Lawn Care Emissions:

What are we breathing, and what are the implications for meeting PM2.5 and ozone standards in the Valley?

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Strategies for Improving Air Quality

- Under the Clean Air Act, the U.S. Environmental Protection Agency sets health-based standards

- Attainment plan: roadmap for our region to meet federal standards
  - In progress: *2012 PM2.5 Plan*

Emissions Inventories are one of the Foundations of an Attainment Plan

- Accounting for all air pollutant emissions – *what sources contribute what*
  - Ozone precursors (NOx, VOC)
  - Directly-emitted PM2.5 and precursors (NOx, SOx)
  - More…
- Continuously improved: surveys and source testing; expected growth and control

NOx: oxides of nitrogen

VOC: volatile organic compounds

SOx: oxides of sulfur

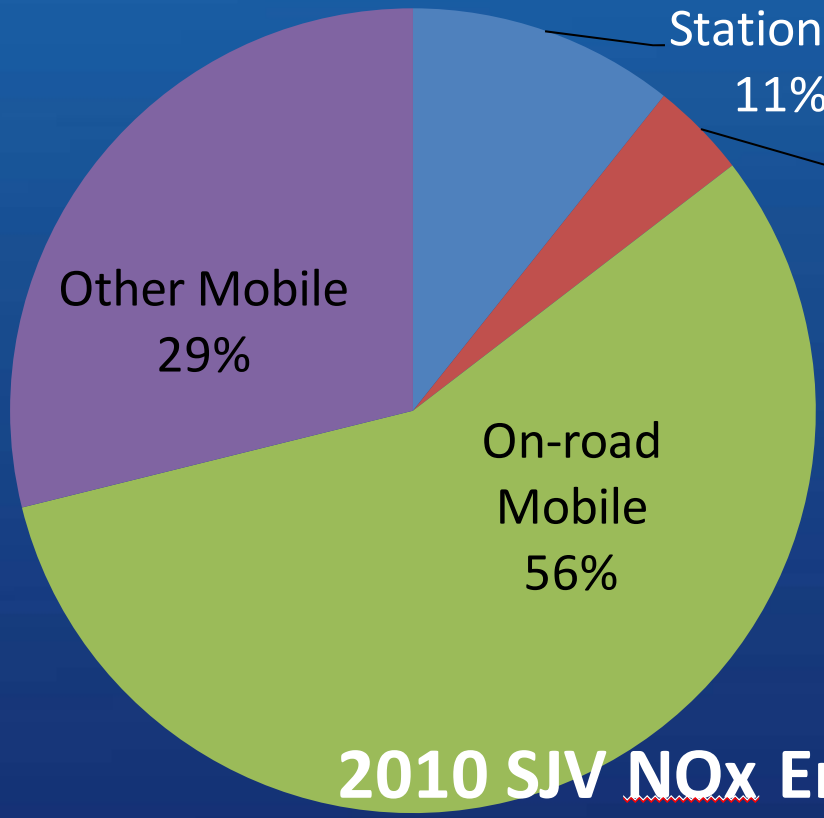
PM2.5: particulate matter 2.5 microns in diameter or smaller

Inventories in attainment plan analysis

- Modeling
- Identify opportunities to reduce emissions
  - All sectors must continue to reduce emissions
  - Develop cost-effective strategies
  - Prioritize measures with the biggest public health benefits

Emissions Inventory Structure

Lawn and garden is part of "Off-road equipment" in "Other Mobile"



2010 SJV NOx Emissions Sources

Current Lawn Care Emissions Data

Lawn care emissions: ARB's "OFFROAD 2007 Model"

- Residential, Commercial
- Gasoline, Diesel
- Exhaust, Evaporation
- Chainsaws, chippers, commercial turf equipment, front mowers, lawn & garden Tractors, lawn mowers, leaf blowers/vacuums, rear engine riding mowers, shredders, snow blowers, tillers, trimmers/edgers/brush cutters, wood splitters; other lawn & garden equipment

