



Air Quality Regional Collaboration - County Inventories

Meeting # 4 - September 20, 2012

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Inventory Specifics

- 2010 year data
- Criteria pollutant breakdown
 - NO_x (nitrogen oxides)
 - PM₁₀ (particulate matter less than 10 microns in diameter)
 - SO_x (SO₂) (sulfur oxides, mostly sulfur dioxide)
 - VOC (volatile organic compounds)
 - CO (carbon monoxide)
 - Benzene also available
- Further work to investigate specific sources
 - In some cases

Inventory Specifics

- Regional classifications
 - Central Mountains
 - West Slope
- Focus
 - Central Mountains: Eagle, Gunnison, Pitkin and Routt counties
 - West Slope: Delta, Garfield, Moffat, Rio Blanco, Mesa, Montrose, Ouray, San Miguel, and Dolores



West Slope

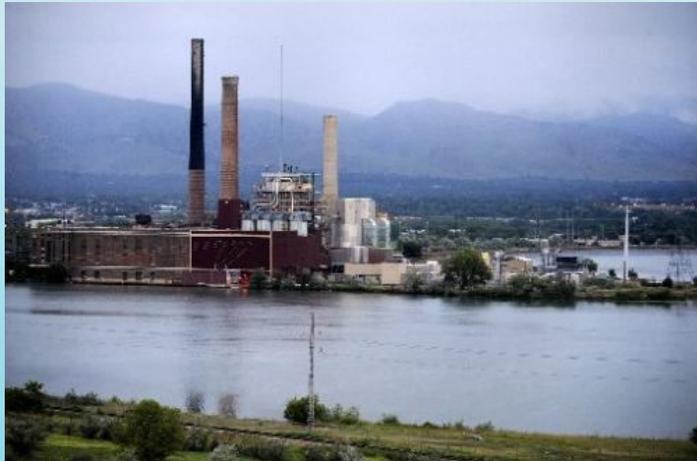


Central Mountains

Source Categories

- Point – Specific location, releases pollutants above certain threshold (power plants, industrial facilities)
- Area – Numerous facilities or activities that individually release small amounts of given pollutant(s), but collectively can release significant amounts of pollution
- Oil and Gas – Can be both point and area sources (point – compressor stations, gas plants; Area – wellheads, vents)
- Mobile – Wide variety of vehicles, engines, and equipment that move, or can be moved, from place to place (vehicles, construction, ATVs)
- Biogenic – Result from natural biological processes (decomposition, vegetation, biomass)

Understanding pollutant origins: Specific to Colorado

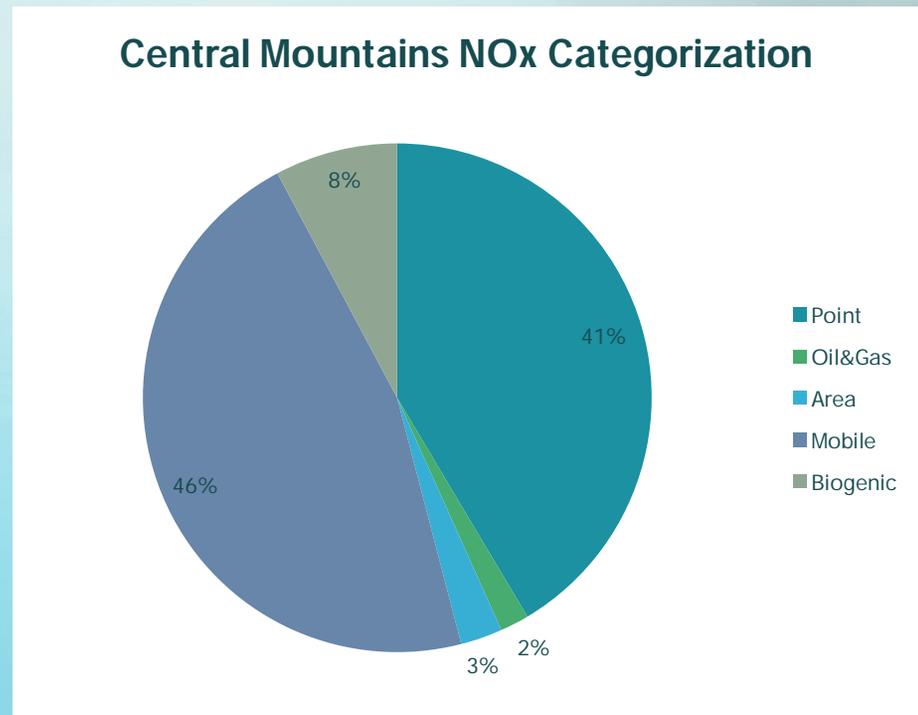


Valmont Generating Station near Boulder, CO

- Nitrogen oxides
 - Fossil fuel combustion (coal and gas)
 - Motor vehicles (~40%)
 - Power plants and industrial facilities (~24%)
 - Other industrial, commercial, and residential sources that burn fuels (~3%)
 - Biogenic (biological decay, lightning)(~14%)
- Central Mountains and West Slope contribute ~25% statewide

