

Emission Control Options for Stationary Sources

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Mike Silverstein

Colorado Air Pollution Control Division



Colorado Department
of Public Health
and Environment

Air Pollution Control Division

Overview of Current Front Range & Statewide Emission Control Measures for Stationary, Nonroad and Area Sources

- **Off-road vehicle/equipment exhaust standards (ozone, PM2.5, PM10, visibility, NO2, carbon monoxide, SO2)**
- **Gasoline/diesel fuel standards (ozone, PM2.5, PM10, visibility, NO2, carbon monoxide, SO2)**
- **COGCC 1341 O&G control measures for odors – sources close to dwellings, completions (ozone)**
- **Federal locomotive engine standards (ozone, PM2.5, PM10, visibility, NO2, carbon monoxide, SO2)**
- **Renewable energy requirements (ozone, PM2.5, PM10, visibility, NO2, carbon monoxide, SO2)**
- **Architectural/traffic/industrial and consumer products standards (ozone)**
- **Numerous regulations for small and large industrial and commercial facilities (ozone, PM2.5, PM10, visibility, NO2, carbon monoxide, SO2)**
- **Front Range and statewide O&G controls – tanks, dehydrators, new/existing engines, pneumatics (ozone, PM2.5, PM10, visibility, NO2, carbon monoxide)**
- **Gasoline station controls (ozone)**

New emissions controls for stationary sources were recently adopted through the Regional Haze process:

- **NOx control upgrades: 15 units**
- **Natural gas operation: 2 units**
 - **Shut down: 9 units**

Ozone
Benefits



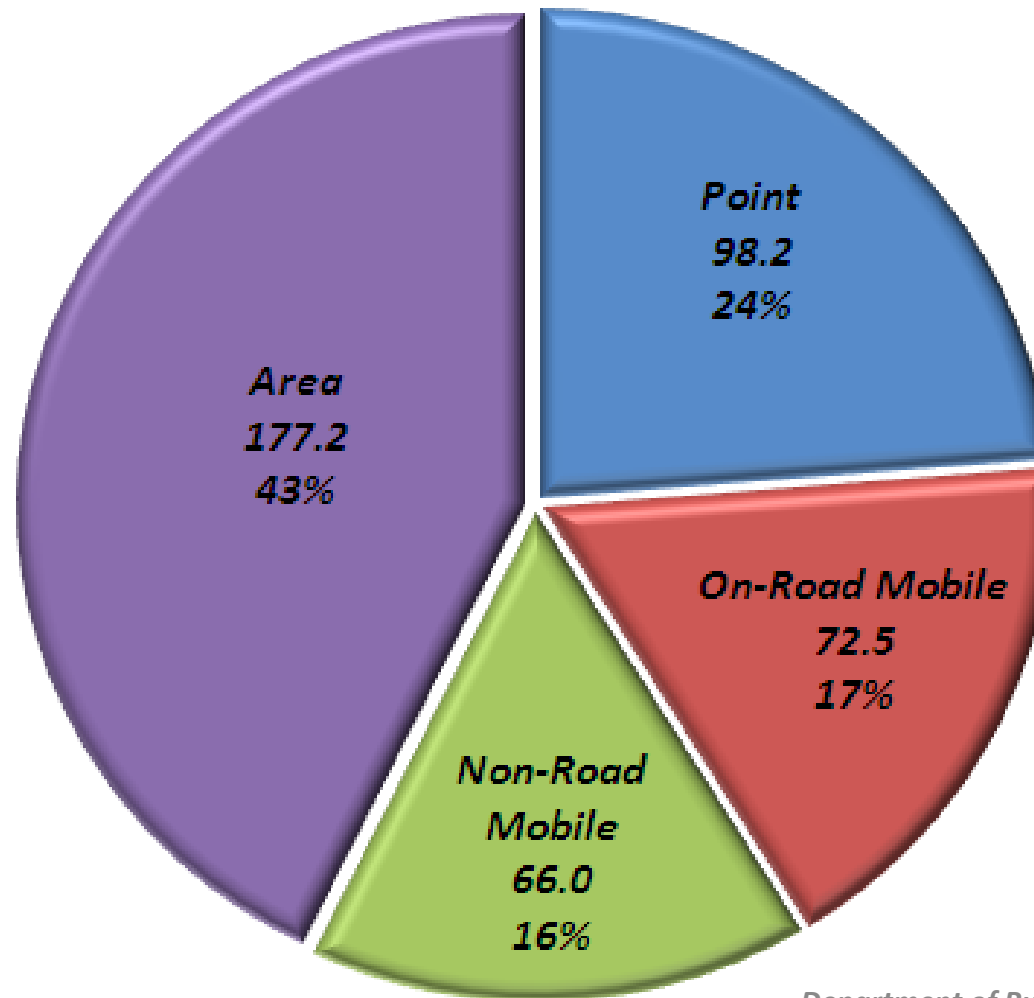
Statewide NOx Reductions	Front Range NOx Reductions
95 tons/day	51 tons/day

