

Atlanta Roadside Emissions Exposure Study (AREES)

Linking Transportation Emissions and Planning Decisions

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Overview

- Air Quality & Public Health
- Atlanta's Air Quality
- Near Road Emissions – A Disconnect in Regional Planning
- AREES Tool

Air Quality & Public Health



Atlanta Does Not Meet Air Quality Standards...



...many regions face air quality challenges

Cairo



Santiago



Beijing



Los Angeles



Clean Air Act

- First enacted by Congress and President Nixon in 1970
 - Triggered by episodes like the Donora Smog of 1948 and the London, England Smog of 1952
 - Preceded by several similar bills since 1963
 - Established national air quality standards for key pollutants



National Ambient Air Quality Standards

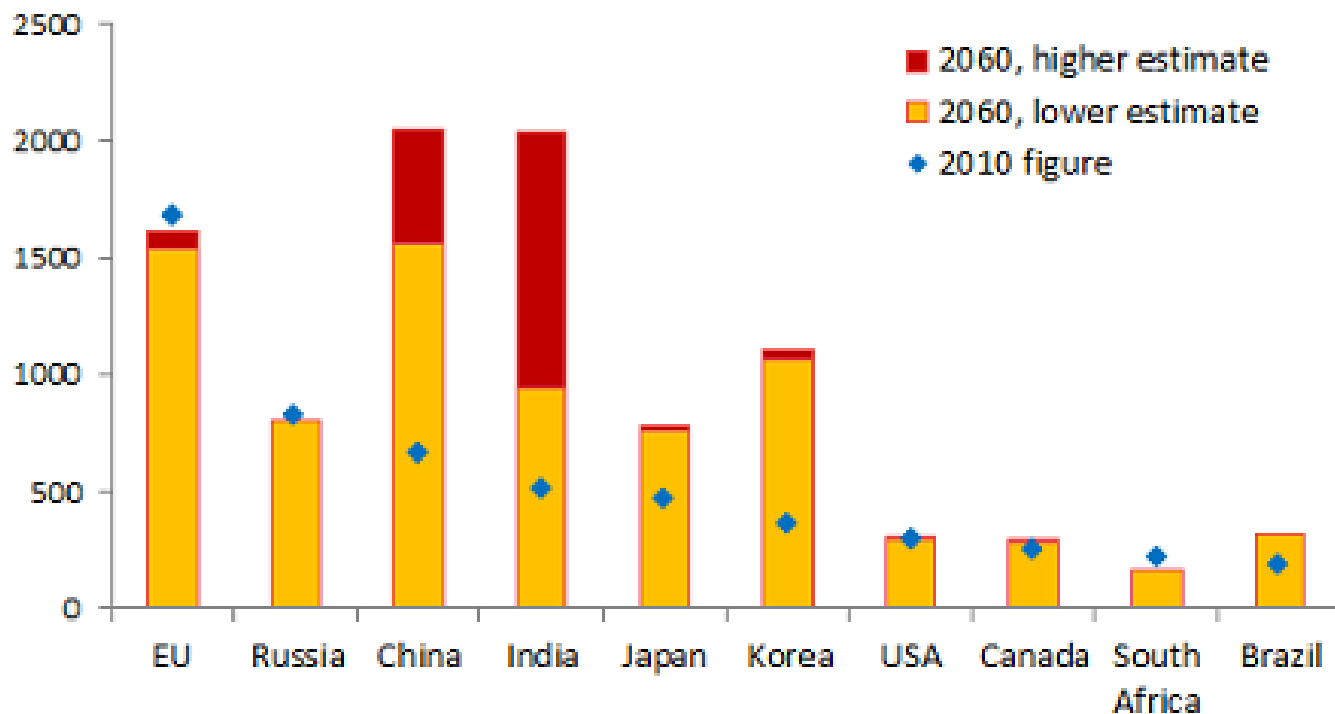
- Carbon Monoxide (CO)
- Lead (Pb)
- Nitrogen Dioxide (NO₂)
- Ozone (O₃)
- Particle Pollution (PM₁₀ & PM_{2.5})
- Sulfur Dioxide (SO₂)