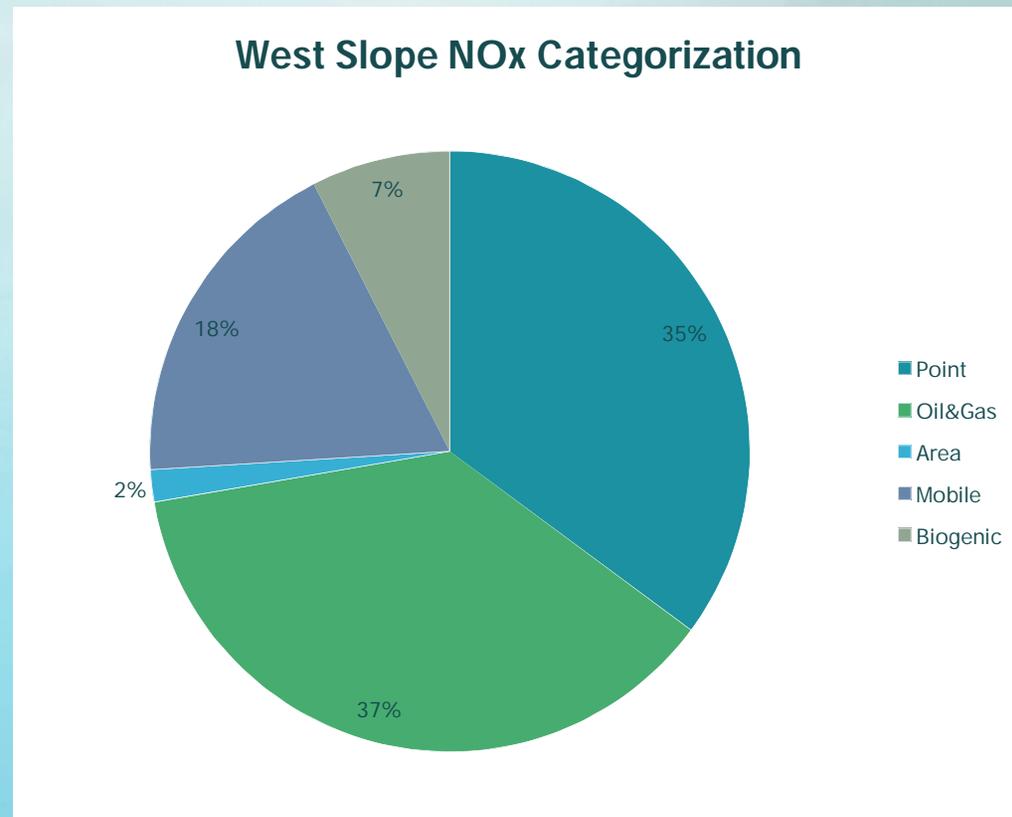
NOx – Central Mountains

- County Breakdown
 - **Routt (~35%)**
 - Fremont (15%)
 - **Eagle (12%)**
 - **Gunnison (6%)**
 - **Pitkin (3%)**
- Attributions
 - **Routt - Hayden Power Plant**
 - Fremont - Clark Power Plant & Holcim Cement Plant
 - **Eagle - Highway Vehicles**



NOx – West Slope

- County Breakdown
 - Moffat (33%)
 - **Garfield (29%)**
 - **Mesa (17%)**
 - **Rio Blanco (8%)**
 - **Montrose (6%)**
 - **Delta (3%), San Miguel (2%)**
- Attributions
 - Moffat – Craig Power Plant
 - **Garfield – Oil and Gas**
 - **Mesa – Oil and Gas & Cameo Power Plant**
 - **Rio Blanco – Oil and Gas**
 - **Montrose – Nucla Power Plant**
 - **Delta – Highway Vehicles**
 - **San Miguel – Oil and Gas**



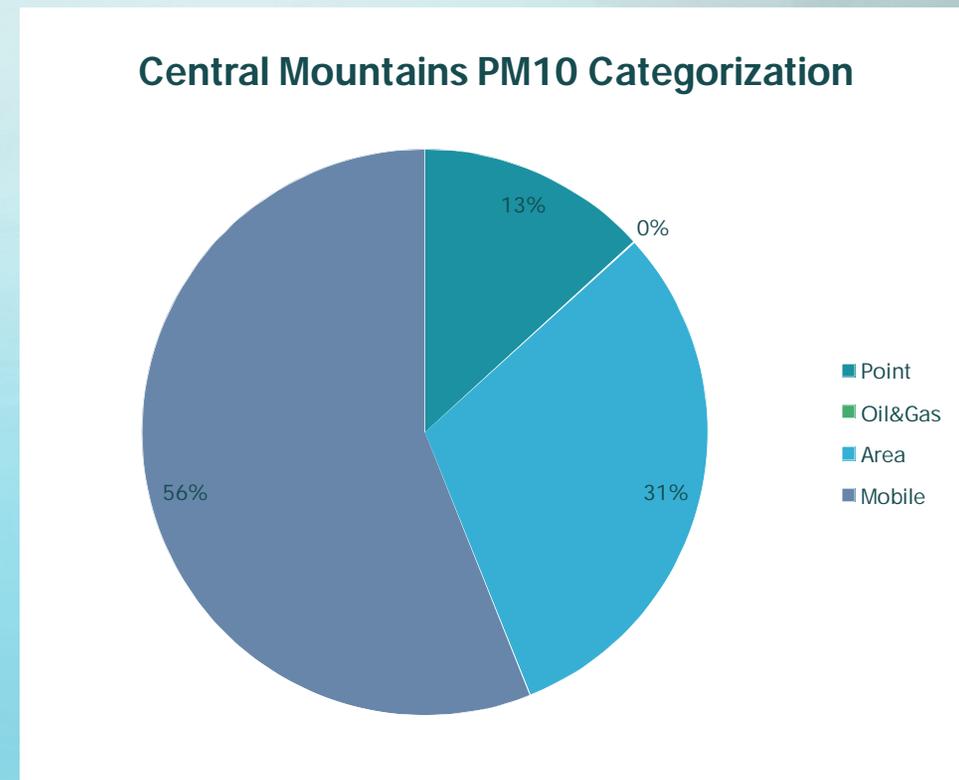
Understanding pollutant origins: Specific to Colorado



