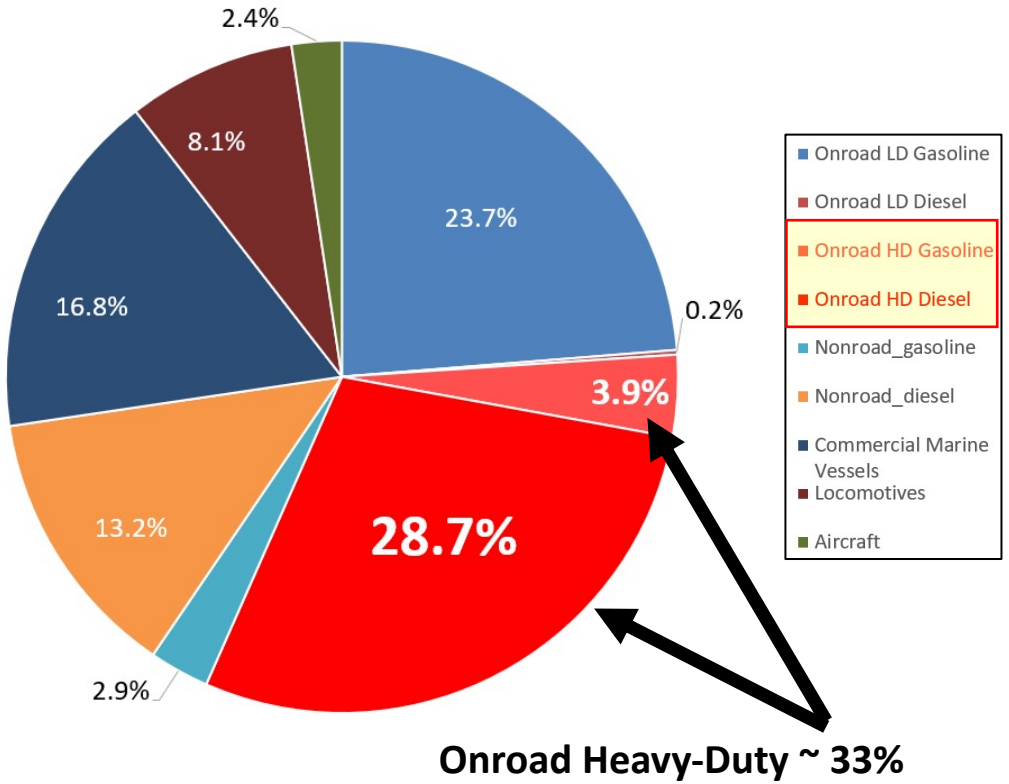
Environmental Opportunity of a New Low NOx Heavy-duty Program

- **Heavy-duty vehicles contribute significantly to local and regional air pollution**
  - EJ communities identify freight movement, including heavy-duty vehicles, as a priority
    - Pollution and risk of negative health effects are elevated near major roads
  - Emission reductions needed to help address ozone bump-ups and ozone transport
- **Significant NOx emission reductions possible with improved catalyst technology**
  - In past 3 years, industry, research labs, and state and federal governments have performed significant technical work to support a low NOx rule
- **If EPA acts quickly, new low NOx standards could begin in 2027**

Mobile Source NOx in 2016



Onroad Heavy-Duty ~ 33%

* http://views.cira.colostate.edu/wiki/wiki/10197;
Onroad inventory updated using CTI NPRM version of MOVES

Heavy-duty Standards: **MY 2027+**

- Medium and heavy-duty vehicles are the largest source of NOx emissions and second-largest source of GHG emissions in the transportation sector.
- The last time EPA set criteria pollutant standards for heavy-duty vehicles was more than 20 years ago.
- In early 2020, EPA released an Advance Notice of Proposed Rulemaking for more stringent NOx emissions standards for heavy-duty vehicles.
    - Sought input on ways to ensure long-term, in-use emissions performance, including emission control technologies, test cycles and procedures, useful life, and warranty
- EPA is moving forward on a proposal for low NOx standards for model year 2027 and later.
- This same action will include an update of current greenhouse gas (GHG) standards to reflect early market shifts to zero-emission technologies in certain segments of the heavy-duty vehicle sector.