Phased-in between 2012 and 2018

Emission Control Strategies for Ozone

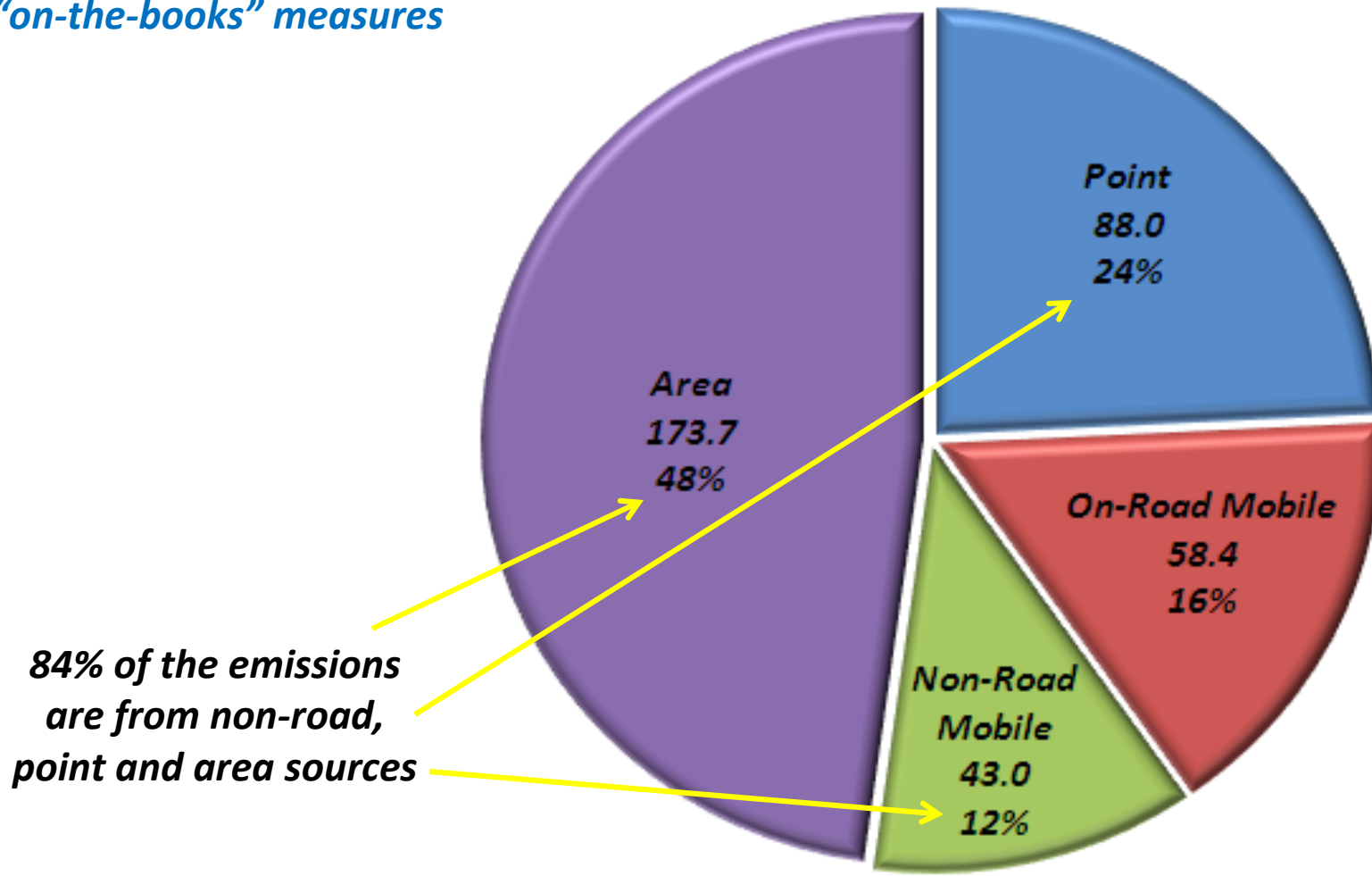
2008 Ozone Action Plan <i>(All strategies apply to the entire Denver/North Front Range nonattainment area (NAA) unless otherwise noted)</i>				Potential Strategies Requiring Additional Evaluation for Near Term Plan/SIP Amendment		
Measures Adopted for Federally-Enforceable State Implementation Plan (SIP)		Potential Emission Reduction	Measures Adopted and Enforced as State- only Measures		Potential Emission Reduction	
			<ul style="list-style-type: none"> ➤ Inspection/maintenance program in North Front Range – eff. July 1, 2010 ➤ More stringent Reg. 11 I/M cut-points (Denver area) – adopted, effective May 1, 2008 ➤ Mandatory high-emitter pilot program (Denver area) – began January 1, 2008 ➤ Tighten up collector plate requirements for older vehicles (statewide)-legislation being pursued 	<ul style="list-style-type: none"> ~ 1 tpd VOC, ~1 tpd NOx, ~17 tpd CO ~ 1 tpd VOC, ~3 tpd NOx, ~13 tpd CO <i>Pilot program results are not available</i> ~ 1 tpd VOC ~ 7 tpd CO 	<p>Ozone Fuels Strategies:</p> <ul style="list-style-type: none"> ➤ 7.0 RVP gasoline ➤ Federal Reformulated Gasoline ➤ Eliminate ethanol waiver 	<ul style="list-style-type: none"> ~ 10 tpd VOC ~ 18 tpd VOC ~ 10 tpd VOC + 300 tpd CO
<ul style="list-style-type: none"> ➤ Increase system-wide condensate tank control requirements to 85% in 2010 and 90% in 2011 for all tanks greater than or equal to 2 tpy 	<p><i>Total from 2010 base ~ 34 tpd (2010)/ 49 tpd (2011) VOC</i></p>	<ul style="list-style-type: none"> ➤ Statewide Oil & Gas regulations -- Controls on existing reciprocating internal combustion engines 	<ul style="list-style-type: none"> ~4 tpd VOC ~16 tpd NOx 	<ul style="list-style-type: none"> ➤ Statewide Oil & Gas regulations – control requirements for new condensate tanks and pneumatic valves 	<p><i>Scope of the potential controls has not been determined</i></p>	
		<ul style="list-style-type: none"> ➤ Pneumatic valves controls - require low/no bleed valves on all new and existing valves by 2009 	<ul style="list-style-type: none"> ~ 23 tpd VOC 	<ul style="list-style-type: none"> ➤ Increase system-wide condensate tank control requirements to 95% for all tanks 	<p><i>Total from 2010 base ~61 tpd VOC</i></p>	
<ul style="list-style-type: none"> ➤ Remove current exemptions in Reg. 3 for selected small sources required to file air pollution emission notices and obtain permits ➤ Require Reasonably Available Control Technology (RACT) for minor sources in NAA (Reg. 3) 	<p><i>Emission reductions are difficult to quantify at this time, but are expected to be small in the short-term</i></p>	<ul style="list-style-type: none"> ➤ Expand Reg. 7 (VOC control requirements) to entire NAA 	<p><i>Emission reductions are difficult to quantify at this time, but are expected to be small in the short-term</i></p>	<ul style="list-style-type: none"> ➤ Emission controls on large NOx sources <ul style="list-style-type: none"> ▪ power plants ▪ boilers ▪ cement kilns 	<ul style="list-style-type: none"> ~ 30-45 tpd NOx 	
				<ul style="list-style-type: none"> ➤ California Paints/Solvents/ Consumer Products Rule 	<ul style="list-style-type: none"> ~ 8 tpd VOC 	
TOTAL EMISSION REDUCTIONS		<p>VOC NOx CO</p>	<p>~34 tpd(2010) 49 tpd (2011)</p>	<p>VOC NOx CO</p>	<p>~30 tpd ~20 tpd >37 tpd</p>	

