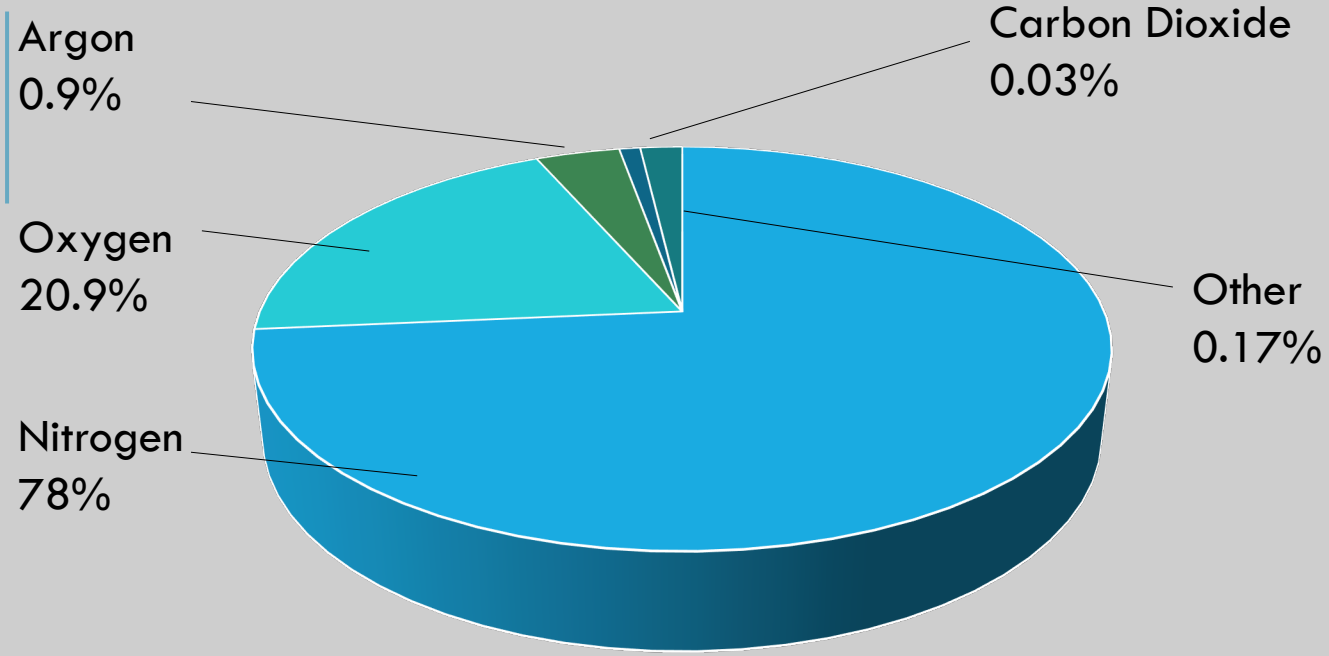
REGIONAL HAZE SIPS

SIP 101 LADCO TRAINING 9/20/2023

Presented by:

USEPA REGION 5

Alisa Liu, Control Strategies Section



THE AIR WE BREATHE

Nitrogen is 78% of what we breathe. Oxygen is 20.9%. Argon gas is 0.9%. 0.03% is Carbon Dioxide.

That leaves less than 0.17% of the atmosphere.

What is in that 0.17%? Mostly trace amounts of other gases like hydrogen and helium and water vapor.