- PM10
 - Includes dust, dirt, soot, smoke, and liquid droplets
 - Primary or secondary pollutant
 - Mobile vehicles (primary & secondary) (~34%)
 - Agriculture (primary) (~30%)
 - Construction (primary) (~23%)
 - Industrial facilities (primary & secondary) (~6%)
 - Woodburning (primary & secondary) (~5%)
- Central Mountains and West Slope contribute ~17% statewide

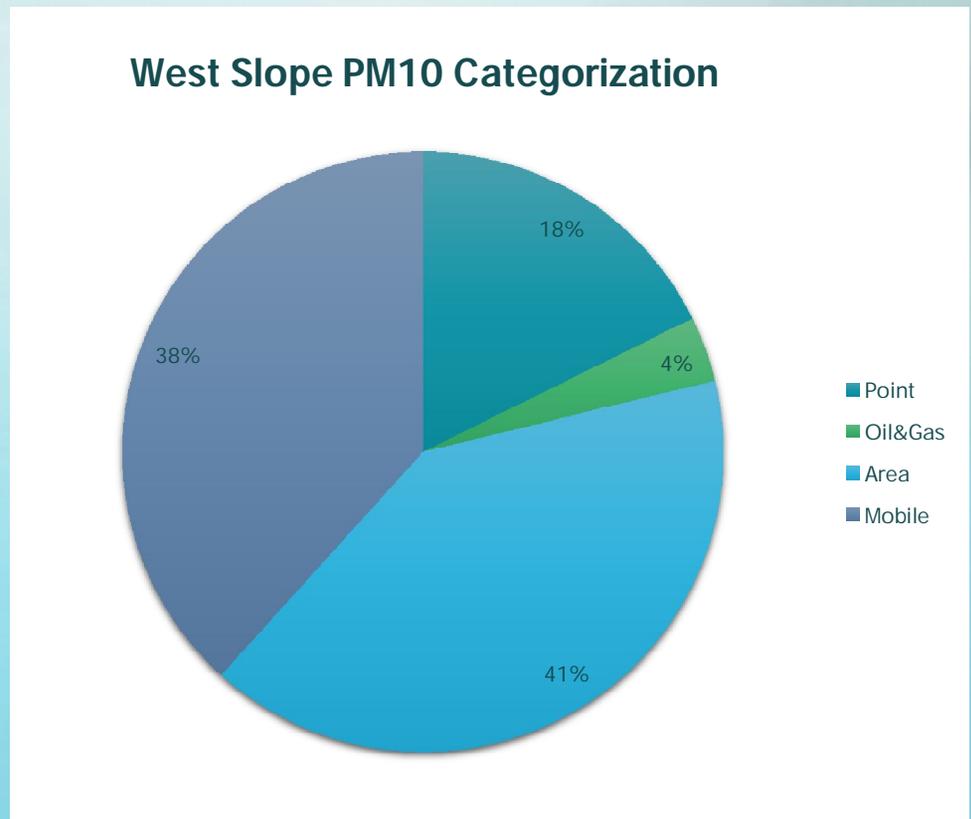
PM10 – Central Mountains

- County Breakdown
 - **Routt (~17%)**
 - **Eagle (~16%)**
 - Grand (~12%)
 - **Gunnison (~7%)**
 - **Pitkin (~3%)**
- Attributions
 - **Routt – Road Dust, Agriculture, Point Sources**
 - **Eagle – Road Dust, Construction, Woodburning**
 - **Gunnison – Road Dust, Construction, Point Sources**



PM10- West Slope

- County Breakdown
 - Mesa (~18%)
 - Rio Blanco (~17%)
 - Moffat (~17%)
 - Garfield (~15%)
 - Montrose (~14%)
 - Delta (6%), San Miguel (24%)
- Attributions
 - Mesa - Construction, Road Dust
 - Rio Blanco - Road Dust
 - Moffat - Road Dust
 - Garfield - Construction
 - Montrose - Agriculture
 - Delta - Point Sources
 - San Miguel - Road Dust