**2008 Preliminary VOC Inventory
for 9-County NAA
414 tons/day**



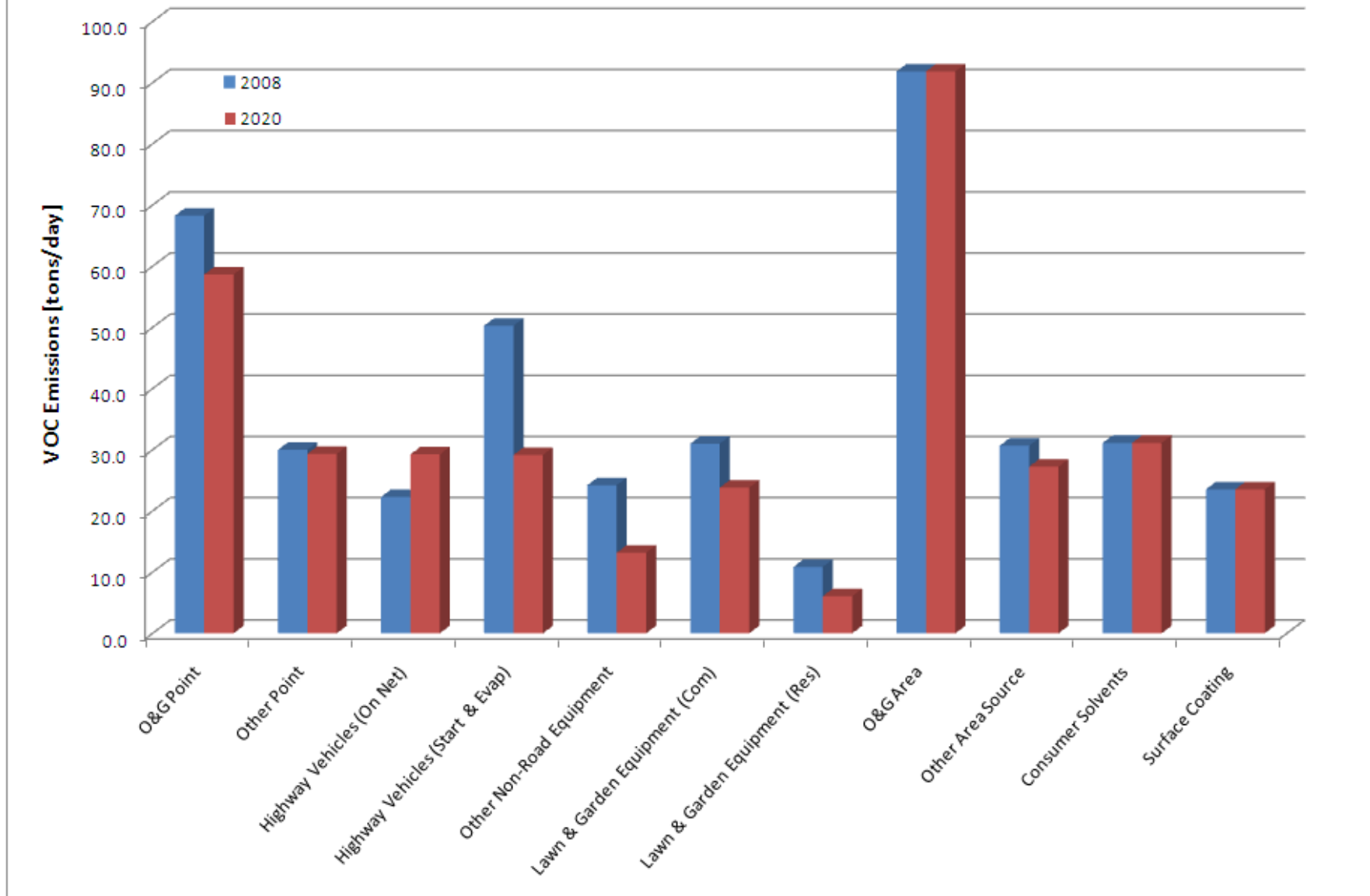
2020 Preliminary VOC Inventory for 9-County NAA 363 tons/day

*51 tons/day (12%) reduction
with "on-the-books" measures*

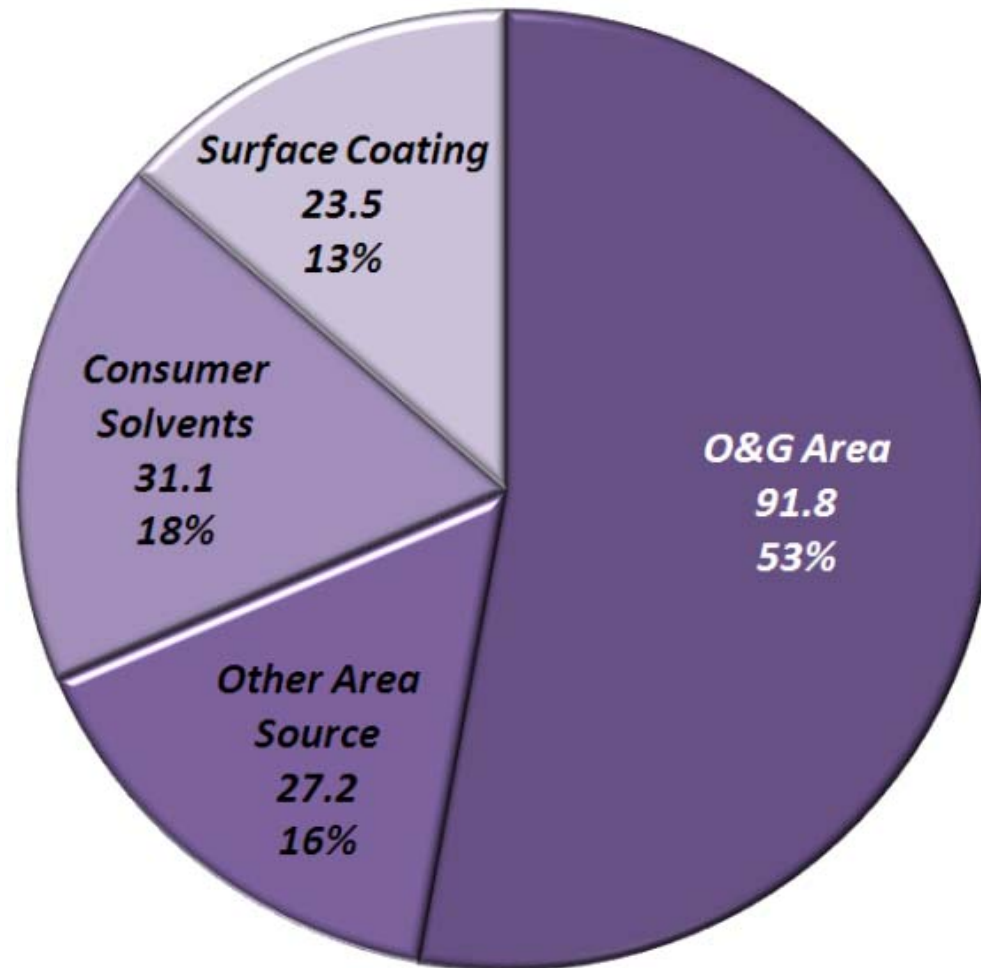


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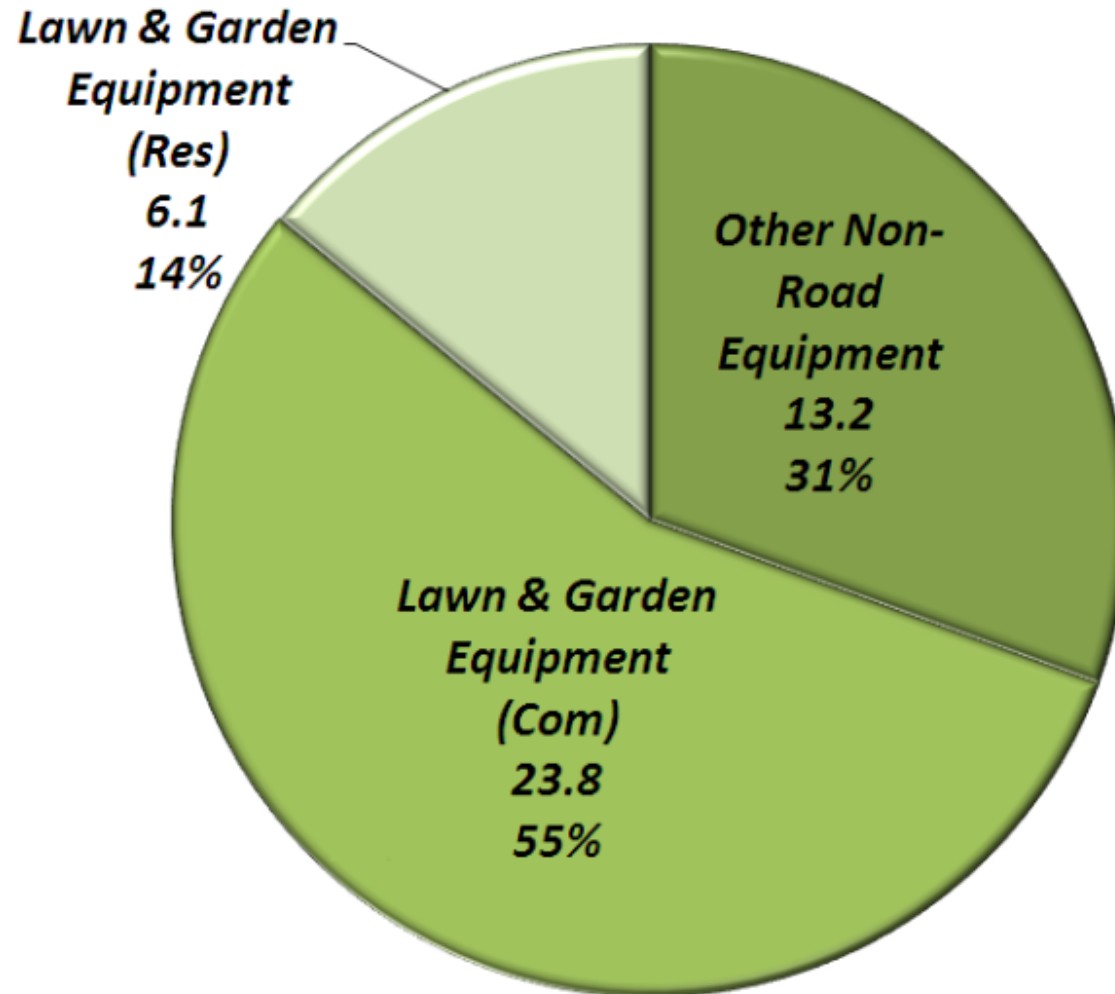
Preliminary 2008 and 2020 VOC Inventory for 9-County NAA