EPA

Heavy-duty GHG Standards: **MY 2030+**

- EPA is also working on new more stringent GHG emissions standards for heavy-duty engines and vehicles starting as soon as model year 2030
- Phase 1 GHG standards were successfully implemented
- Phase 2 GHG standards began this year, and phase in through 2027
- Phases 1 and 2 combined will reduce CO_2 emissions by 1.4 billion metric tons, based on:
  - Development and introduction of advanced gasoline and diesel engines
  - Advanced in aerodynamics and driveline efficiency
- Market is beginning to shift to zero-emission technologies, with many manufacturers setting ambitious goals for introduction of low-carbon heavy-duty engines and vehicles
- Phase 3 will be an opportunity for EPA to build on this market momentum and establish a new round of HD GHG standards

Aircraft

- EPA participates on the US delegation to the International Civil Aviation Organization (ICAO) to set emissions standards for aircraft.
  - In 2015 ICAO set GHG standards
  - In 2019 ICAO set PM standards
  - Committee on Aviation Environmental Protection (CAEP) will meet next in February 2022 to decide on work items for the next 3-year cycle.
- EPA finalized GHG emissions standards for aircraft that align with the ICAO standards in January 2021.
- EPA is developing a proposed rulemaking for PM standards in recognition of our international obligations stemming from the 2019 ICAO action.
- EPA is supporting the Administration's sustainable aviation fuel development efforts.

Lead Emissions from Piston-engine Aircraft

- Emissions of lead from piston aircraft remain the largest source of lead to air, accounting for 70% of lead emitted in 2017
- We recently finalized evaluations of lead concentrations at airports
  - Model-extrapolated Estimates of Airborne Lead Concentrations at US Airports
  - National Analysis of Populations Residing Near or Attending School Near US Airports
- We are evaluating new petitions requesting EPA to move forward with the endangerment finding regarding aircraft lead
  - This has been on the long-term agenda of regulatory actions

Marine

- EPA participates on the US delegation to the International Maritime Organization (IMO).
- This year, IMO adopted short-term efficiency-based measures to address GHG emissions from international shipping.
  - Energy Efficiency Design Index for existing ships (EEXI) – efficiency design retrofit standard for ships already in the fleet
  - Carbon Intensity Indicator (CII) – operational standard based on annual CO2 per mile travelled
- IMO is now beginning work on mid and long-term measures.
  - U.S. and EPA to provide input into a revised IMO GHG strategy

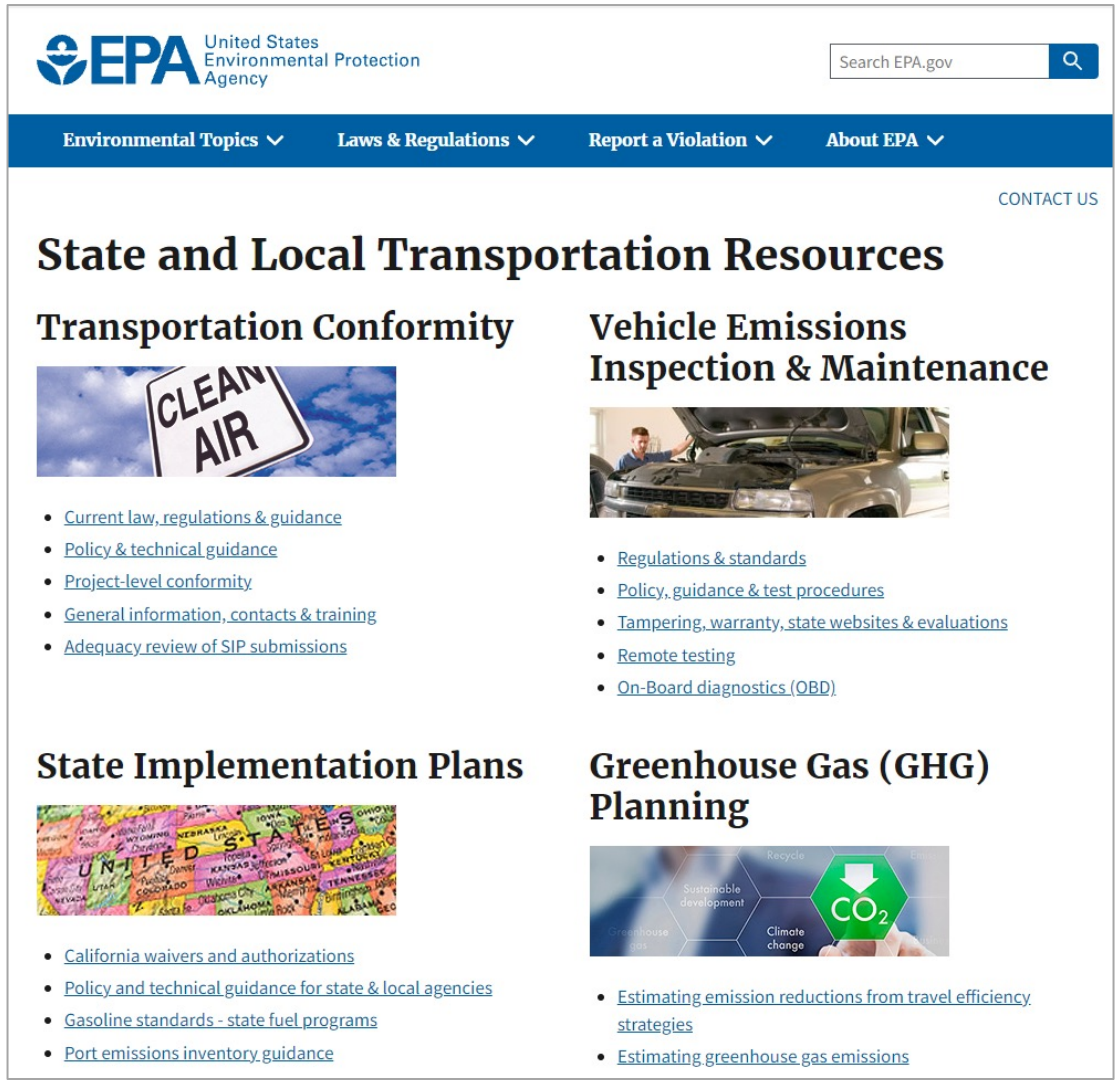
Renewable Fuel Standard (RFS)