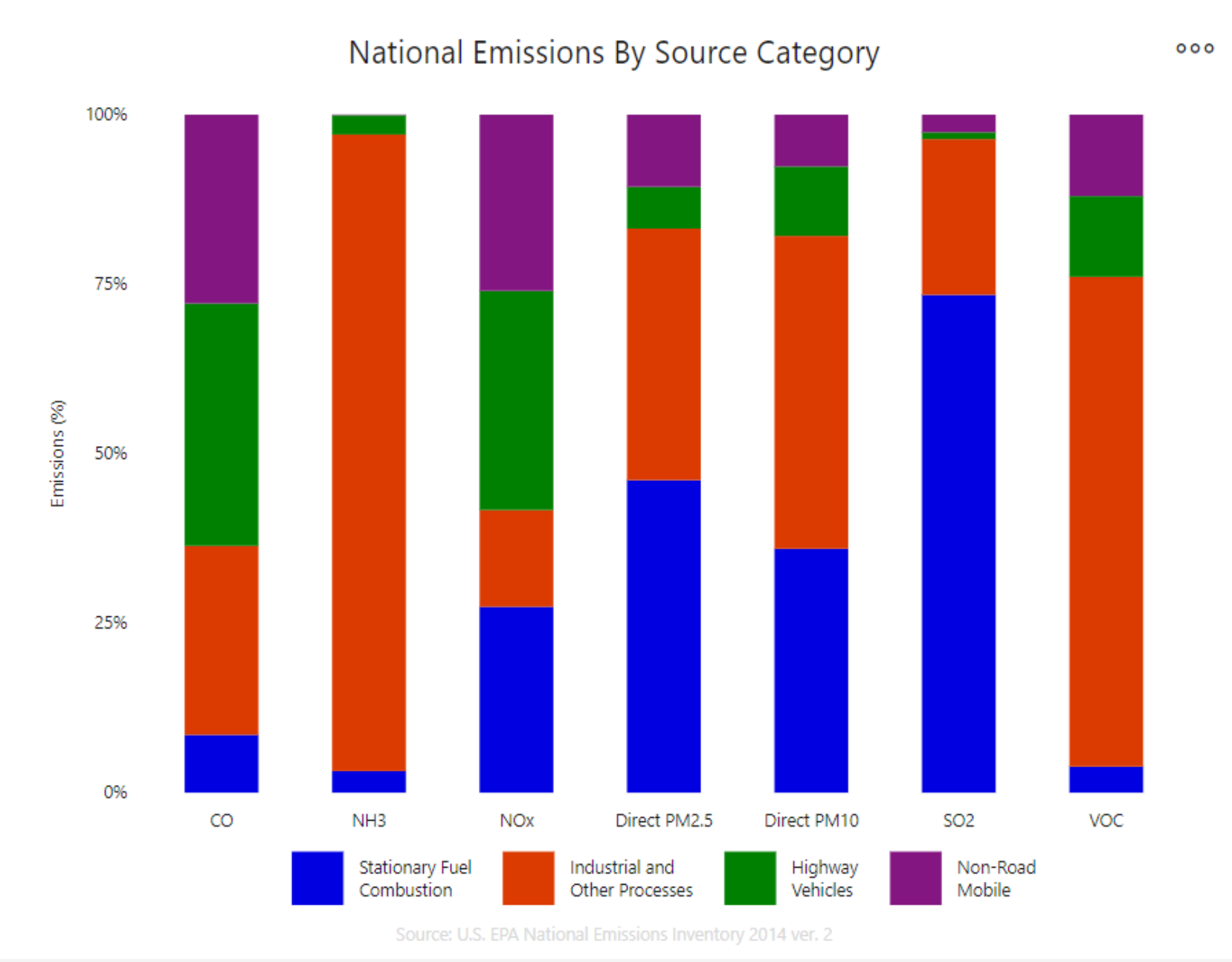
But in the fringe is “other stuff.”

EMISSIONS

When we look more closely at a sliver of that 0.17% slice of the pie, we see what else is in there and where it comes from.

CO, NH3, NOx, PM, SO2, and VOC are among the most common pollutants.

And it where does it come from? It comes from us: our cars, airplanes, industries, electrical generation.



Nitrogen Oxides

Ammonia

VOC

HAZE POLLUTANTS

Regional Haze encompasses a mix of pollutants and natural emissions that contribute to visibility impairment.

NOx, SO2, PM account for 3 of the 6 Criteria Pollutants (CO, O3, Pb, NOx, PM, SO2).

Particulate Matter

- CM (Course Mass, PM10 – PM2.5)
- Crustal (Soil)
- EC (Elemental Carbon)
- OMC (Organic Carbonaceous Material)

