



The Role for NASA-funded Research in the Rapid Electrification of Mobile Sources

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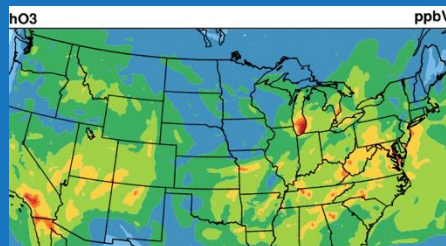
October 19, 2023

LADCO Background

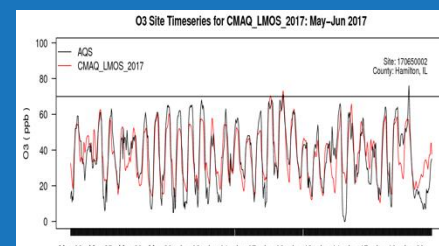
LADCO staff conduct air quality modeling and monitoring data analyses that our member states use for air quality management planning



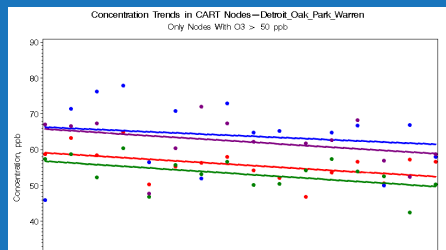
GIS & Mapping