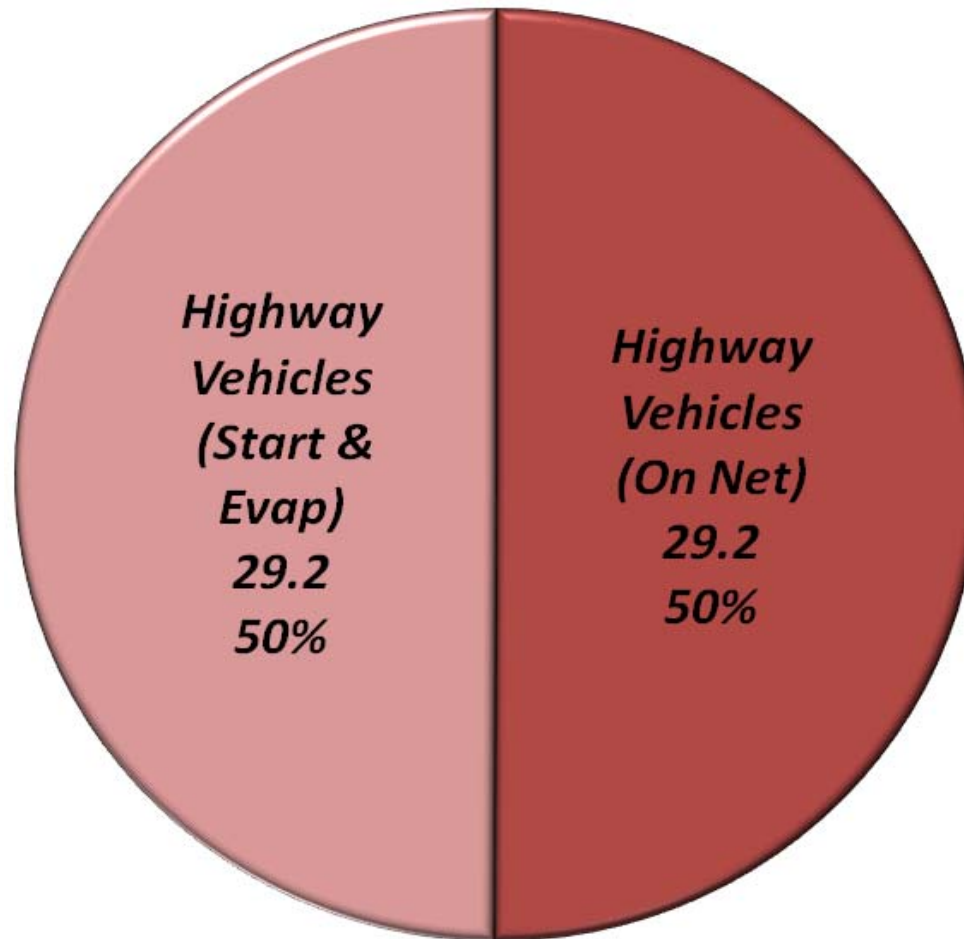
2020 VOC Emissions from Area Sources (48% of the 2020 VOC Inventory)