Sea Salt

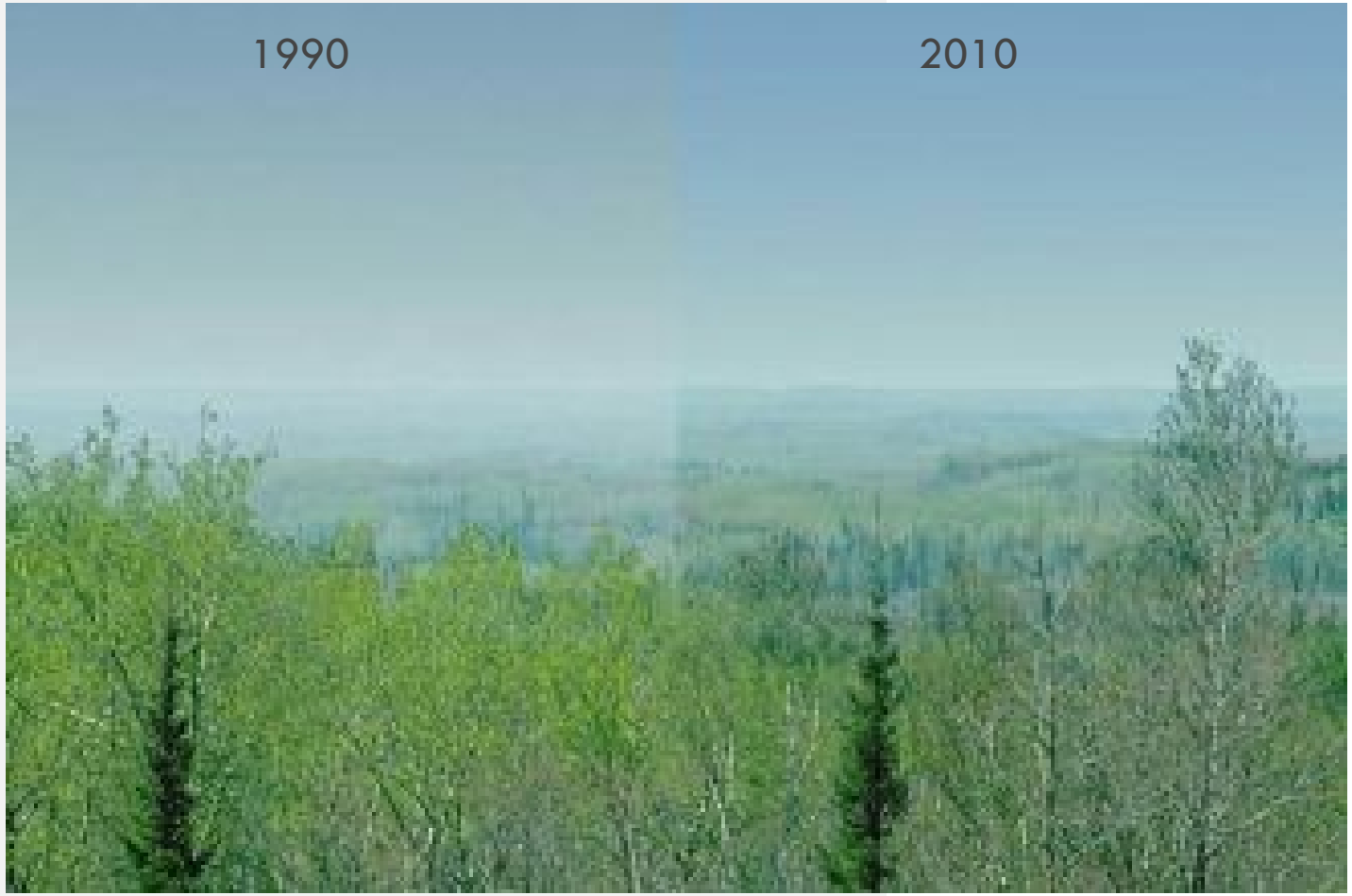
Sulfur Dioxide

WHERE DO THEY COME FROM?

When most people think of air pollution, we think of stationery sources like coal-fired power plants and industries or mobile sources like cars and railroad locomotives.

Nature also contributes to haze-causing air emissions with wildfires, dust storms, and biogenic volatile organic compounds (VOC) such as terpene forest emissions.

WHAT IS HAZE?



Boundary Waters Canoe Area Wilderness, Simulation of 20% Haziest Days

Haze is the reflection of sunlight off pollution particles in the air, especially during humid conditions. Haze is the product of various types of air pollutants reacting together, especially in high humidity: SO2, NOx, VOCs, NH3, PM.

Regional Haze is defined at 40 CFR 51.301 as "visibility impairment that is caused by the emission of air pollution from numerous anthropogenic sources located over a wide geographic area."

HAZE VS. SMOG

WHAT IS SMOG?

When sunlight reacts with NOx and VOCs in the atmosphere, smog develops. NOx can be attributed to sources such as coal-fired power plants and car exhaust, while VOCs can be released from gasoline, paint, and cleaning solvents. Exposed to sunlight, NOx and VOCs form airborne particles and ground level ozone that result in smog. Smog can lead to health related issues in humans and animals as well as plants. As such, there are NAAQS standards for Ozone that address human health (Primary) and the environment (Secondary).

Los Angeles, traveljunction.com

REGIONAL HAZE SIP

Regional Haze is an ***aesthetic*** measure of **visibility**, not a ***human health (Primary)*** or ***environmental (secondary)*** standard.

Since 1988, EPA has been monitoring visibility in national parks and wilderness areas. Then in 1999, EPA promulgated the Regional Haze Rule to improve the aesthetic air quality in these areas. 64 FR 35714, 7/1/2199

Under CAA Section 169A, the national goal is the "prevention of any future, and the remedying of any existing, impairment of visibility in mandatory Class I Federal areas which impairment results from manmade air pollution."

Even if a State meets all of the NAAQS for each of the Criteria Pollutants, the State must have a SIP to also demonstrate that its emissions will not cause haze to form over certain protected scenic areas any more than nature would alone.

TARGET AREAS

The Regional Haze Rule focuses on 156 Mandatory Class I Areas consisting of National Parks (>6,000 acres) and Wilderness Areas (>5,000 acres) given special protection under the 1977 CAA for visibility. These areas are managed by:

- National Park Service
- US Fish & Wildlife Service
- US Forest Service
- Native American Tribes

A 60-day consultation period between the states and Federal Land Mangers is built into the Rule.