Major areas of focus

- Annual volume rules
  - 2021
  - 2022
  - Outstanding obligation to address 2016 remand
- The “Set” rule
  - Clean Air Act requires EPA to determine volume targets for years 2023 and beyond
- Small refinery exemption (SRE) program
  - Supreme Court Case (HollyFrontier v RFA) decided in June
  - Pending petitions

OTAQ's State and Local Regulatory Resources

- Provides regulations and guidance for air quality planning by state, local, and tribal agencies
- Documents released over last year include:
  - MOVES3 SIP and Conformity Policy and Technical Guidance
  - MOVES3 Federal Register Notice
    - Conformity grace period for MOVES3 ends January 9, 2023
  - Port Emissions Inventory Guidance
  - VMT Offset Guidance and Tool for Severe Ozone Areas



MOVES3 Released November 2021

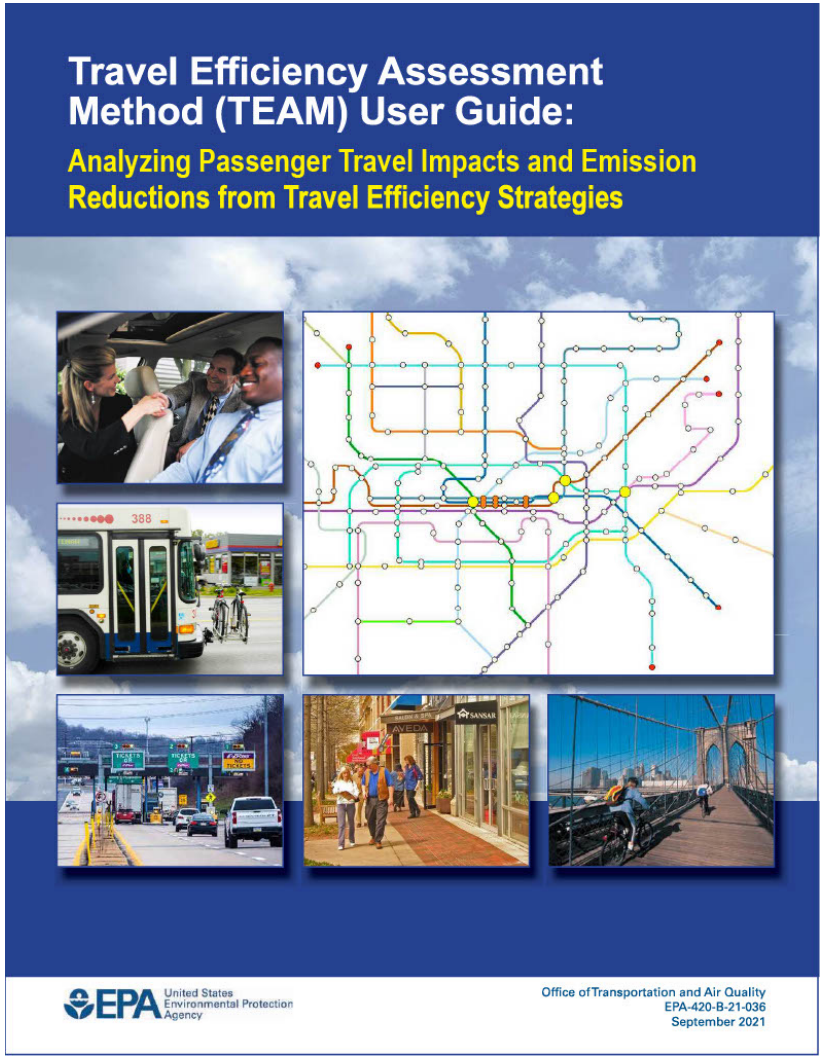
- EPA's MOtor Vehicle Emission Simulator (MOVES) estimates emissions for mobile sources at the national, county, and project level for criteria air pollutants, greenhouse gases, and air toxics.
- MOVES3, released in November 2020:
  - Includes functional improvements
  - Allows users to model the benefits from regulations promulgated since the previous model was released
  - Incorporates the latest data and science, for example:
    - HD running emission rates based on testing data from hundreds of HD trucks
    - LD emission rates for HC, CO and NO_X based on millions of test results from in-use testing data and inspection and maintenance (I/M) data
  - Supports CAA SIP and conformity analyses by state and local governments outside CA
- MOVES development work continues for MOVES4+.
- More information is available at https://www.epa.gov/moves