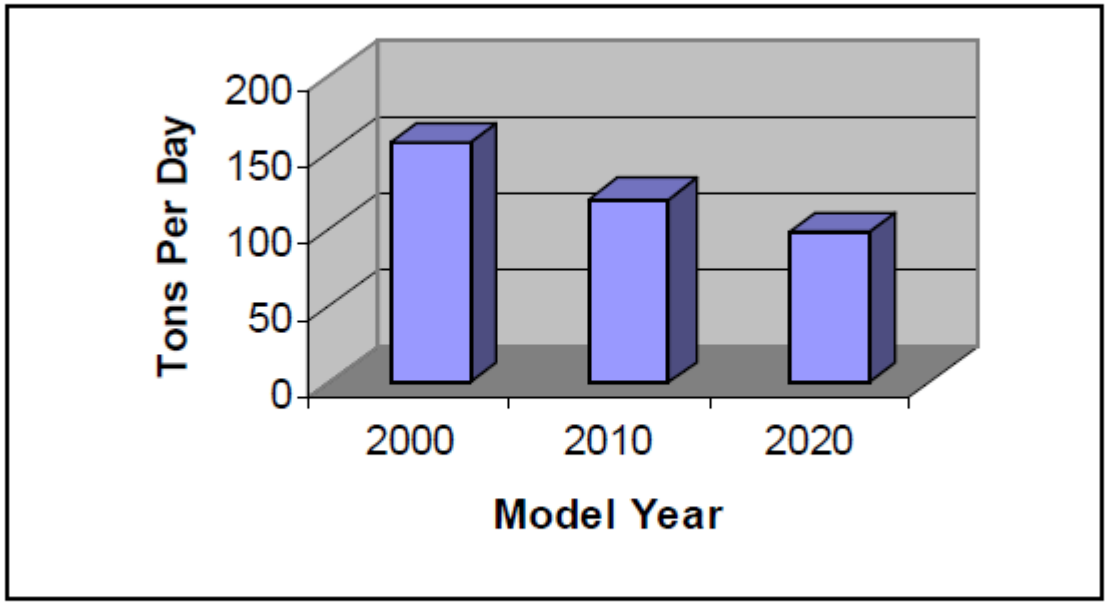
Highest Activity Rates by Commercial Equipment Type

Equipment	Commercial		Residential	
	Equipment population	Total Use, Hrs/Yr	Equipment population	Total Use, Hrs/Yr
Lawn Mowers	233,217	75 million	4,094,152	63 million
Chainsaws	182,618	74 million	2,100,109	10 million
Trimmers/Edgers/ Brush Cutters	346,127	59 million	2,831,965	61 million
Leaf Blowers/ Vacuums	104,065	29 million	917,472	4 million
TOTAL (all equipment)	1,633,442	336 million	11,571,344	159 million

Commercial and residential combined (statewide) :

- Total pieces of equipment: 13 million
  - 12.4% commercial, 87.6% residential
- Total Hrs/Yr: 495 million
  - 68% commercial, 32% residential

Figure 2.1. SORE Evaporative and Exhaust Emissions Inventory
Statewide ROG(1) + NOx Emissions



(1) ROG, or reactive organic gases, is the reactive part of hydrocarbon emissions which contribute to the formation of ozone in the presence of sunlight and other gases.