REGION 5

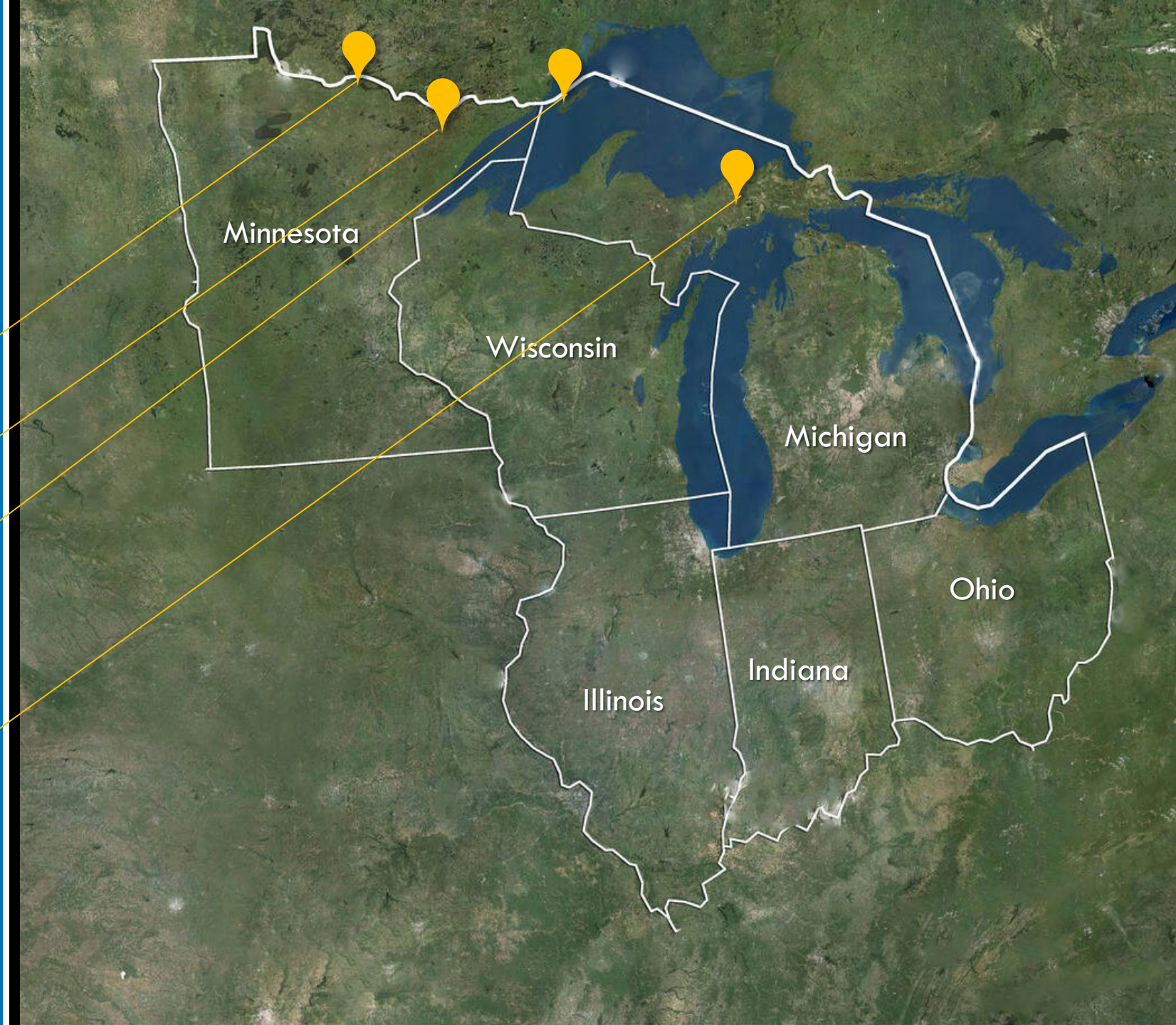
We are home to 4 Federal Mandatory Class I Areas located in northern Minnesota and Michigan.