Understanding pollutant origins: Specific to Colorado

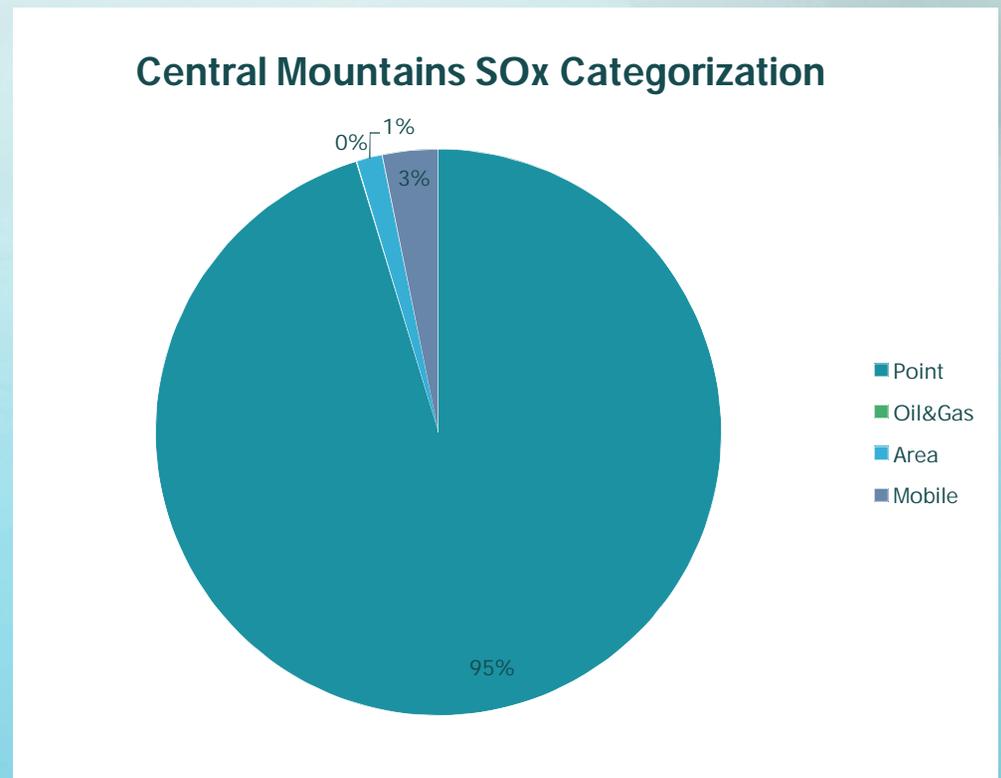


Holcim Cement Plant near Canon City, CO

- SO_x (SO₂ indicator criteria pollutant)
 - Power plants and industrial facilities that derive product from raw materials such metallic ore, coal and crude oil (refineries, cement manufacturing) (~95%)
 - Mobile sources burning diesel (aircraft, non-road, locomotives) (< 5%)
- Central Mountains and West Slope contribute ~22% statewide

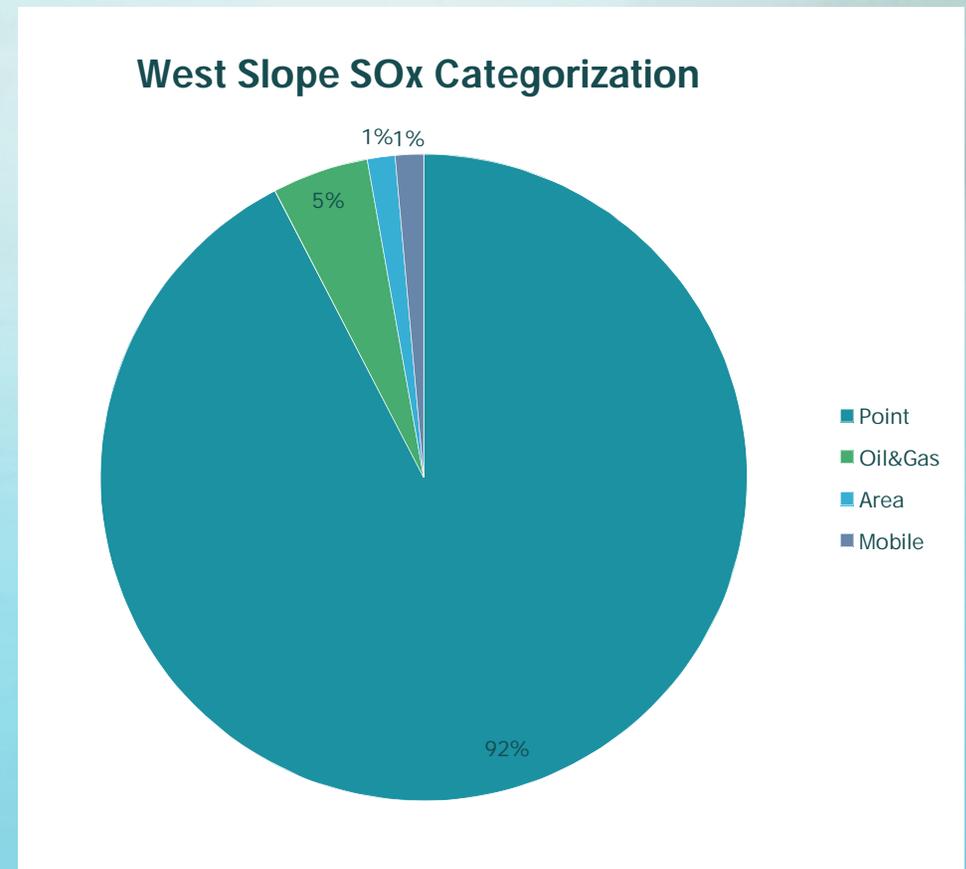
SOx – Central Mountains

- County Breakdown
 - **Routt (~56%)**
 - Fremont (~38%)
 - **Eagle (1%)**
 - **Gunnison (0%)**
 - **Pitkin (0%)**
- Attributions
 - **Routt - Hayden Power Plant**
 - Fremont - Clark Power Plant & Holcim Cement Plant
 - **Eagle - Railroads**