2020 VOC Emissions from Non-Road Mobile Sources (12% of the 2020 VOC Inventory)

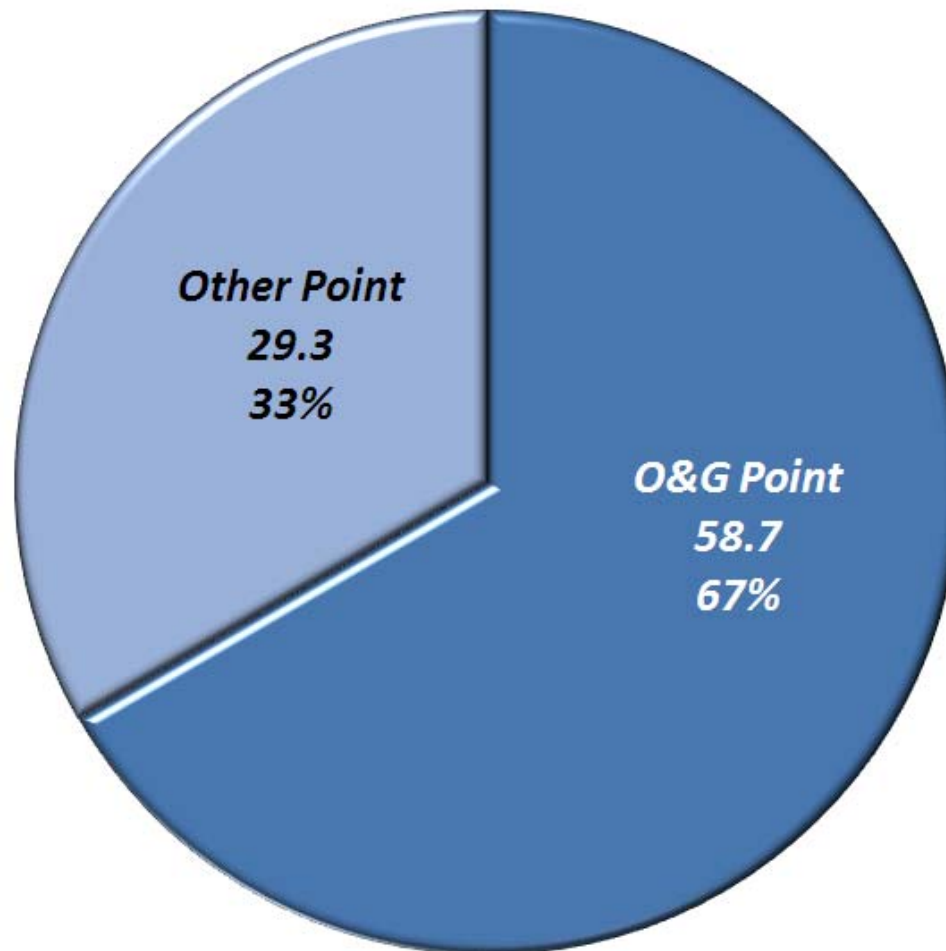


2020 VOC Emissions from On-Road Mobile Sources (16% of the 2020 VOC Inventory)

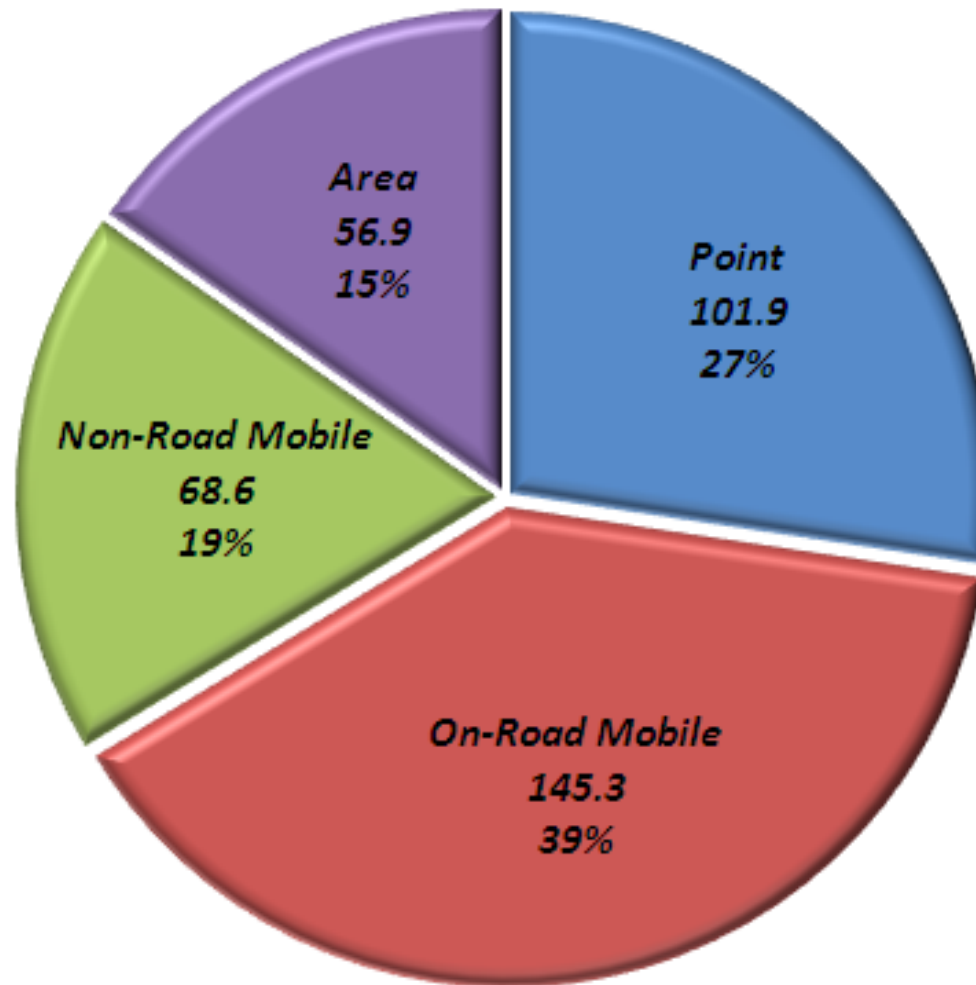


2020 VOC Emissions from Point Sources

(24% of the 2020 VOC Inventory)



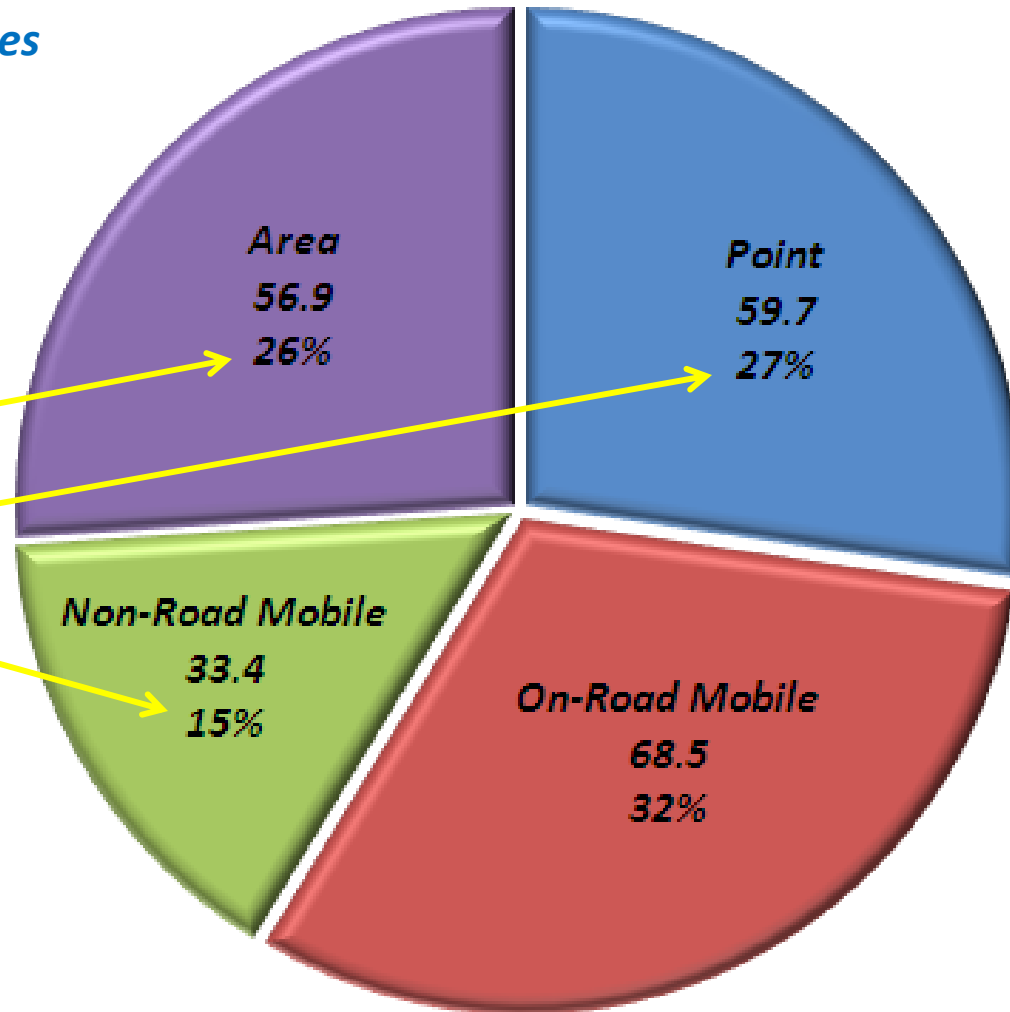
**2008 Preliminary NOx Inventory
for 9-County NAA
373 tons/day**