MOVES
Motor Vehicle Emission Simulator

EPA

EPA's Travel Efficiency Assessment Method

- OTAQ released the *Travel Efficiency Assessment Method (TEAM) User Guide*
  - Provides a methodology for state, local, and tribal governments to consider alternatives to passenger vehicle travel
  - See examples of travel efficiency (TE) strategies on next slide
- This voluntary approach is based on a national assessment and 12 case studies and can be used to quantify reductions in criteria pollutants, GHGs, and VMT.
- TEAM case studies, reports, and key takeaways factsheet available at: https://www.epa.gov/state-and-local-transportation/estimating-emission-

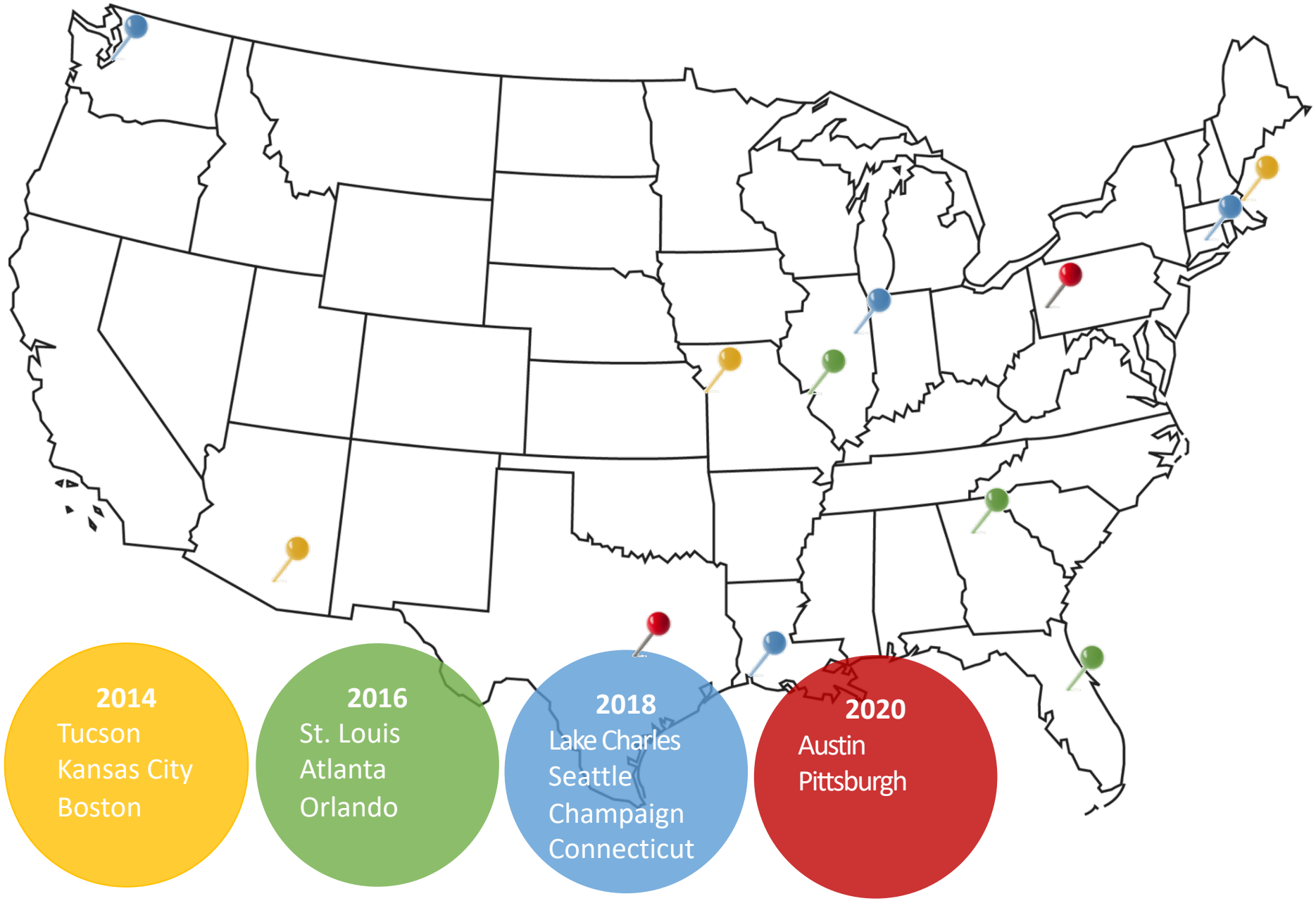


Travel Efficiency Strategies

Strategies to reduce emissions by affecting travel activity – examples:

- Travel demand management
  - Telecommuting
  - Transit Subsidies
  - Carpool and Vanpool Programs
- Changes to public transit
  - Reduced Fares
  - Increased Frequency, Range
- Travel pricing
  - Road Pricing, Parking Pricing
- Changes to land use
  - Transit Oriented Development, Mixed Use, Jobs/Housing Balance

TEAM Case Studies with State and Local Partners



Updates to EPA Guidance Coming This Year

- 2021 PM Hot-spot Conformity Guidance
  - Updates the 2015 PM Hot-spot Guidance to incorporate latest versions of MOVES3 and AERMOD and practice in the field
  - Technical guidance can also be used for other near-source analyses, such as for EJ and NEPA analyses
- Other updates coming later this year to incorporate MOVES3
  - Using MOVES in Project-Level CO Analyses