Voyageurs National Park

Boundary Waters Canoe Area

Isle Royale National Park

Seney Wilderness Area

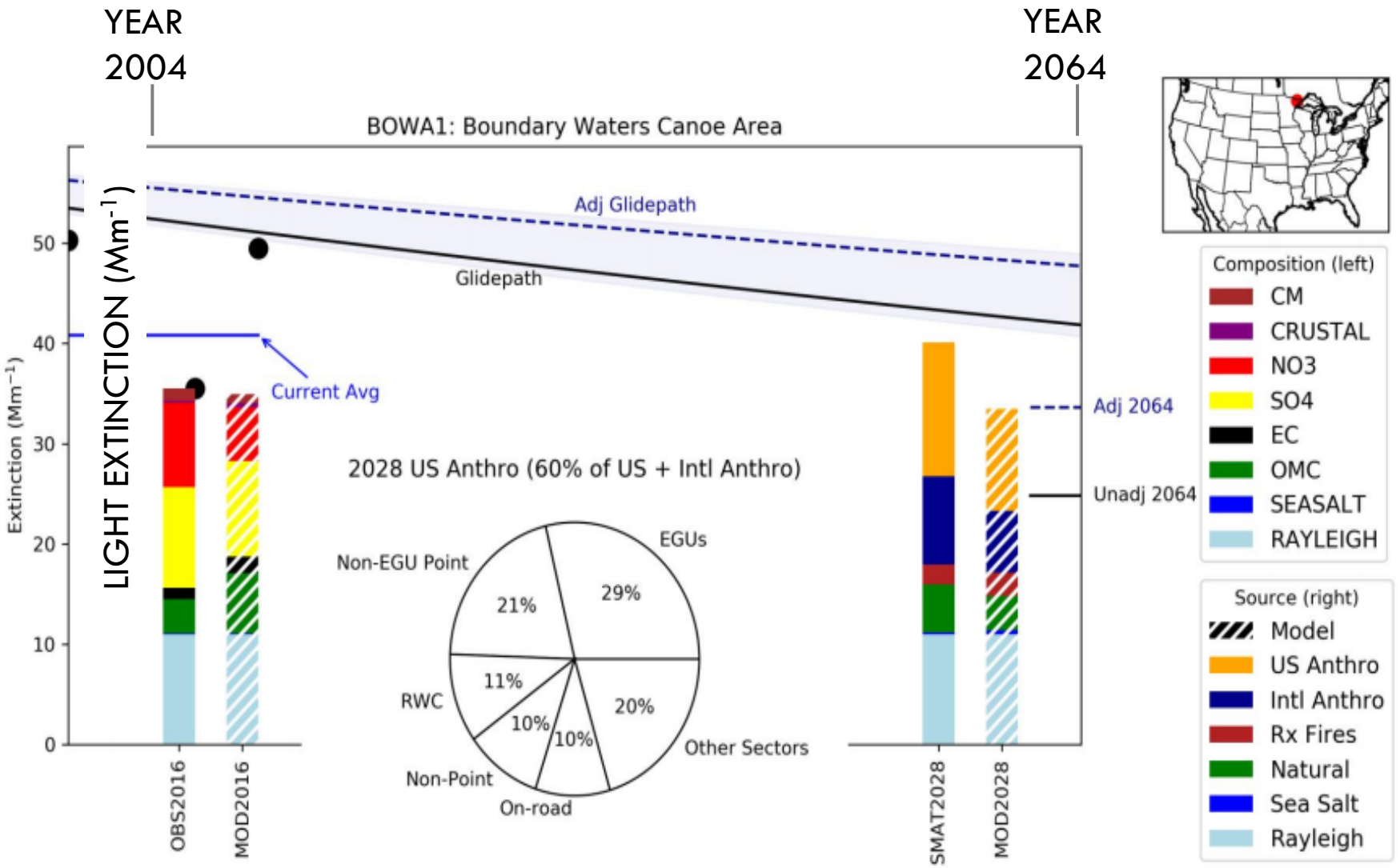


CLASS I AREAS IN REGION 5

GLIDEPATH

"Glidepaths" for each Class I area show needed progress in emission reductions from a base year (2004) to 2064 where the goal is natural visibility conditions.

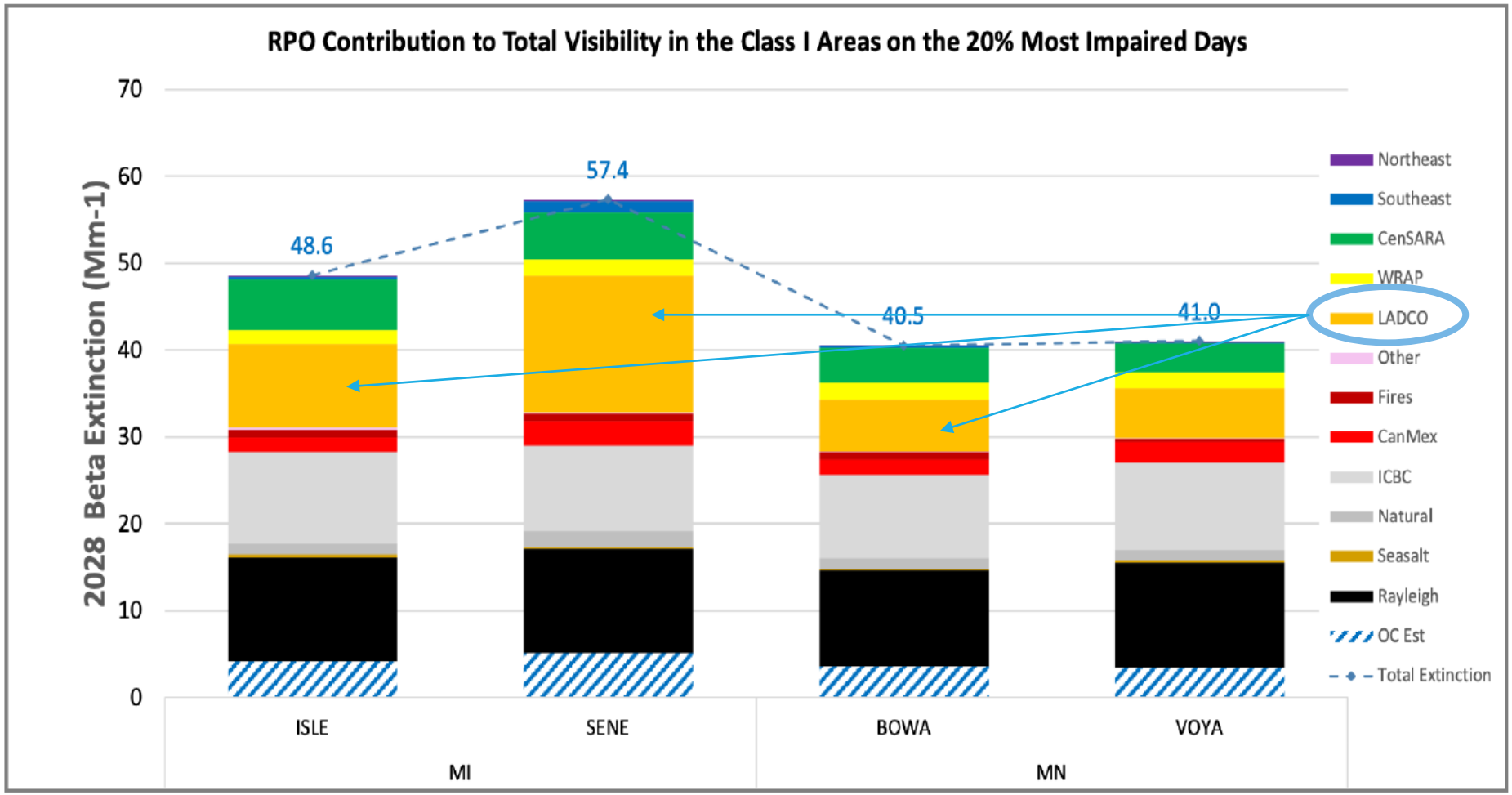
Haze-causing emissions come from a variety of sources. At each Class I area, the composition and the amount of progress to be made toward natural visibility is site specific.