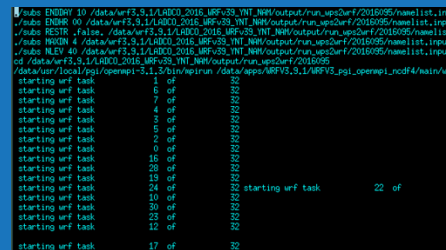
Modeling



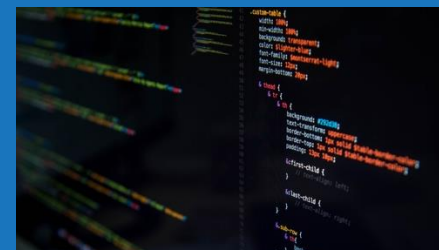
Model Evaluation



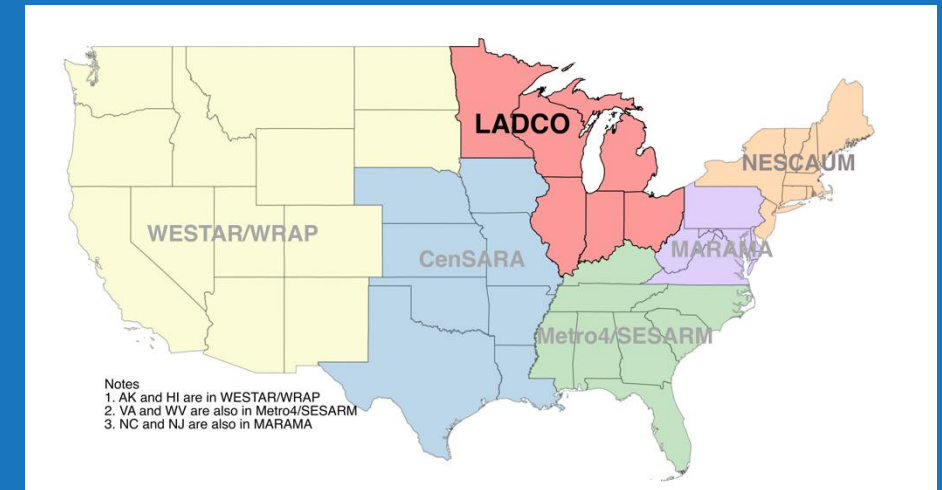
Statistical Analysis



Cloud Computing



Technology Transfer



Formed in 1989

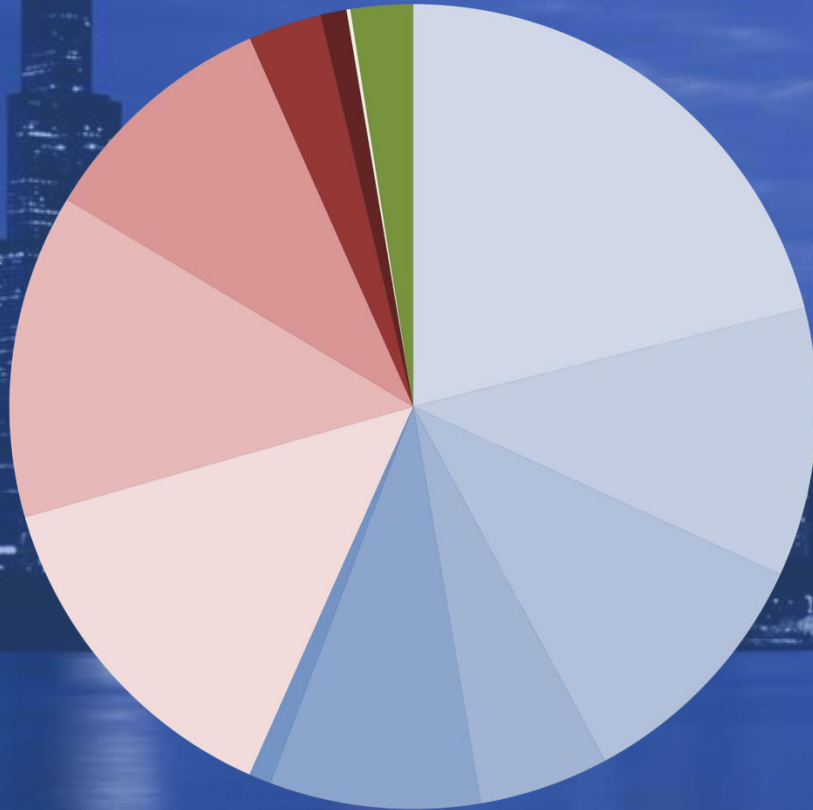
Federally-funded by US EPA

Members: IL, MN, IN, OH, MI, WI

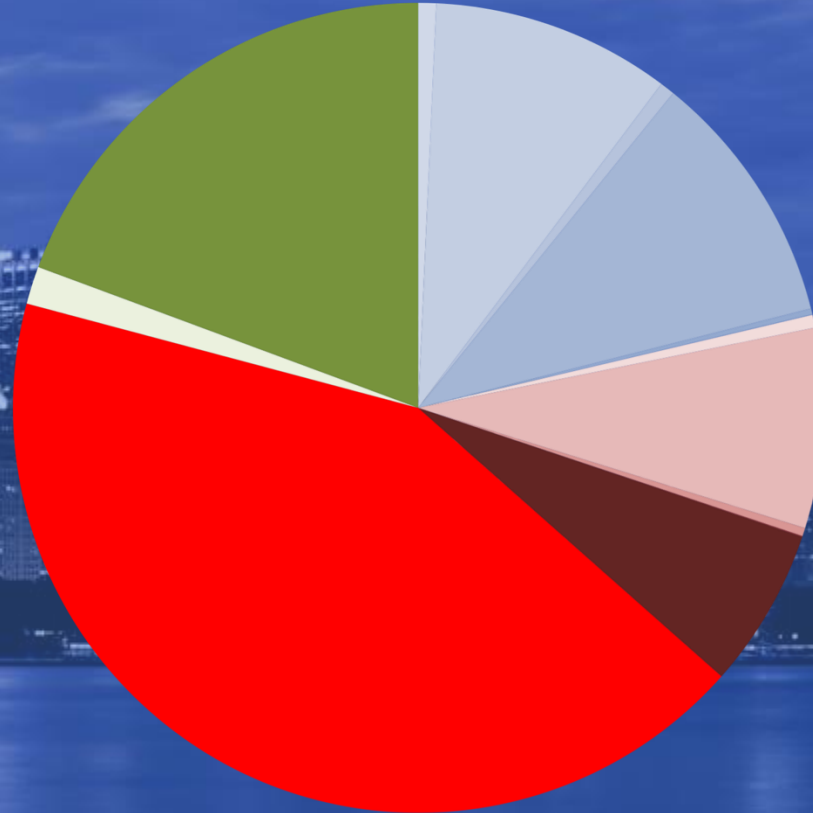
Governance: State air agency directors

Chicago, IL Emissions (US EPA, 2020)