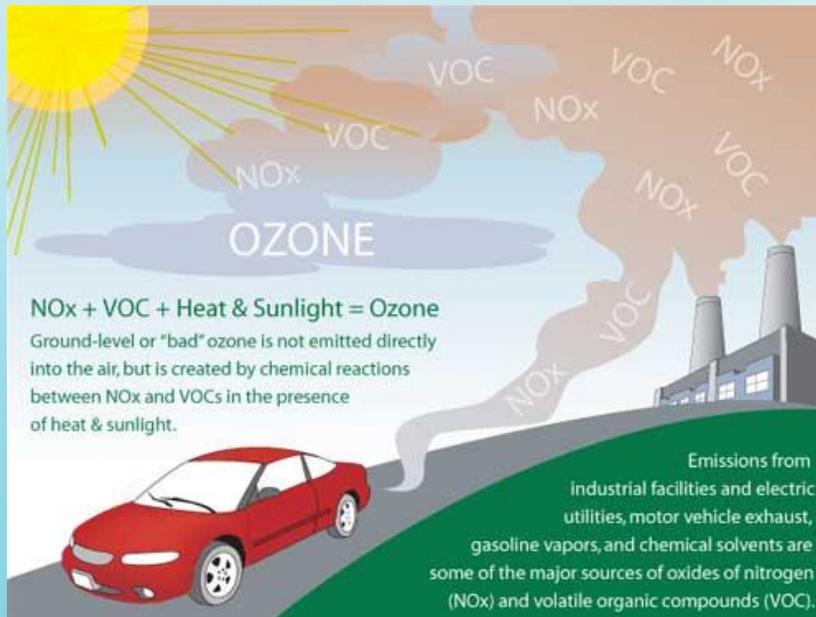


SOx – West Slope

- County Breakdown
 - Moffat (~48%)
 - Mesa (~31%)
 - Montrose (~15%)
 - Garfield (~4%)
 - Rio Blanco (~2%)
 - Delta (0%), San Miguel (0%)
- Attributions
 - Moffat – Craig Power Plant
 - Mesa – Cameo Power Plant
 - Montrose – Nucla Power Plant
 - Garfield – Oil and Gas
 - Rio Blanco – Oil and Gas
 - Delta – Railroads
 - San Miguel – Wildfire (minimal)



Understanding pollutant origins: Specific to Colorado



- VOCs (volatile organic compounds)
 - Chemicals containing hydrogen, carbon, and other elements that evaporate easily
 - Hundreds of these compounds present in atmosphere
 - In presence of sunlight and Nox, VOCs react to form ground-level ozone, a component of smog

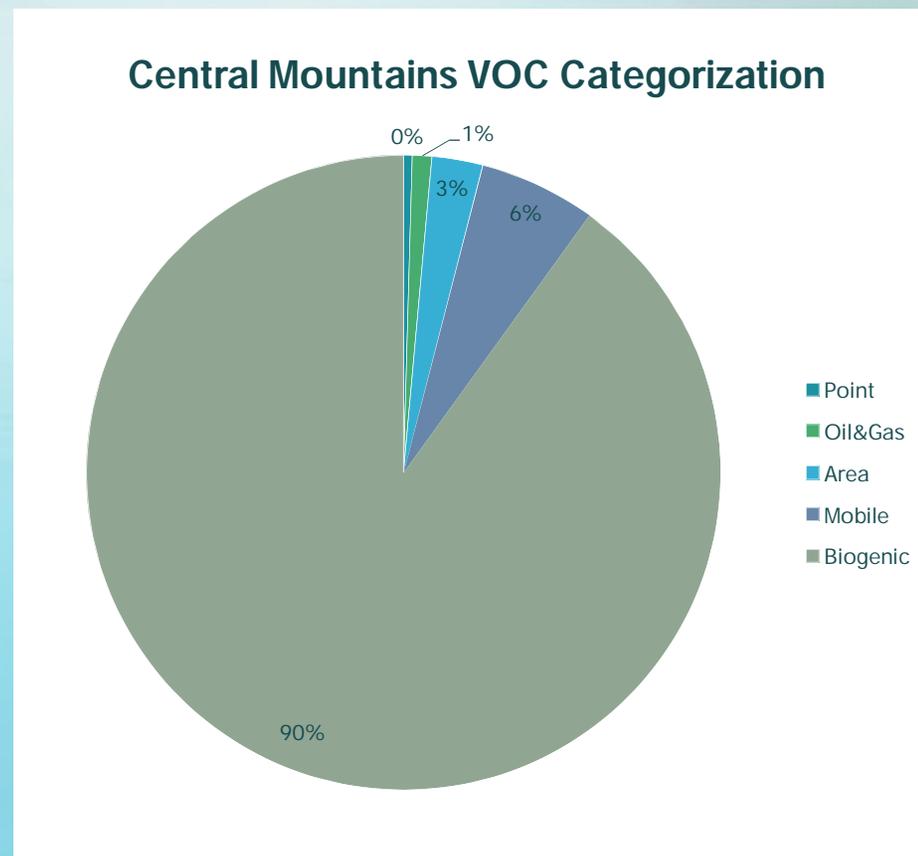
Understanding pollutant origins: Specific to Colorado

- VOCs (volatile organic compounds)
 - Biogenic (vegetation) (~71%)
 - Oil and gas (~14%)
 - Mobile sources (~9%)
 - Paints & solvents (~3%)
 - Woodburning (~1%)
- Central Mountains and West Slope contribute ~37% statewide
 - Central Mountains - 17%
 - West Slope - 20%