CONTRIBUTORS TO HAZE IN CLASS I AREAS

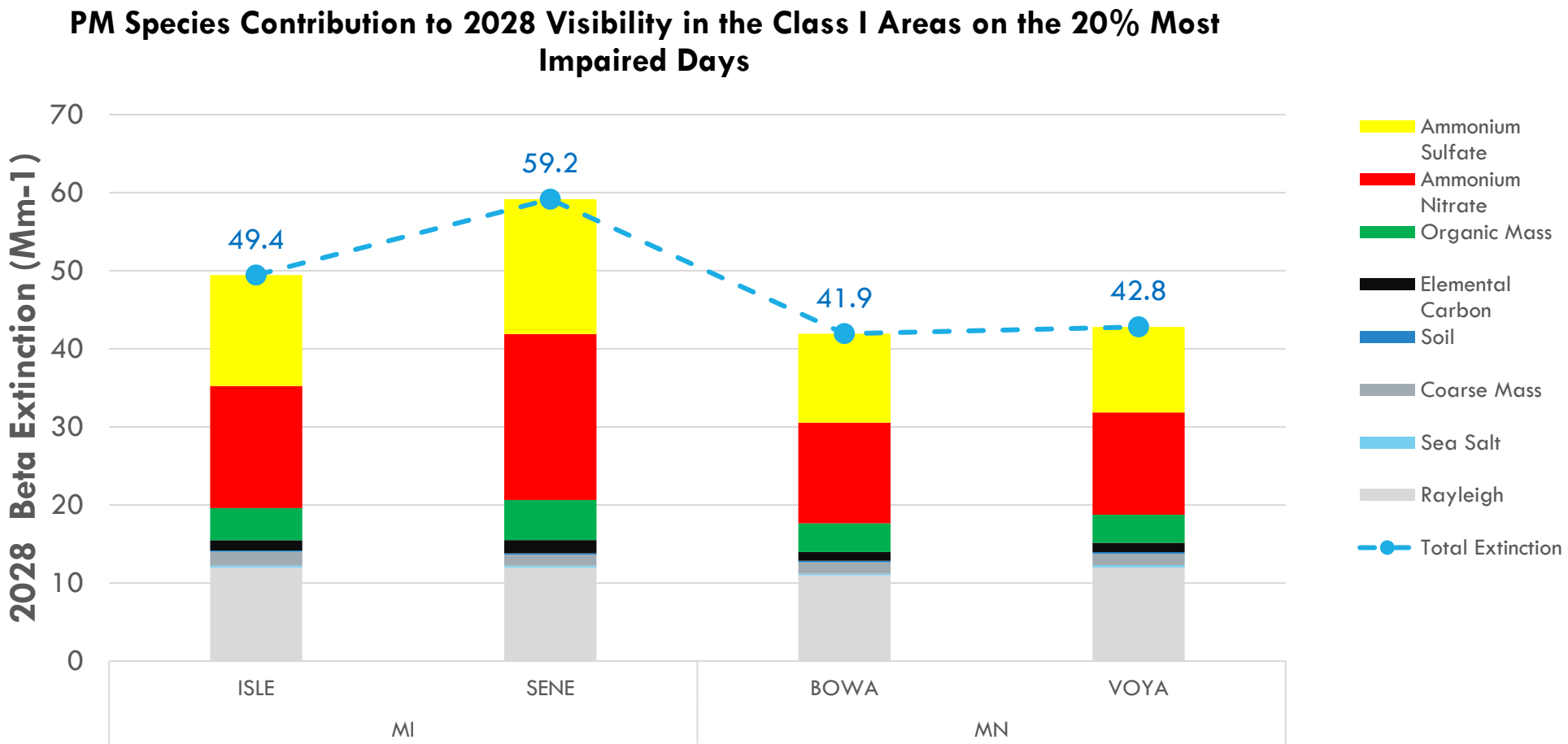
A State's Regional Haze SIP addresses multiple pollutants that may be causing Regional Haze at home and in other states.