NOx



VOCs

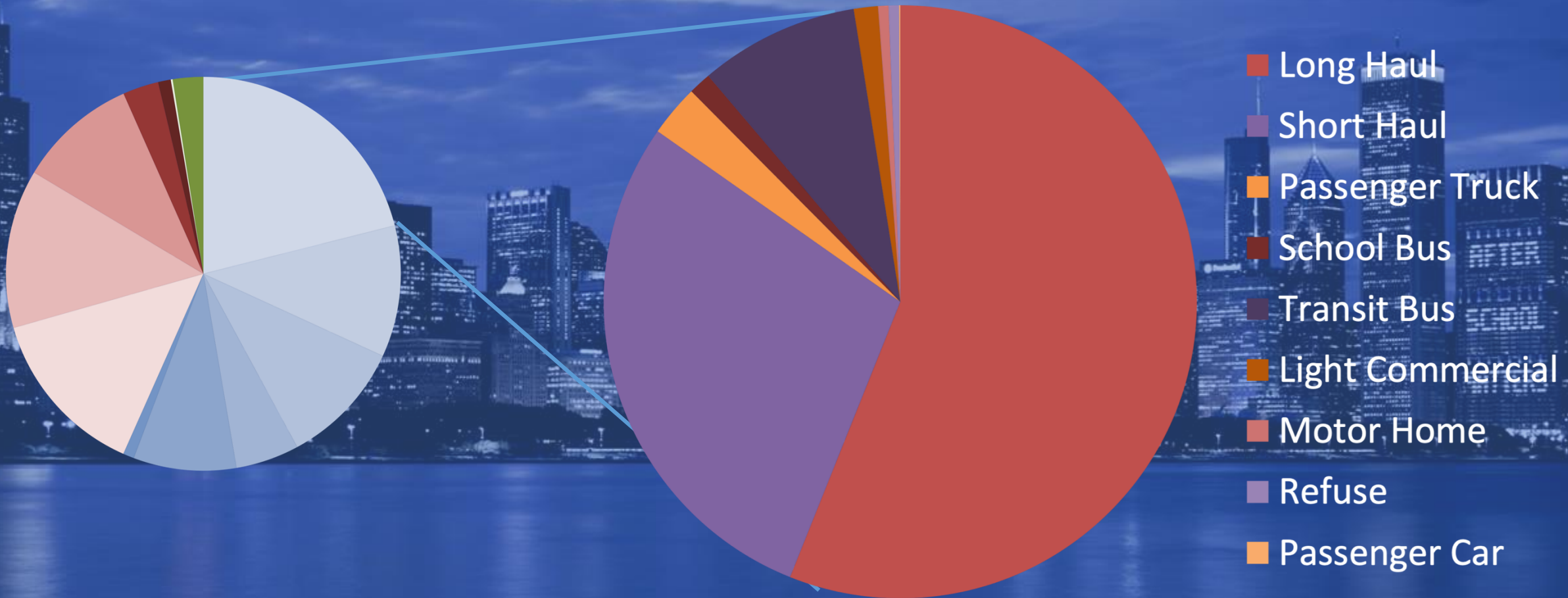


- Onroad - Diesel
- Onroad - non-Diesel
- Nonroad - Diesel
- Nonroad - non-Diesel
- Rail
- Marine
- Residential Natural Gas
- Industrial Point
- ICI Boilers
- Electricity Generation
- Nonpoint
- Solvents
- Fire
- Natural

Mobile sources account for 57% of NOx and 21% of VOC annual total NEI 2020 emissions