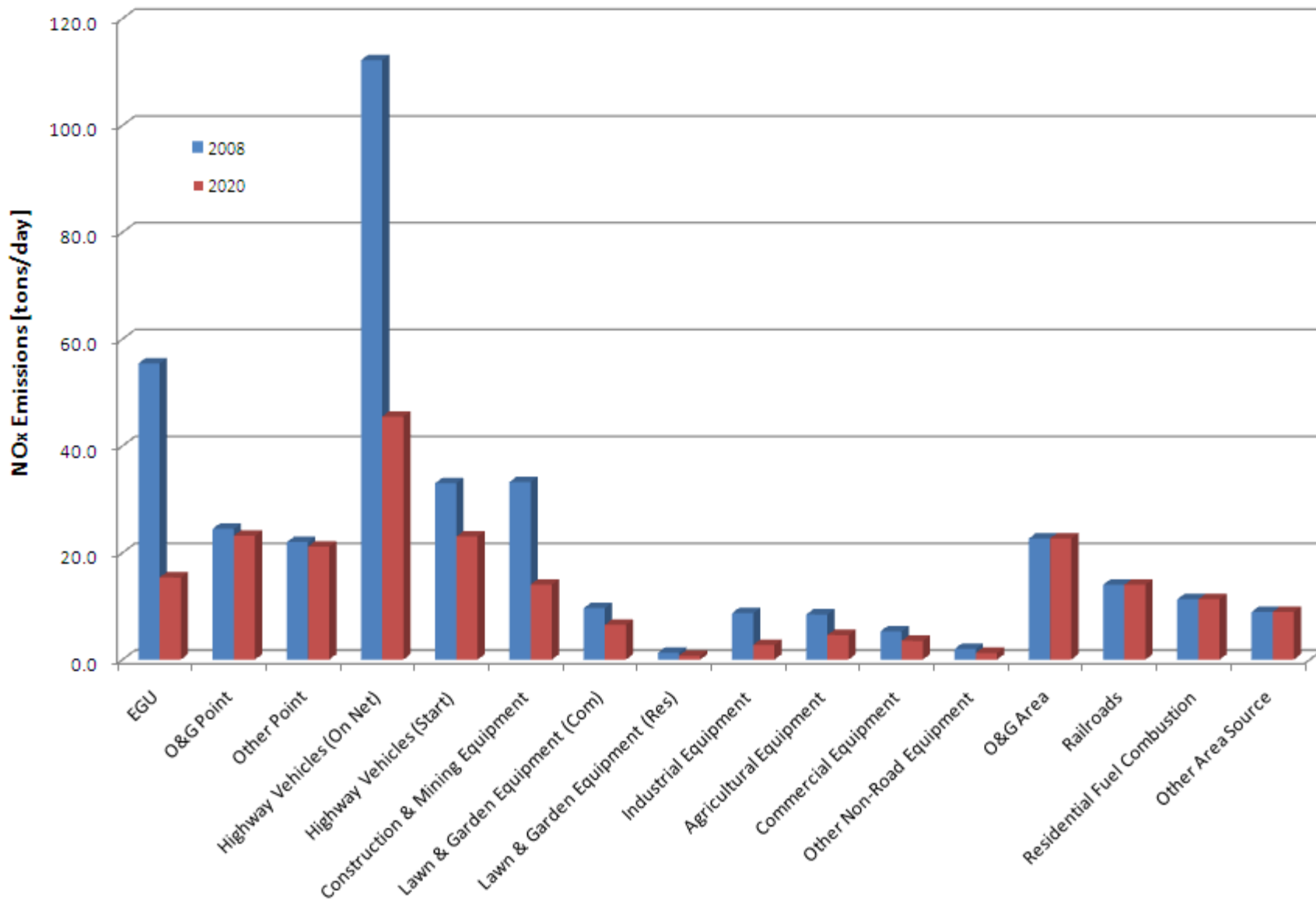
2020 Preliminary NOx Inventory for 9-County NAA 218 tons/day

*155 tons/day (41%) reduction
with "on-the-books" measures*

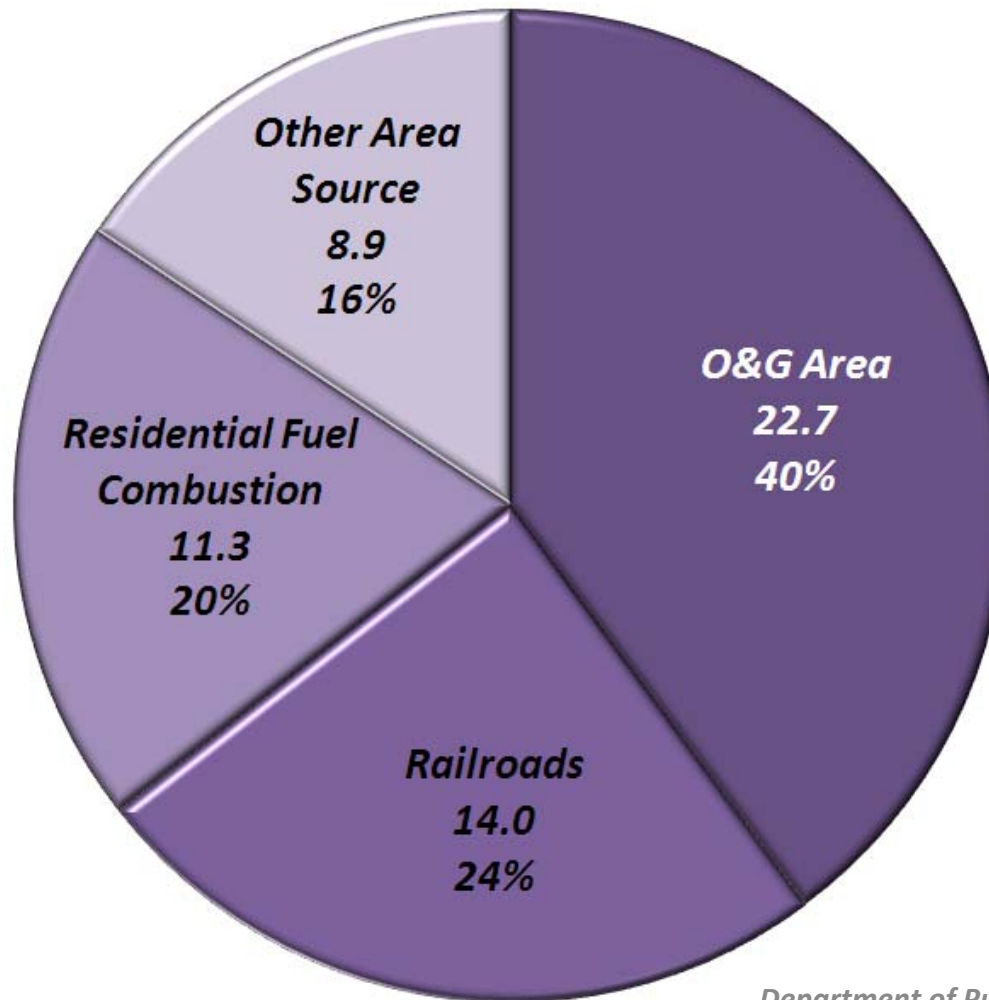
*68% of the emissions
are from non-road,
point and area sources*