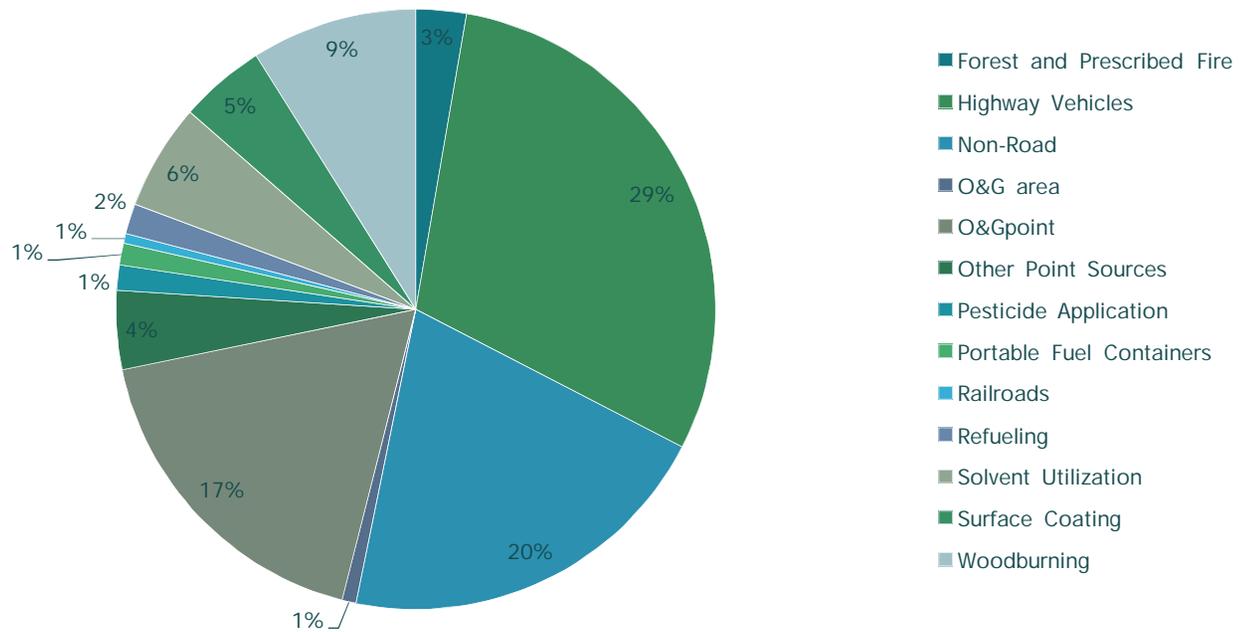
VOCs – Central Mountains

- County Breakdown
 - **Routt (~13%)**
 - **Gunnison (~10%)**
 - Jackson (~10%)
 - Grand (~9%), Fremont (~8%)
 - **Eagle (~8%), Pitkin (~5%)**
- Attributions
 - **ALL: Biogenic, Non-Road & Highway Vehicles**
- Should be noted that woodburning is another significant anthropogenic source category



VOCs -Routt County Breakdown

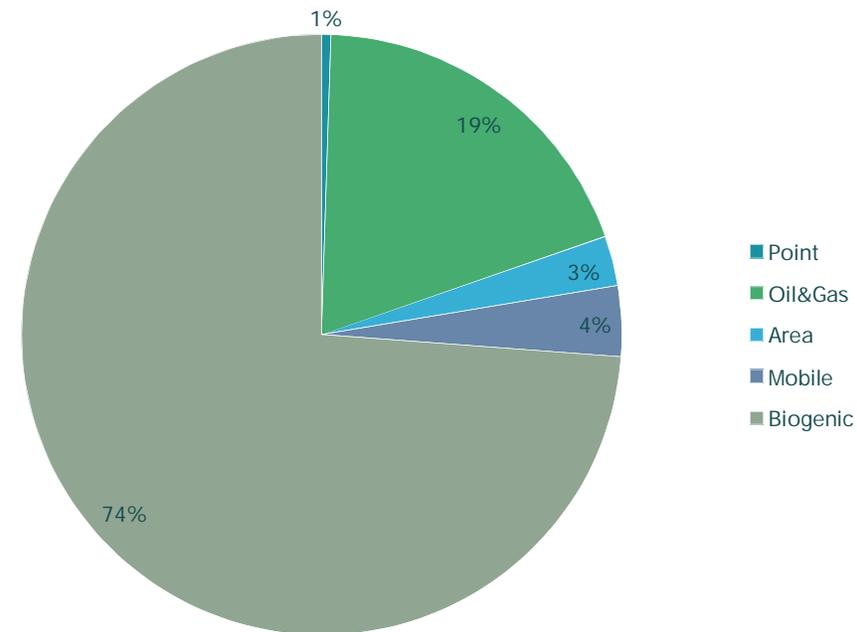
**Routt County VOC Categorization
(without biogenic)**