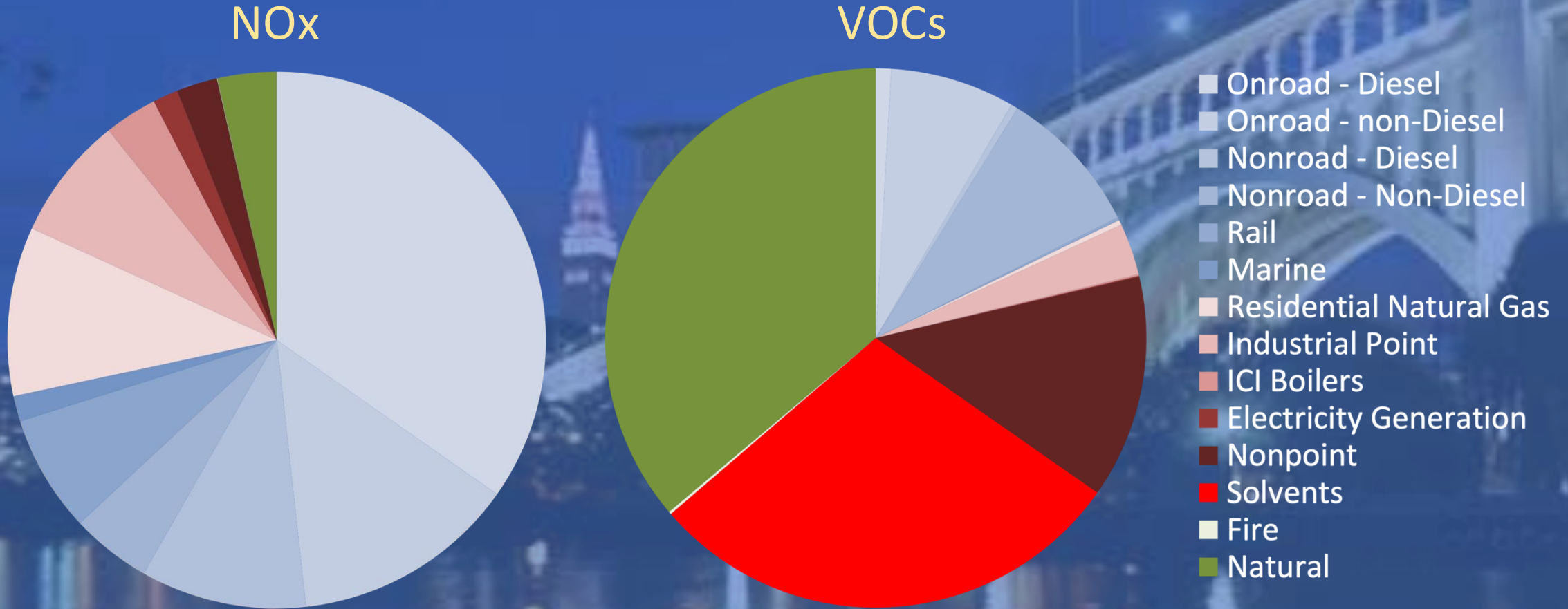
Chicago, IL Emissions (US EPA, 2020)

Onroad Diesel NOx



Long-haul HDDV ~ 56% of the diesel NOx (13% of total NOx)
in Chicago

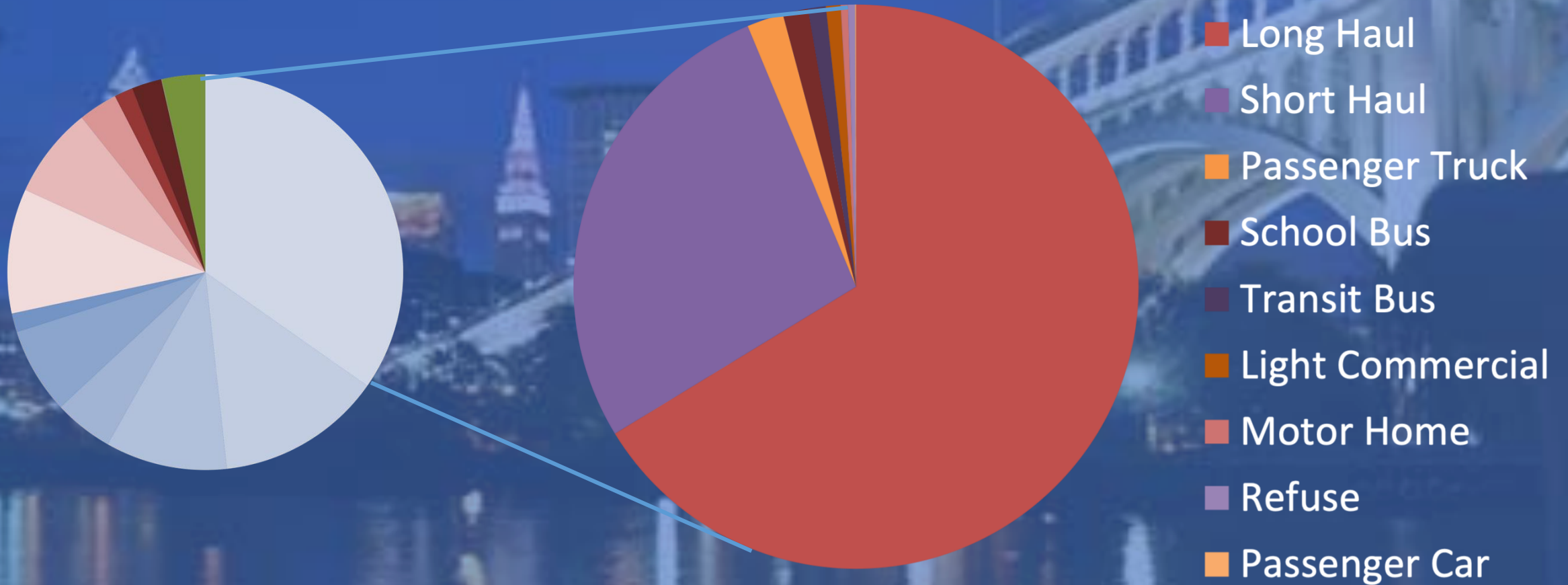
Cleveland, OH Emissions (US EPA, 2020)