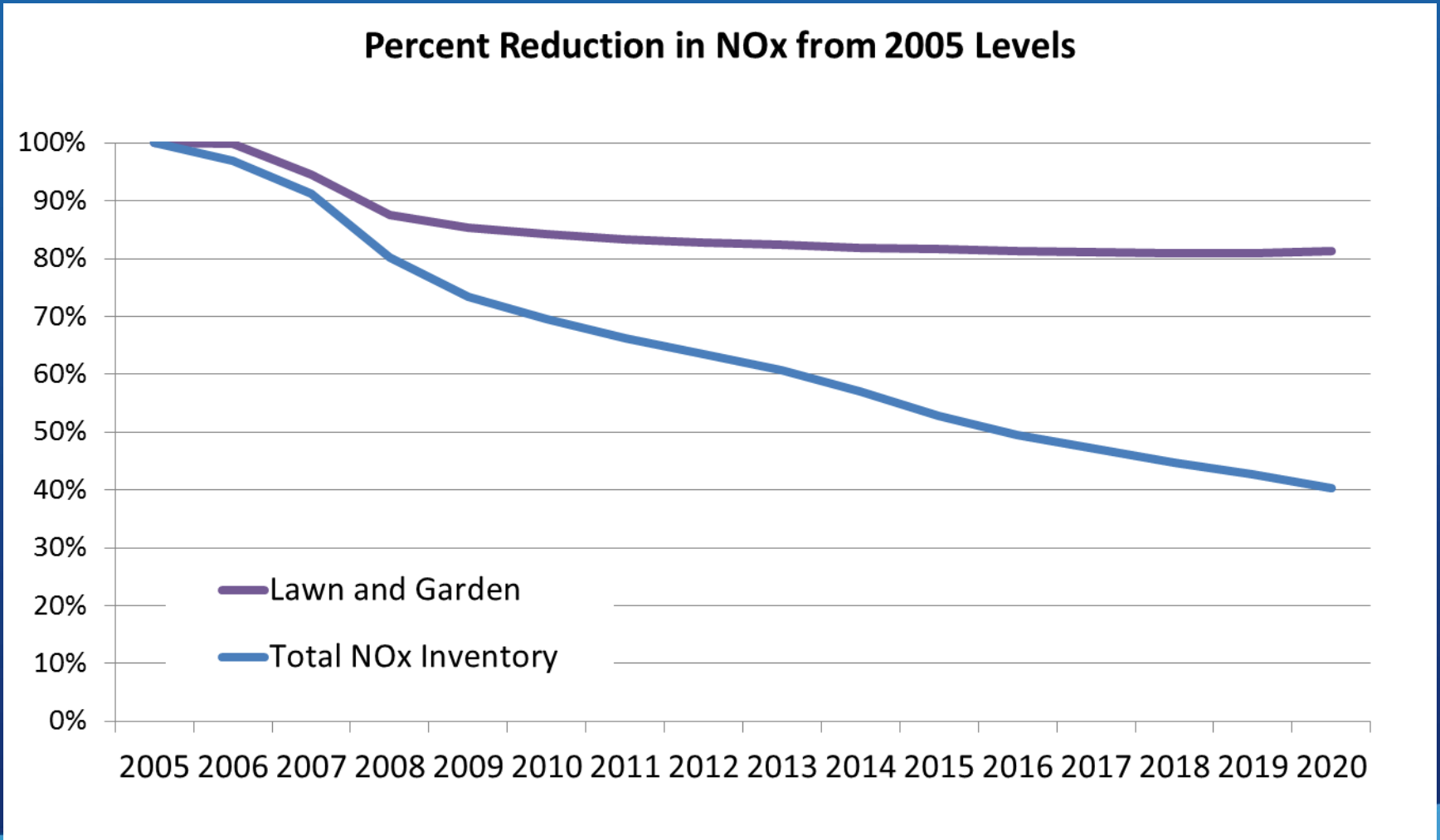
SORE: Small Off-Road Engines

Source: California Air Resources Board (ARB), October 3, 2008 Staff Report: Initial Statement of Reasons for Proposed Rulemaking Public Hearing to Consider Amendments to the Current Regulations for Small Off-road Engines

Valley Lawn and Garden Emissions

- About 175 pounds of directly-emitted PM2.5 per day – over 60,000 pounds per year
  - Exhaust and evaporation – does not include entrained particulates
- About 1,800 pounds of NOx per day – over 600,000 pounds of NOx per year
- About 12,000 pounds of VOC per day – over 4.5 million pounds per year
  - Includes highly-reactive hydrocarbons

Opportunities for emissions reductions



Improving emissions estimates

- ARB's 2012 survey
  - Who usually maintains lawn, shrubs, trees, or garden areas
  - Do you own and/or use any powered lawn or garden equipment at your residence?
  - What types to you own and how often do you use them? How is each powered?
  - How long do you use each piece of equipment each time?
  - How often do you use it (by season)?
  - What is the age of the equipment?
  - Do you plan to buy any additional powered lawn and garden equipment?
  - Etc…
- District-sponsored, Valley-specific research

Conclusions

- Attainment Planning:
  - Upcoming challenges motivate us to consider ALL opportunities for cost-effective air pollutant emissions reductions
- Emissions inventory:
  - We are currently accounting for lawn care emissions, but we can improve this accounting
  - Current trends show that lawn care emissions are decreasing, but not decreasing as much as other sources
- Public health:
  - Time, place, and type of emissions from lawn care are of special interest for our risk-based strategy