For the Class I areas in Region 5, here is a glimpse at projected contributions from Regional Planning Organizations (RPO) as well as Canada & Mexico.



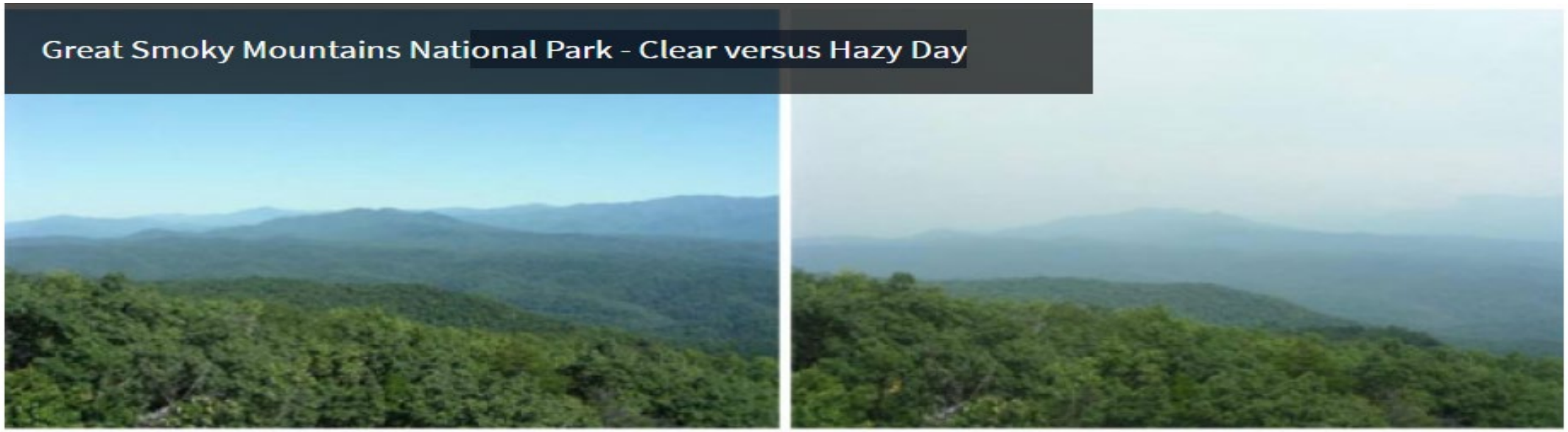
UNDERSTANDING SPECIES COMPOSITION

Through LADCO's modeling efforts, we are able to better understand the composition of the contributors to Regional Haze and identify the sources where emission reductions would result in improvements to visibility.



WHAT IS THE "NATURE" COMPONENT?

Nature accounts for some of the visibility impairment at Class I Areas from wildfires, dust storms, and natural VOCs. Nature made the Great Smoky Mountains "smoky" because of the terpene emissions from the forest, however, manmade pollution turns "Smoky" into "Hazy". Terpene is a family of pleasant smelling biogenic VOCs. The Glide Path target is to reach those natural visibility conditions without the manmade component.

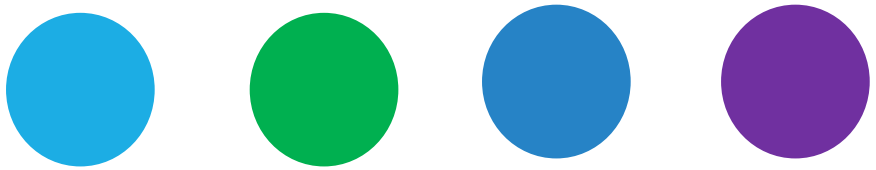


TOOLS

- 2017 Regional Haze Rule
  82 FR 3078, 1/10/2017
- 2019 Regional Haze Guidance
  https://www.epa.gov/sites/default/files/2019-08/documents/8-20-2019_-_regional_haze_guidance_final_guidance.pdf
- 2019 Technical Support Document for 2028 Modeling
  https://www.epa.gov/sites/default/files/2019-10/documents/updated_2028_regional_haze_modeling-tsd-2019_0.pdf
- 2021 Clarifications Memo
  https://www.epa.gov/system/files/documents/2021-07/clarifications-regarding-regional-haze-state-implementation-plans-for-the-second-implementation-period.pdf
- EPA's Air Pollution Control Cost Manual
  https://www.epa.gov/sites/default/files/2020-07/documents/c_allchs.pdf

REGIONAL HAZE SIP

THE FAMOUS FOUR



All 50 states, DC, and the US Virgin Islands must begin the SIP development process by selecting sources for evaluation of emissions reductions that could aid in incrementally making "reasonable progress" toward visibility goals. Sources can be identified by, for example, photochemical modeling or comparing emissions and distance to the nearest Class I Area.