Mobile sources account for 72% of NOx and 18% of VOC annual total NEI 2020 emissions

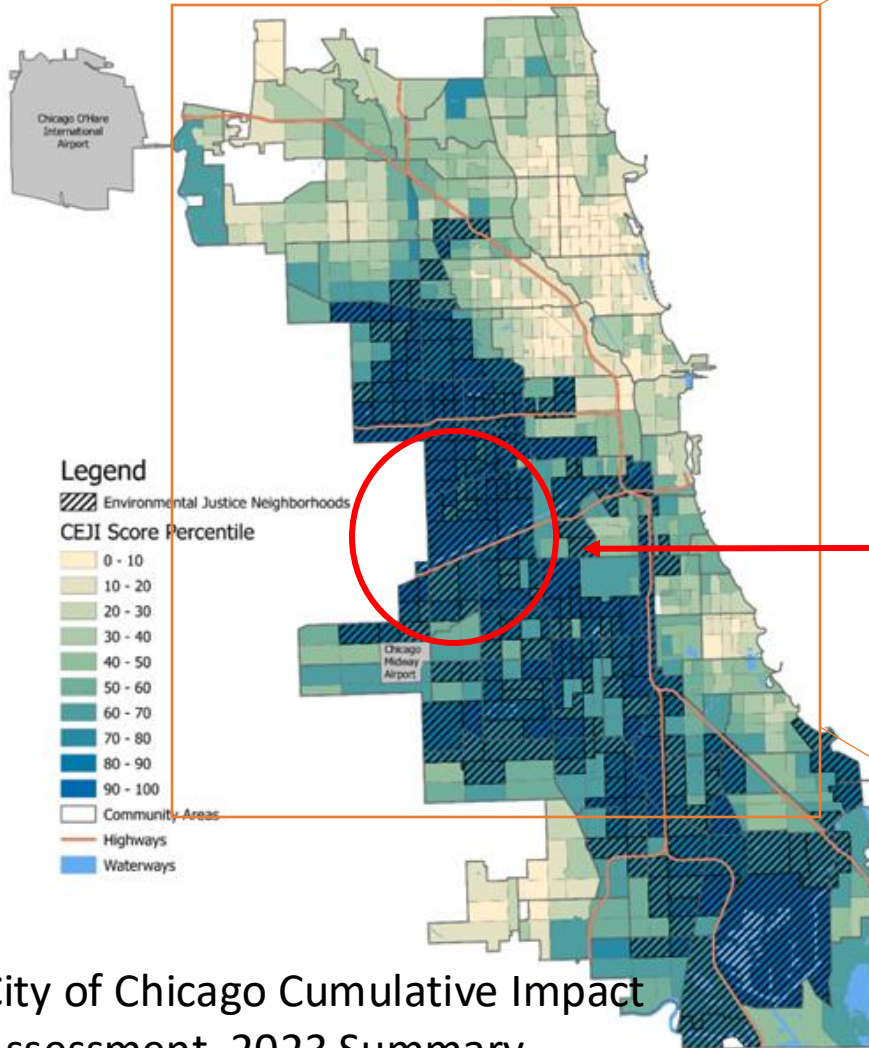
Cleveland, OH Emissions (US EPA, 2020)