  - Using MOVES for Estimating State and Local Inventories of Greenhouse Gas Emissions and Energy Consumption
- More information at our website: www.epa.gov/state-and-local-transportation

EPA

Impacts of Diesel Emissions

- Exhaust emissions from diesel engines are considered one of the largest contributors to air pollution, which adversely affects human health.
- Nearly ten million legacy diesel engines that don’t meet EPA’s current emission standards are still in use.
- Historically underserved communities are disproportionately exposed to harmful pollutants.
- Supply chain issues impacting the production and demand for new and used vehicles could slow turnover of these legacy diesel engines.

EPA's Ports Initiative

Through EPA tools and assistance in the five program areas, we aim to accelerate adoption of:

- **Cleaner technologies**
- **Clean air planning practices**
  (e.g., emissions inventories, clean air plans, community engagement that inform strategic clean air investments)

New resources include:

- Case study on San Pedro Bay Ports' Clean Air Action Plan
- Case study on air pollution reductions for NY/NJ Harbor Deepening Project
- Interactive map highlighting clean air practices at ports
- FY21 EJ Small Grants – RFA emphasis on Ports Initiative projects; use of EPA's Community Action Roadmap to prepare for communities for collaborative efforts with port operators

EPA

Diesel Emissions Reduction Act (DERA)

Offers funding to accelerate upgrade and turnover of legacy diesel fleets to achieve significant emission reductions.

Prioritizes DERA funding in communities with environmental justice concerns.