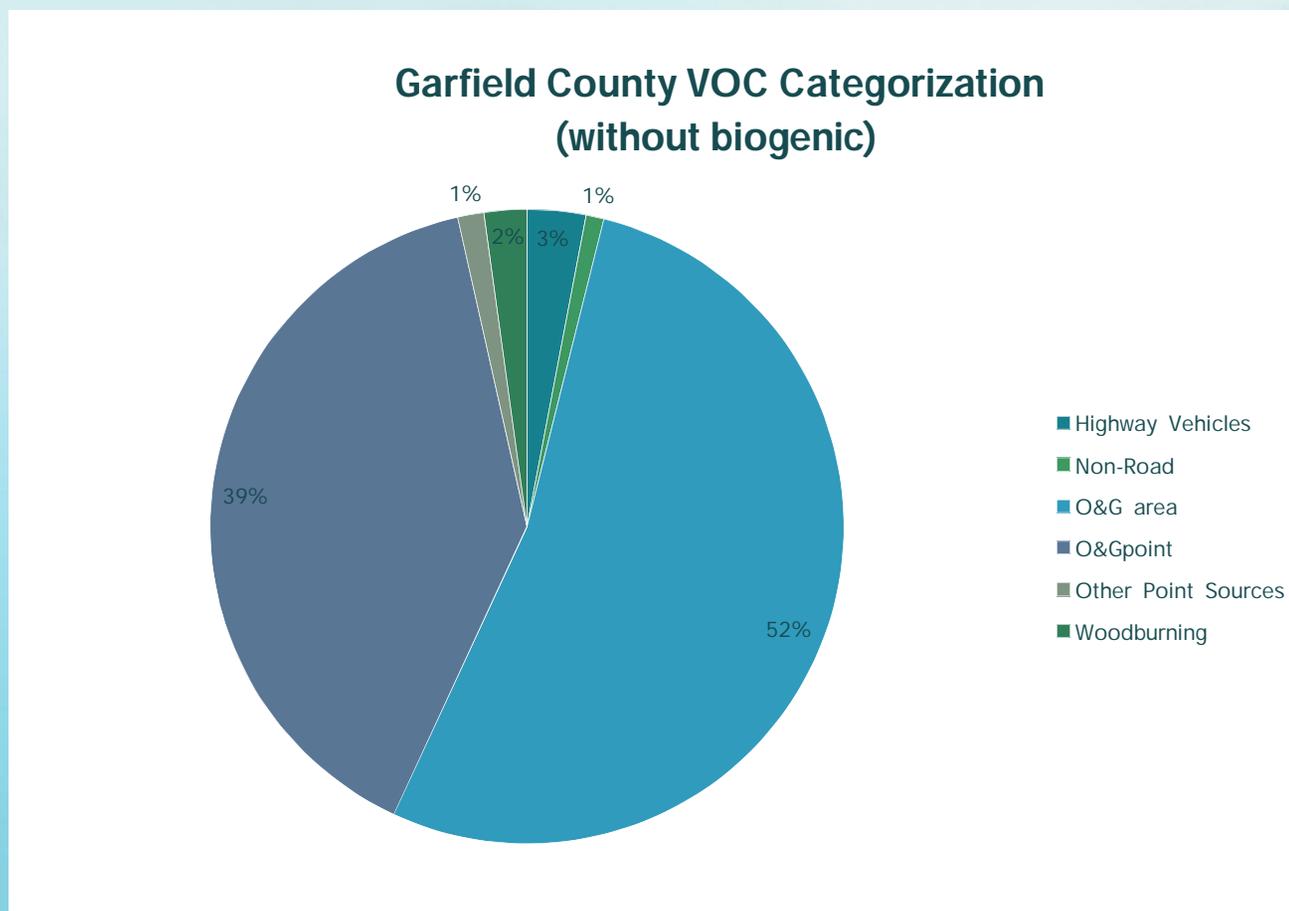
VOCs – West Slope

- County Breakdown
 - Garfield (~26%)
 - Mesa (~16%)
 - Rio Blanco (~14%)
 - Montrose (~9%)
 - Moffat (~13%)
 - Delta (7%), San Miguel (5%)
- Attributions
 - Garfield & Mesa – Biogenic, Oil and Gas
 - Rio Blanco – Biogenic, Oil and Gas Point
 - Montrose – Biogenic, Point Sources
 - Moffat – Biogenic, Oil and Gas Point
 - Delta – Biogenic, Woodburning
 - San Miguel – Biogenic, Oil and Gas Area
- Woodburning should not be discounted

West Slope VOC Categorization



VOCs – Garfield County Breakdown



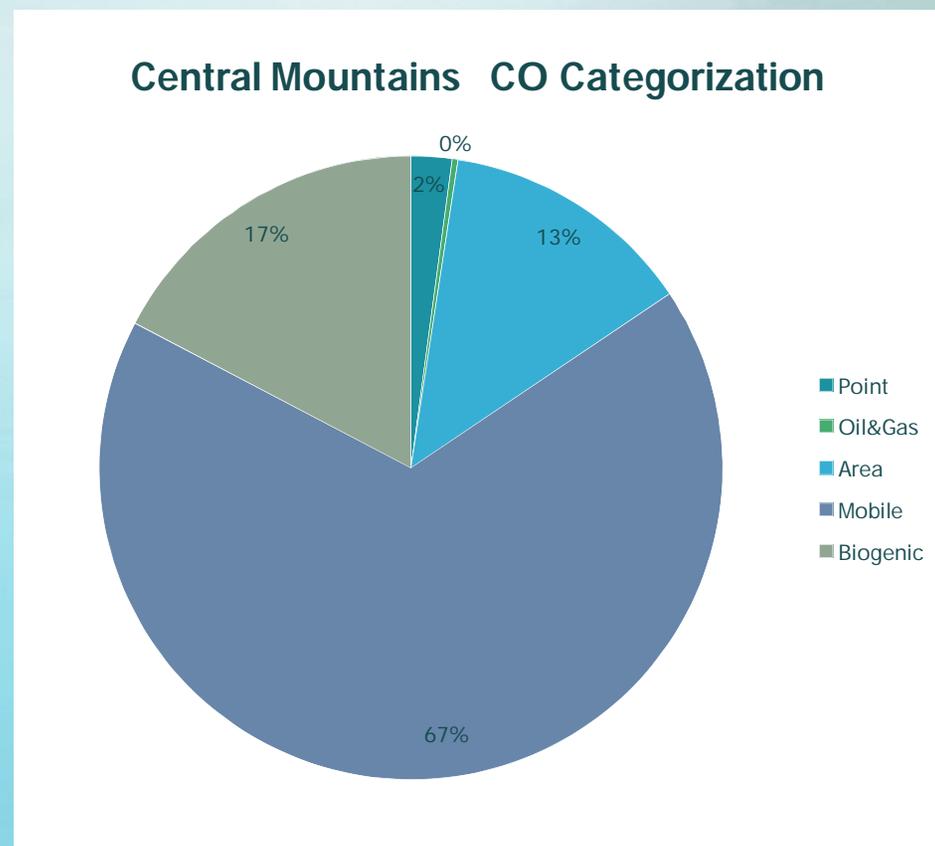
Understanding pollutant origins: Specific to Colorado