Onroad Heavy Duty Diesel NOx

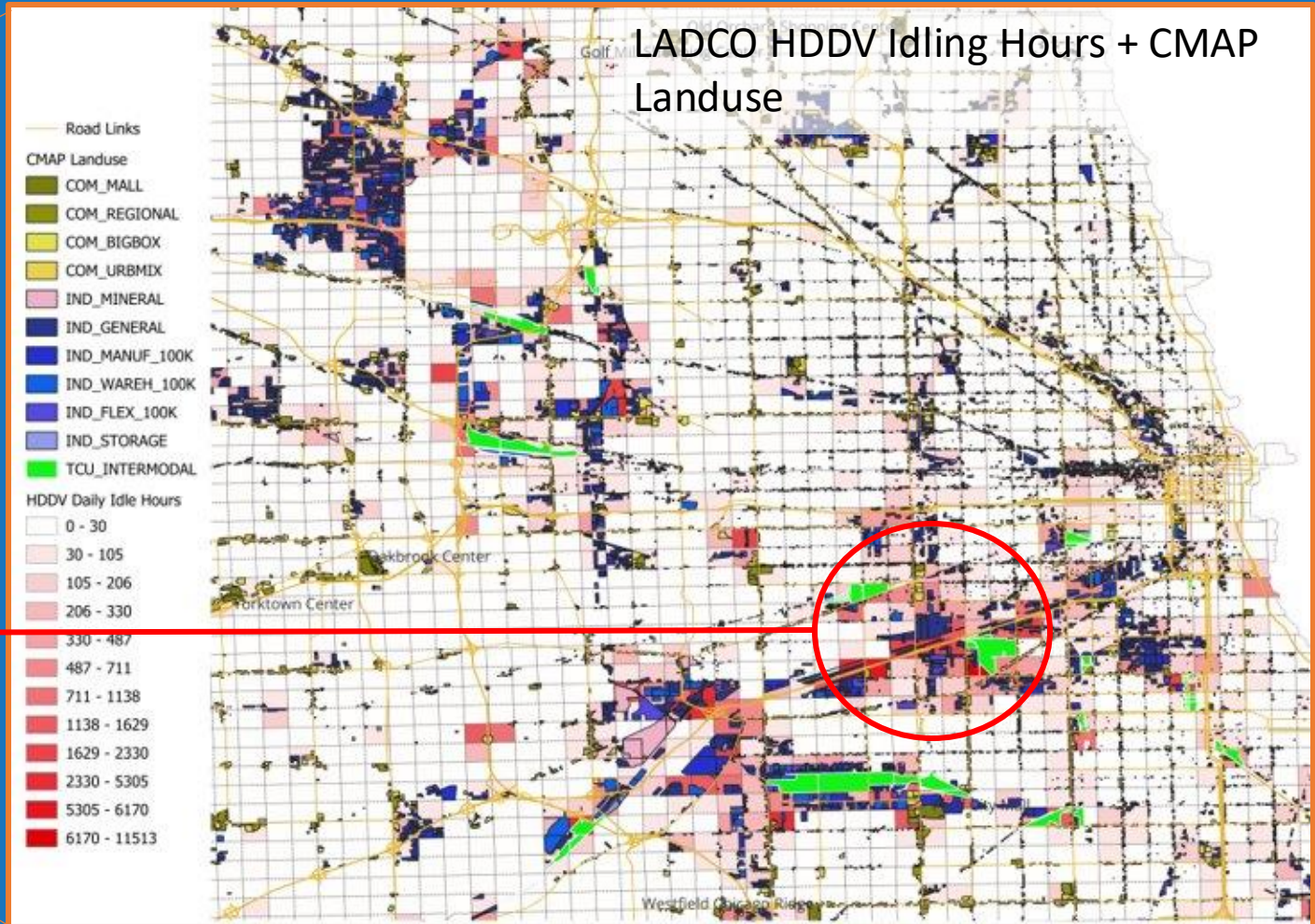


Long-haul HDDV ~ 65% of the diesel NOx (23% of total NOx) in Cleveland.

Figure 10. Chicago EJ Index Map



City of Chicago Cumulative Impact Assessment, 2023 Summary



Medium/Heavy Diesel Vehicle (MHDV) idling hot spots in Chicago occur in overburdened EJ communities

The Current Moment

- Mobile emissions impact the trifecta of current targets for environmental improvement:
 - Air pollution
 - Climate
 - Equity
- Multiple federal programs offer access to unprecedented capital for state and local agencies to pursue climate (and air quality) goals
 - Challenge: timing and priorities



LADCO and our members are working to identify “shovel-ready” mobile source projects.

Project priorities:

1. Impact: environmental, health, equity, regulatory
2. Practical: within the jurisdiction of state or local regulators
3. Timing: next 2-3 years
4. Alignment with IRA funding

Where Can NASA (and you) Help

- Synthesize recent projects that characterized the climate, air pollution, and health co-benefits of different emissions sources
- We have to consider reordering the planning process
 - Start with identifying what policies can be implemented given the resources, timing, and jurisdiction
- Develop and apply machine learning tools to more rapidly assimilate the growing number of data catalogs into research and decision making → start with the mobile source electrification optimization problem