The SIP must look at a variety of sources for opportunities to control emissions in an effective and economically reasonable way. There are no bright lines in the Rule for what is reasonable for states to include in their long-term strategies for making reasonable progress.

"Reasonable progress" is defined by the state's process of looking at sources through the lens of a four-factor analysis to determine if new or upgraded controls are warranted to make "reasonable progress" toward the 2028 Visibility Goals:

1. Cost of new controls
2. Time to install controls
3. Non-air quality impacts, and
4. Remaining useful life of the source

2028

2038

2048

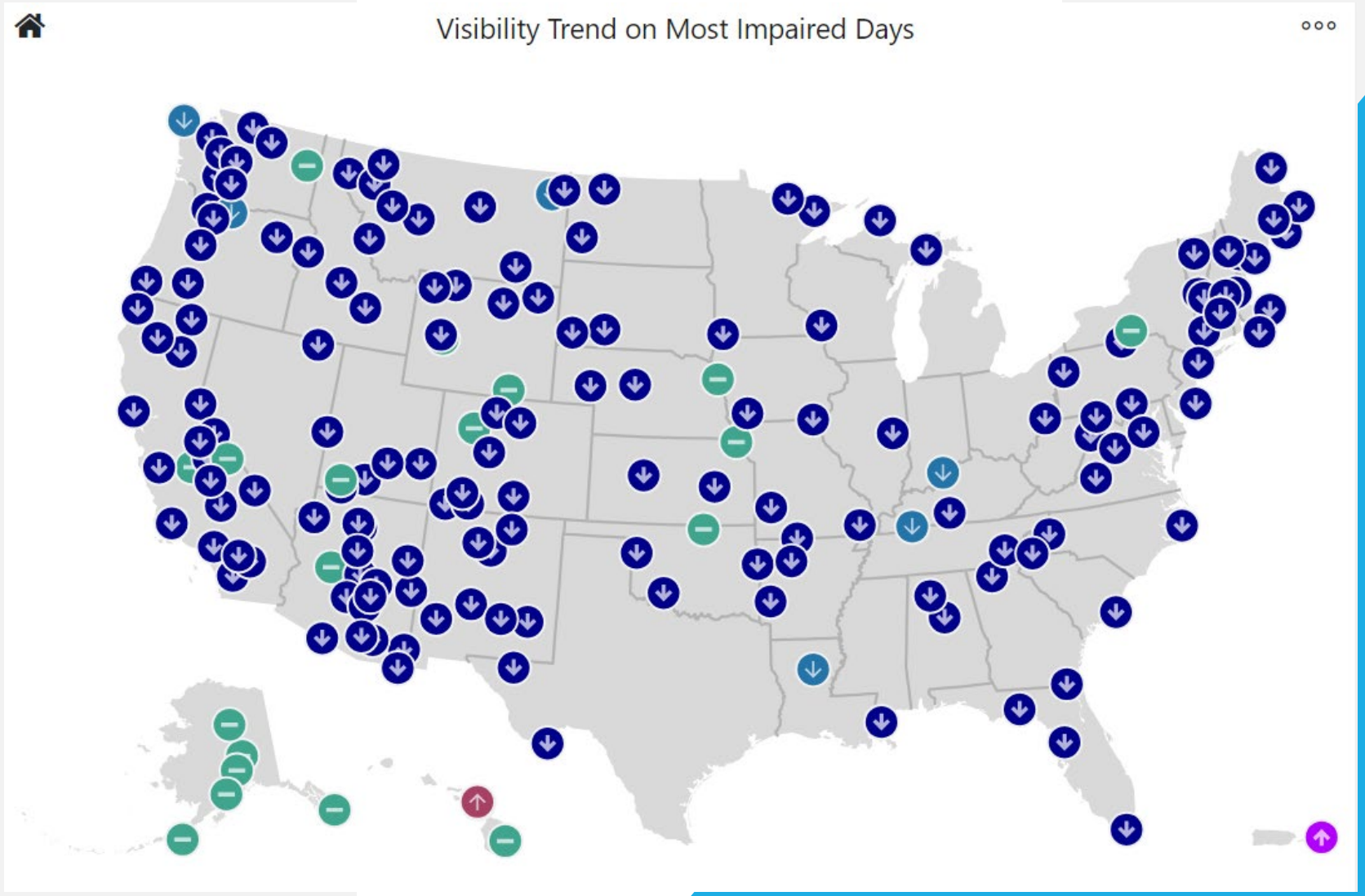
2058

SIP REVISIONS

States need to submit revisions to their Regional Haze SIPs on a 10-year schedule, each incrementally making “reasonable progress” toward the goal of natural visibility conditions.

HOW ARE WE DOING?

For 2000 – 2018, the map indicates most Class I areas have improving visibility or decreasing haze (indicated by the downward pointing arrows).



https://gispub.epa.gov/air/trendsreport/2021/#home

THANK YOU !

REGION 5 REGIONAL HAZE TEAM

Alisa Liu
Charles Hatten
Matt Rau
Pamela Blakley

Air & Radiation Division, Air Programs Branch, Control Strategies Section