- Carbon monoxide
 - Primarily from mobile sources (~75%)
 - Aircraft, trucks, automobile, non-road mobile, and railroads
 - Wildfires (biogenic) (~10%)
 - Woodburning (~7%)
 - Oil and gas fuel combustion (~3%)
 - Other fuel combustion (< 5%)
- Central Mountains and West Slope contribute ~20% statewide



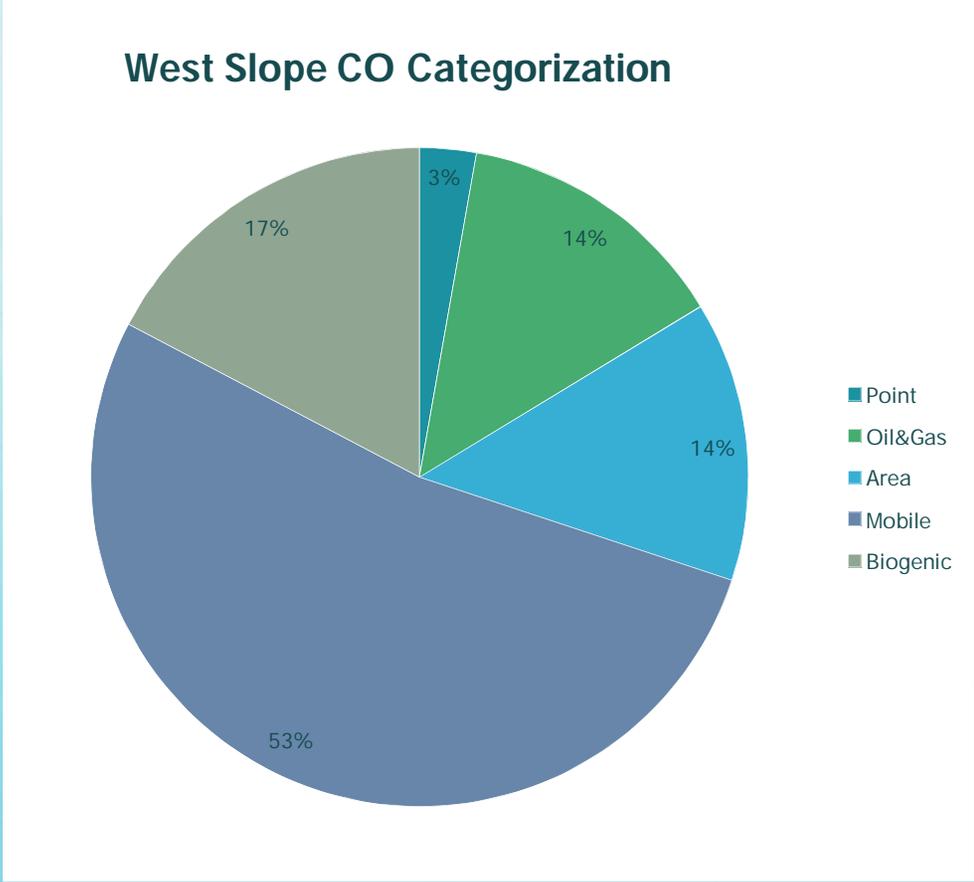
CO – Central Mountains

- County Breakdown
 - **Eagle (~16%)**
 - Fremont & Summit (~10% each)
 - **Routt & Gunnison (~8% each)**
 - Grand (~8% each)
 - **Pitkin (5%)**
- Attributions
 - **ALL: Highway Vehicles & Non-Road**
 - **Eagle: Highway Vehicles 4x > Non-Road**
 - Grand: Forest/Prescribed Fire Significant
 - Fremont: Point Sources Significant



CO- West Slope

- County Breakdown
 - Mesa (~30%)
 - Garfield (~24%)
 - Montrose & Moffat (~10% each)
 - Rio Blanco (~9%)
 - Delta (8%), San Miguel (4%)
- Attributions
 - ALL: Highway Vehicles & Non-Road
 - Mesa: Highway Vehicles ~5x > Non-Road
 - Garfield /Mesa/Rio Blanco - Oil & Gas Significant
 - Garfield/Mesa/Delta/Montrose - Woodburning Significant
 - Montrose: Highway Vehicles ~7x > Non-Road
 - Moffat: Other Point Sources Significant





Thank you!

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