Public Health Impacts

- Can trigger/worsen asthma in adults and children
- Can impact long-term development of children's lungs
- Worsens or causes a variety of cardiovascular diseases (bronchitis, cardiac arrhythmia, respiratory symptoms)
- Can trigger heart attacks and strokes in sensitive adults

Poor Air Quality's Global Reach

Premature deaths from exposure to particulate matter and ozone Projected number of deaths caused by outdoor air pollution per year per million people



Source: OECD (2016), The Economic Consequences of Air Pollution

Air Quality & Public Health

Atlanta's Air Quality



Atlanta Nonattainment Areas

local relevance



regional impact

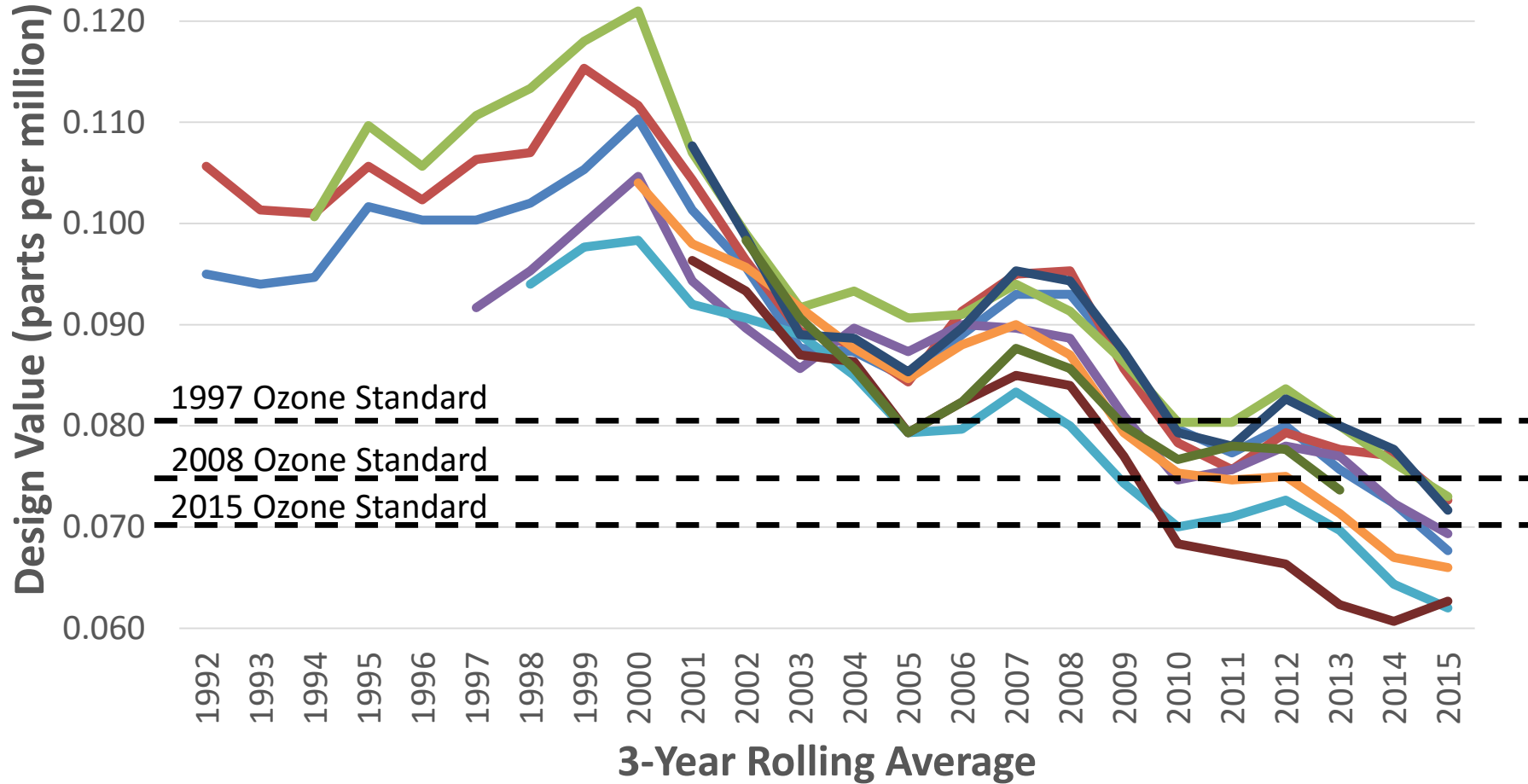
Atlanta Nonattainment Areas

local relevance



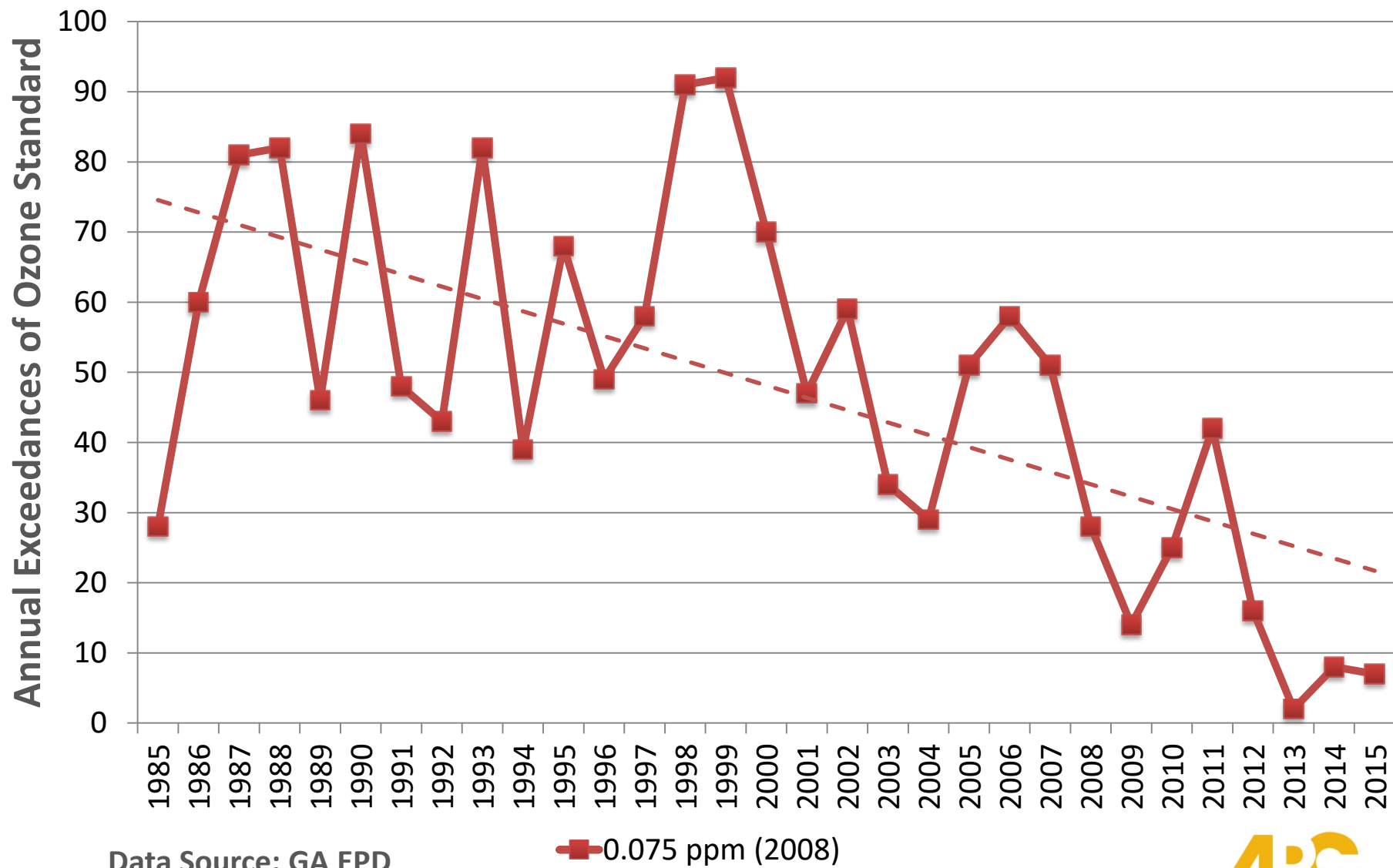
regional impact

8-Hour Ozone Design Value by Monitor

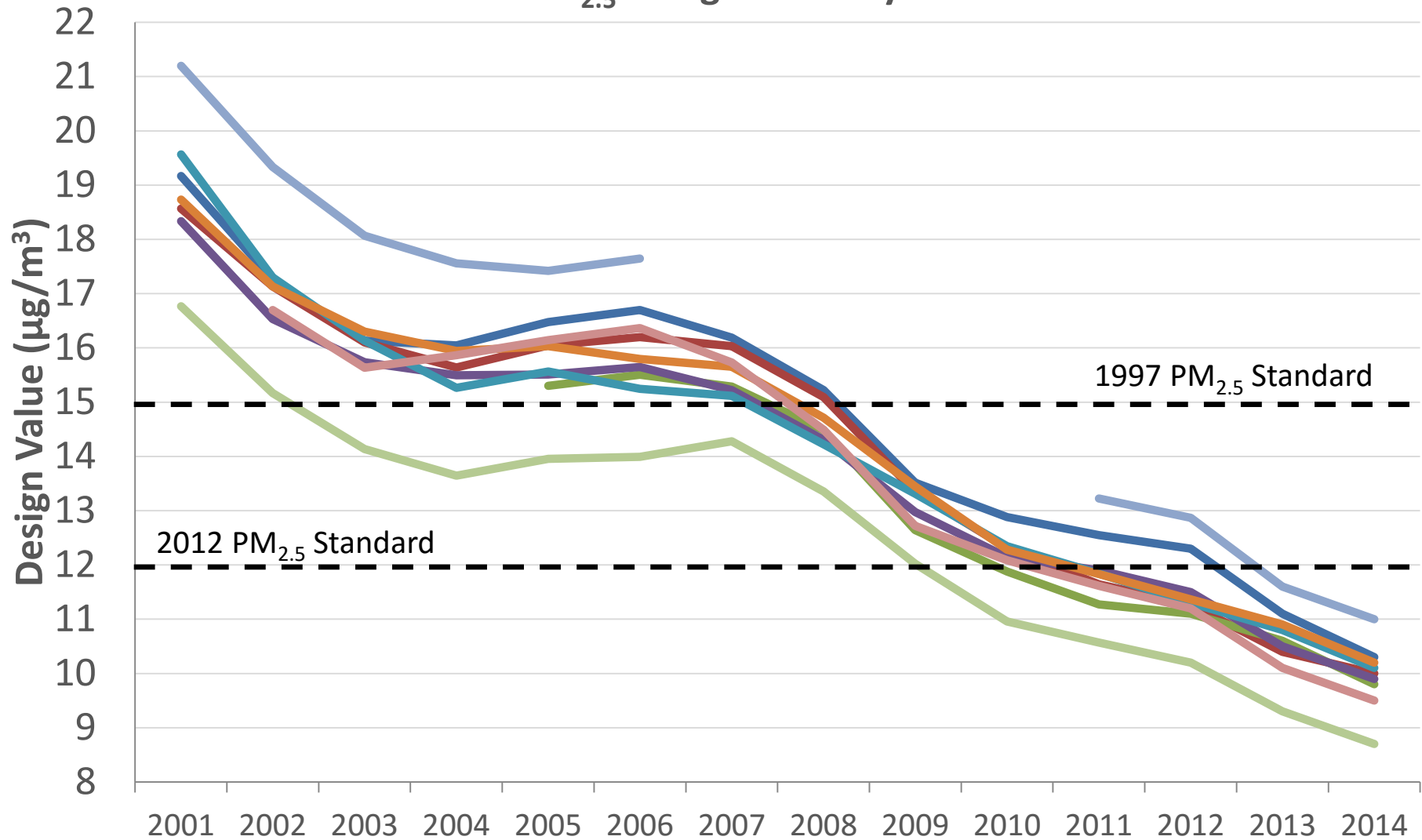


• Data Source: GA EPD