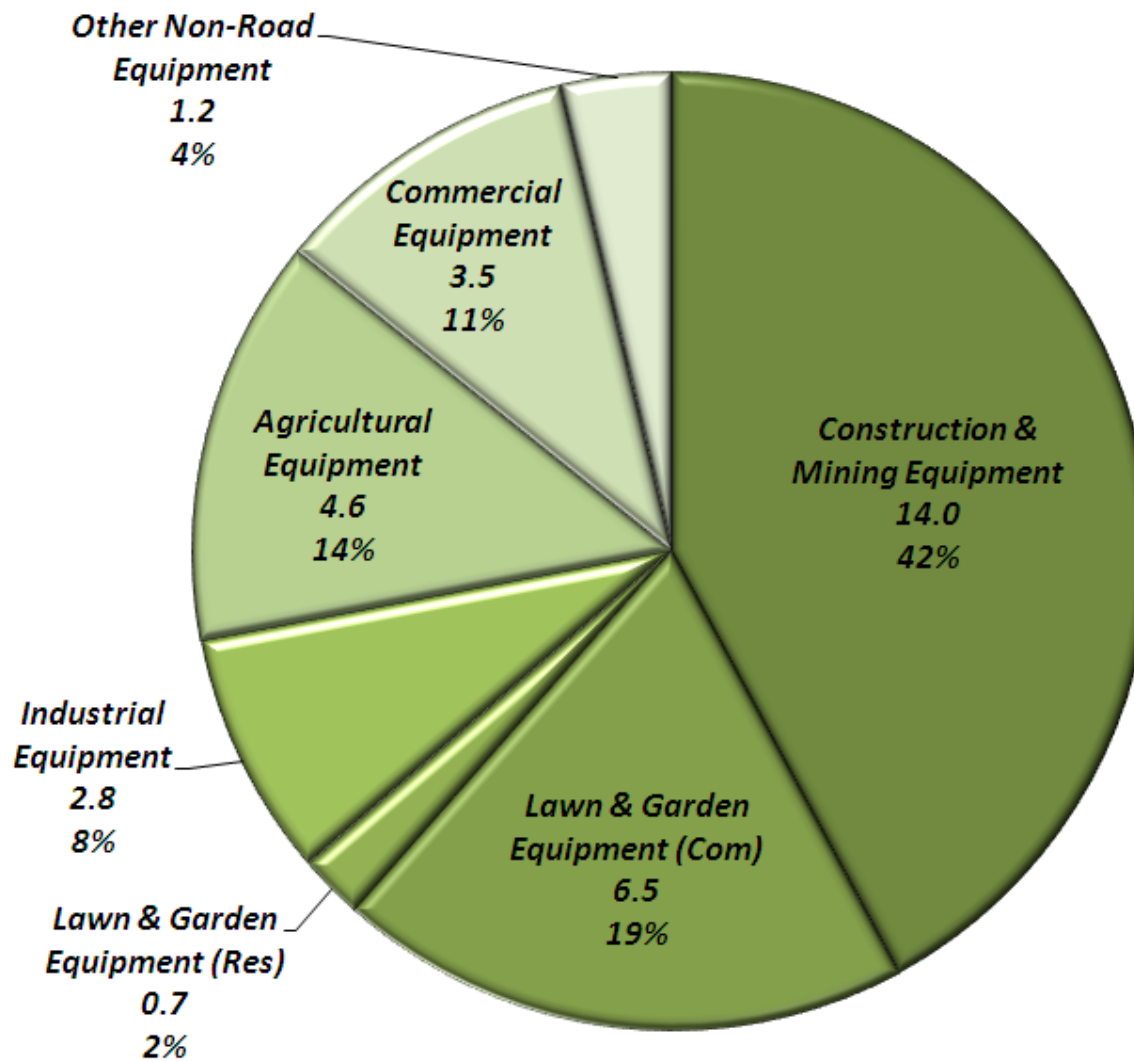
Preliminary 2008 and 2020 NO_x Inventory for 9-County NAA