DERA has four (4) grant and rebate programs:

State Grants

School Bus Rebates

National Grants

Tribal & Insular Area Grants

School Bus Rebates	**Now Open:** 2021 DERA School Bus Rebates program will fund $10 million for school bus rebates. **Now Open:** 2021 American Rescue Plan (ARP) Electric School Bus Rebates program will fund $7 million for electric school bus rebates in underserved communities. The **deadline for emailing applications** to DERARebates@epa.gov is **4:00 PM EST Friday, November 5, 2021.**
DERA and Ports Initiative - one of six EPA programs participating in Justice40 Initiative pilots	Goal of delivering 40% of overall benefits from federal investments in climate and clean energy to disadvantaged communities. Benefits include direct diesel emission reductions and associated health benefits from DERA-funded projects and enhanced capacity for additional diesel emission reductions beyond DERA-funded projects.

Justice40 – DERA/Ports Initiative Pilot

- DERA/Ports Initiative is one of six EPA programs selected as a Justice40 Initiative pilot.
- We are seeking input on implementing the pilot, and are especially interested in the following:
  - How should EPA determine benefits to a particular community for mobile source projects when vehicles travel between communities?
  - Are disadvantaged communities aware of DERA funding, and if not, how can we reach more communities and support them in partnering with eligible DERA applicants?
  - How else can EPA encourage meaningful engagement with overburdened communities to support DERA projects and other activities that reduce diesel emissions?
  - How can EPA better engage with school districts in disadvantaged communities about funding opportunities for new, cleaner technologies, like electric school buses?

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For more information, see materials from October 12 National EJ Community Engagement Call:
https://www.epa.gov/environmentaljustice/national-environmental-justice-community-engagement-calls

SmartWay Cuts Freight GHGs

- EPA's SmartWay Program, launched in 2004, works to reduce emissions by promoting more efficient goods movement practices.
  - The program includes over 3,700 partner companies.
  - SmartWay partners avoided 143 million metric tons of CO2, 2.7 million tons of NOx, and 112,000 tons of PM.
  - SmartWay also helps companies to develop and deliver on sustainability goals that benefit the communities they serve.
- SmartWay spans the US and Canada and is a model for green freight programs in China, the European Union, Latin America, Mexico, and elsewhere.
- SmartWay Awards will recognize the achievements of top-performing SmartWay partners next week

SmartWay®
U.S. Environmental Protection Agency

EPA

Looking to the Future

	Today	A Possible Tomorrow
Modes	• Light-duty cars & trucks • Primarily single occupant	• More bike/ped and micromobility • New transit modes & service models • Complex system effects
Ownership & Use	• Personal ownership • Uniform VMT and turnover	• Shared/fleet ownership • Varied VMT and turnover patterns • Connected and autonomous
Energy Source	• Primarily fossil fuels • Tailpipe emissions only	• Zero emission vehicles • Renewable sources • Lifecycle emissions
Data	• Lab testing of new vehicles • Rate-based (g/mi) metric • Footprint-based standard	• Real-world data • New metrics integrate across vehicles, fuels, activity • Big data reflects activity and system changes

Mobile Source Technical Review Subcommittee Future Mobility Report

- Given the emerging technologies and trends impacting the transportation sector, EPA sought detailed feedback from the Mobile Sources Technical Review Subcommittee (MSTRS) about EPA's role with respect to a range of future mobility paradigms
- MSTRS members worked for the last two years to develop a comprehensive report and recommendations around four topics: Vehicle Technology, Personal Mobility, Fuels, and Goods Movement
- Some common themes and recommendations emerged from this effort, including:
  - Good data and analysis will be critical to meeting future mobility goals
  - EPA should adopt a comprehensive approach to decarbonizing the transportation sector
  - EPA should consider ways to integrate and prioritize social equity, environmental justice, and mobility justice
  - EPA should increase collaboration across agencies and look outside its traditional regulatory authority
  - Fuel-neutral, technology-agnostic performance standards will continue to be critical, as will incentives, public education, and outreach programs
  - EPA will need to consider new approaches to solve new and old problems, including strategies for hard-to-electrify legacy and future fleets

Recent Trends to Watch: Reimagining Streets

denver.org

"It shows people what's possible."

--Robin Hutcheson, President, NACTO

"It's an opportunity to stop doing things in the old polluting and unhealthful ways."

--Mary M. Cheh, Council Member, Washington, DC

Recent Trends to Watch: Goods Delivery

Christopher Dilts/Bloomberg News

Cay Yanca/US EPA

Amazon.com

amny.com

Questions?