Annual Exceedances of the 2008 Federal Ozone Standard in Metropolitan Atlanta



Annual PM_{2.5} Design Value by Monitor



3-Year Rolling Average

Data Source: GA EPD

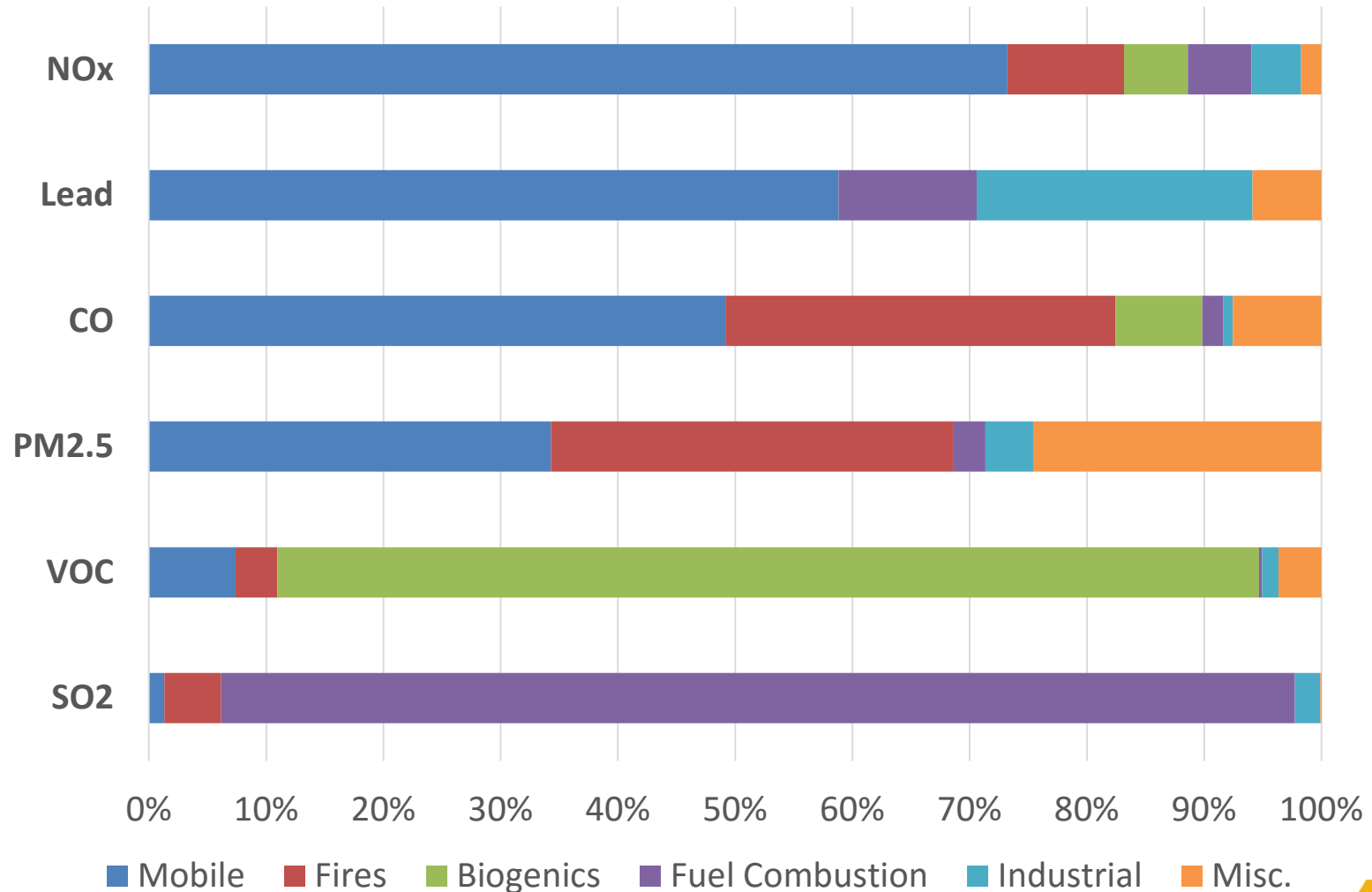
- Forest Park
- South DeKalb
- ATL First Station #8
- Kennesaw
- Doraville
- Gwinnett
- Powder Springs
- ATL E. Rivers School
- Yorkville