2020 NOx Emissions from Area Sources (26% of the 2020 NOx Inventory)

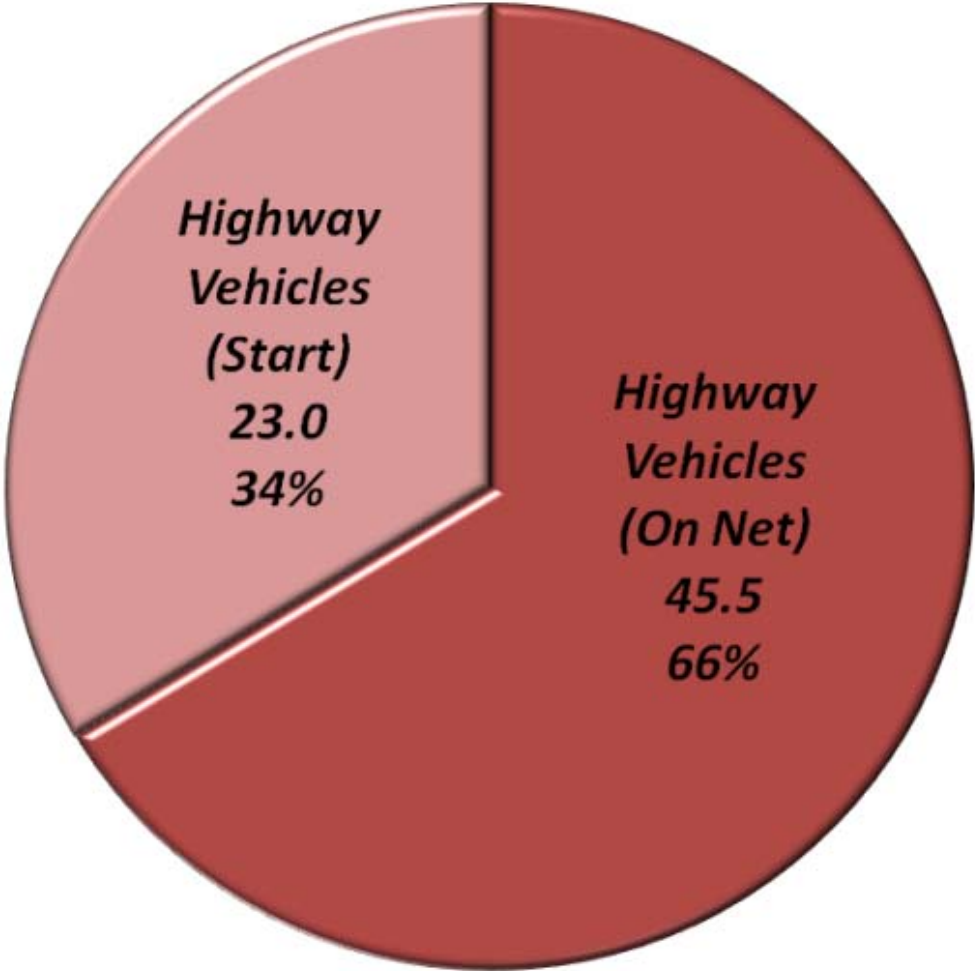


2020 NOx Emissions from Non-Road Mobile Sources (15% of the 2020 NOx Inventory)

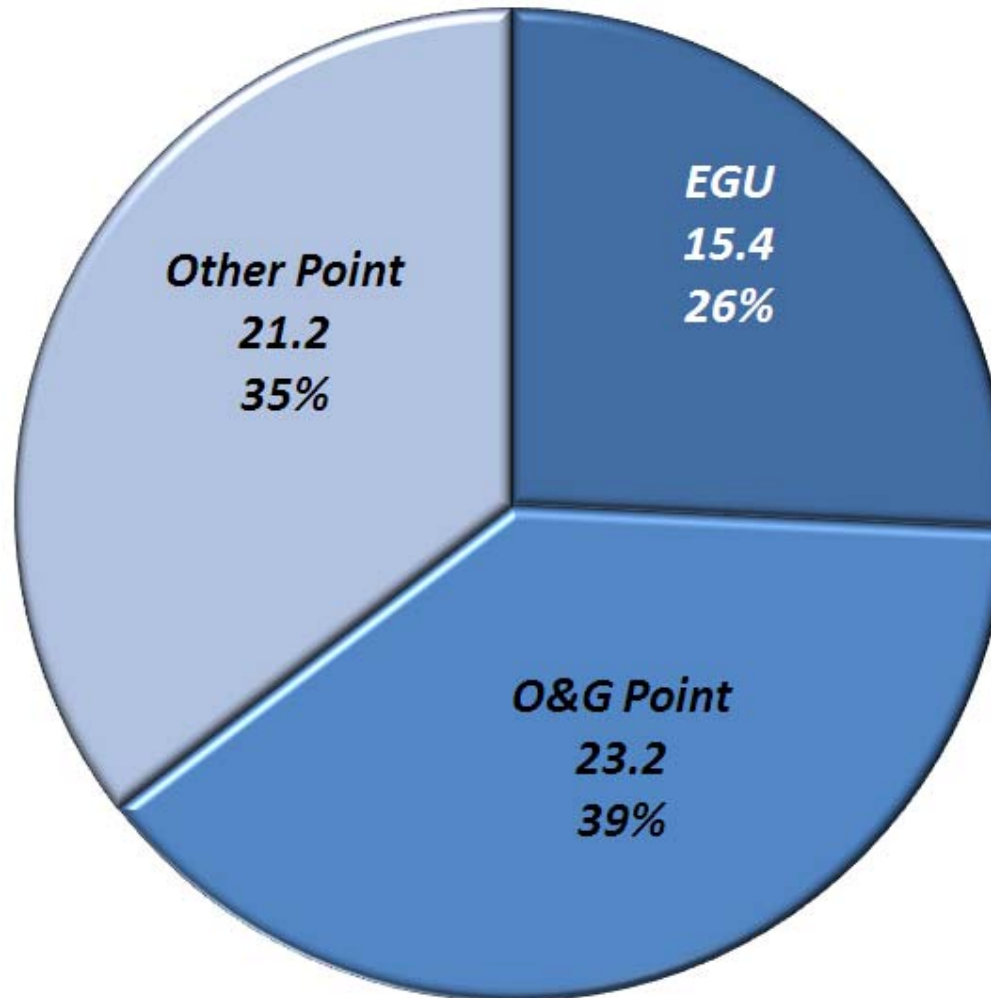


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2020 NOx Emissions from On-Road Mobile Sources (32% of the 2020 NOx Inventory)



2020 NOx Emissions from Point Sources (27% of the 2020 NOx Inventory)



Denver Metro Area & North Front Range Ozone Control Measures - Under Evaluation

Strategies Previously Considered but Not Adopted

Measure/Strategy

1	Stage II Vapor Recovery at Gasoline Dispensing Facilities in DMA/NFR
2	Revise Reg. 7 to address VOC emissions from additional stationary sources (e.g. refineries, bottling facilities, container & insulation manufacturing)
3	Condensate Tanks – Increase System-wide Control Efficiency Requirement; Fully Capture Flash Gas; Lower the Statewide Threshold Requiring Control; Incorporate Oil Tanks into System-Wide Regulations
4	Glycol Dehydrators - Modify Dehydrator Applicability Threshold; Increase Control Requirement
5	Condensate Load out Operations - Require submerged filling at the Tanker Truck and at the refinery or location where transfer occurs)
6	Condensate Load out Operations - Require E&P condensate load out operations to be controlled using submerged filling
7	Condensate Tanks – Electronic Surveillance System
8	Compressor Stations in NAA – Potential Electrification of NG-Fired RICE w/high NOx
9	RICE under 500 HP and portable RICE
10	NOx Emission Controls on Power Plants, Boilers, Cement Kilns
11	Minor Source BACT for NOx and VOCs in NAA
12	California Type Regulations for Paints, Architectural/Industrial Coatings, Solvents and Consumer Products
13	Well Completions – Require Green Completions When Feasible
14	Fugitive Leaks - Require a Directed Inspection and Maintenance (DI&M) Program

blue = point sources
purple = area sources

Denver Metro Area & North Front Range Ozone Control Measures - Under Evaluation

Strategies Previously Considered but Not Adopted

Measure/Strategy	
15	Drill Rigs – Adapt California Drill Rig Requirements; Use Voluntary Program to add Selective Catalytic Reduction Control on Diesel Drill Rigs
16	Miscellaneous Oil and Gas Sources - Expand Reg. 7 Applicability for Small Engines, Require Insulation on Heated Separators, and Install BASO Valves
17	Pneumatic Devices - Expand Requirement for Low/No-Bleed Pneumatic Devices to Statewide
18	Pneumatic Injection Pumps – Replace or Control Pneumatic Methanol and Chemical Injection Pumps
19	Produced Water Tanks - Require Produced Water Tanks to be Controlled at Sites with Existing Control Equipment
20	Biogenic Sources – Tree Planting Guidelines
21	Evaluate Area Source Categories in NAA for RACT

Additional Strategies Not Previously Considered but Employed Elsewhere in SIPs Nationally

Measure/Strategy	
22	Tighten NOx Limits for Boilers and Steam Generators for Industrial Applications
23	Zero Emissions Lawn and Garden (commercial) incentives for replacement of spark ignition gas mowers equipment
24	Zero Emissions Lawn and Garden (residential) incentives for replacement of spark ignition hand held equipment
25	Indirect Source Rule: Construction Mitigation to reduce off-road construction emissions from new development for large projects
26	Operational Indirect Source Rule: reduce emissions associated with new development of large commercial and residential projects after project completion
27	Texas Emission Reduction Program (TERP) –incentive to repower/replace/retrofit large off-road equipment
28	Benefits of Existing Energy Efficiency and Renewable Energy Standards

Other Strategies

Measure/Strategy	
29	Demand Response Participant - Controls for Compression Ignition (CI) Reciprocating Internal Combustion Engines (RICE)

blue = point sources
purple = area sources
green = non-road mobile

Outline of Ozone Management Strategy Assessment Papers

Measure type:

Measure name and description:

Preliminary sense of anticipated air quality benefits:

Preliminary sense of anticipated costs:

Additional technical analysis needed to refine benefits/costs estimates:

Implementation feasibility:

Demonstrated ability to take "SIP Credit" for the measure:

Likelihood that measure could be in place in time for SIP inclusion (approx 2015):

Preliminary Assessment of Co-benefits:

Other Considerations/Comments:

Example of the information resulting from our review:

VOC Emissions from Gasoline Refueling DMA-NFR (9-county) Non-Attainment Area

PRELIMINARY