Near Roadway Emissions - A Disconnect in Regional Planning



Transportation's Share of Emissions

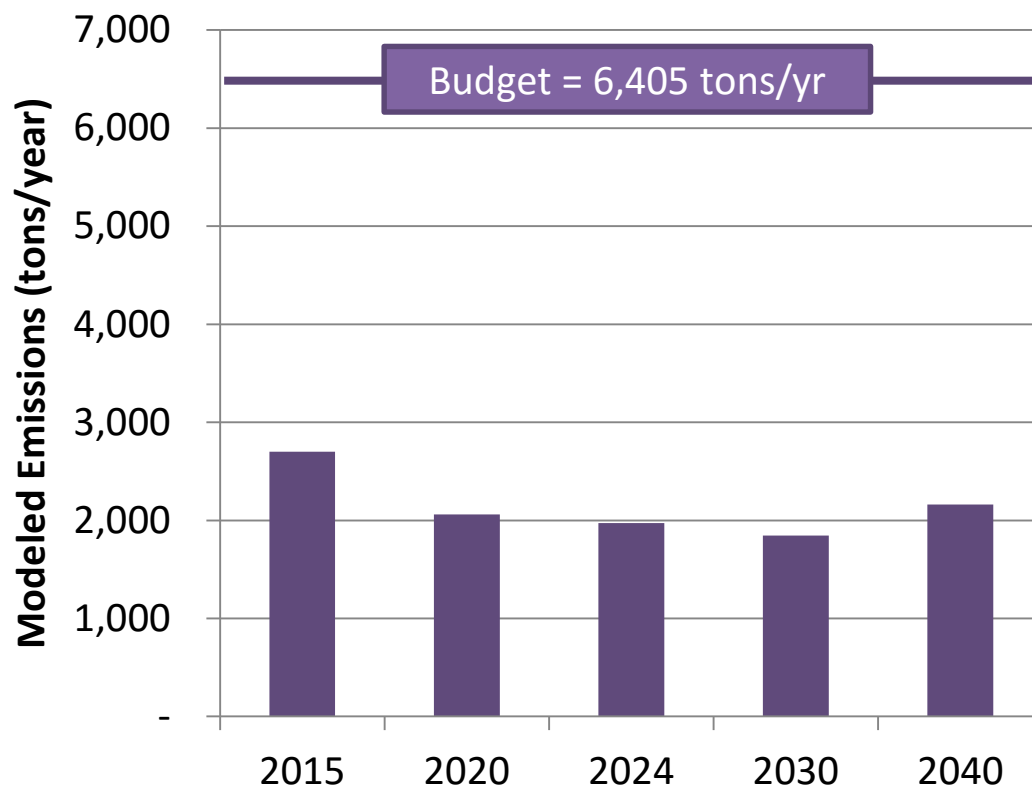
Georgia Air Pollution Emission Sources in 2011



Data Source: US EPA, 2011 National Emissions Inventory

Transportation Conformity - Regional

- Regionally-focused
- Accumulated emissions for the entire planning area
- Impossible to break down to a neighborhood-level



Regional-Local Disconnect



AREES - A New Tool for Near-Road Air Quality Analysis



AREES Goals

- Establish a method to assess local scale impacts of the transportation system on air quality
- Identify “hot spots” of locally elevated air pollution levels
- Provide a guide for ARC and local communities to inform transportation project selection and sensitive land-use siting based on concern for public health



AREES Methodology

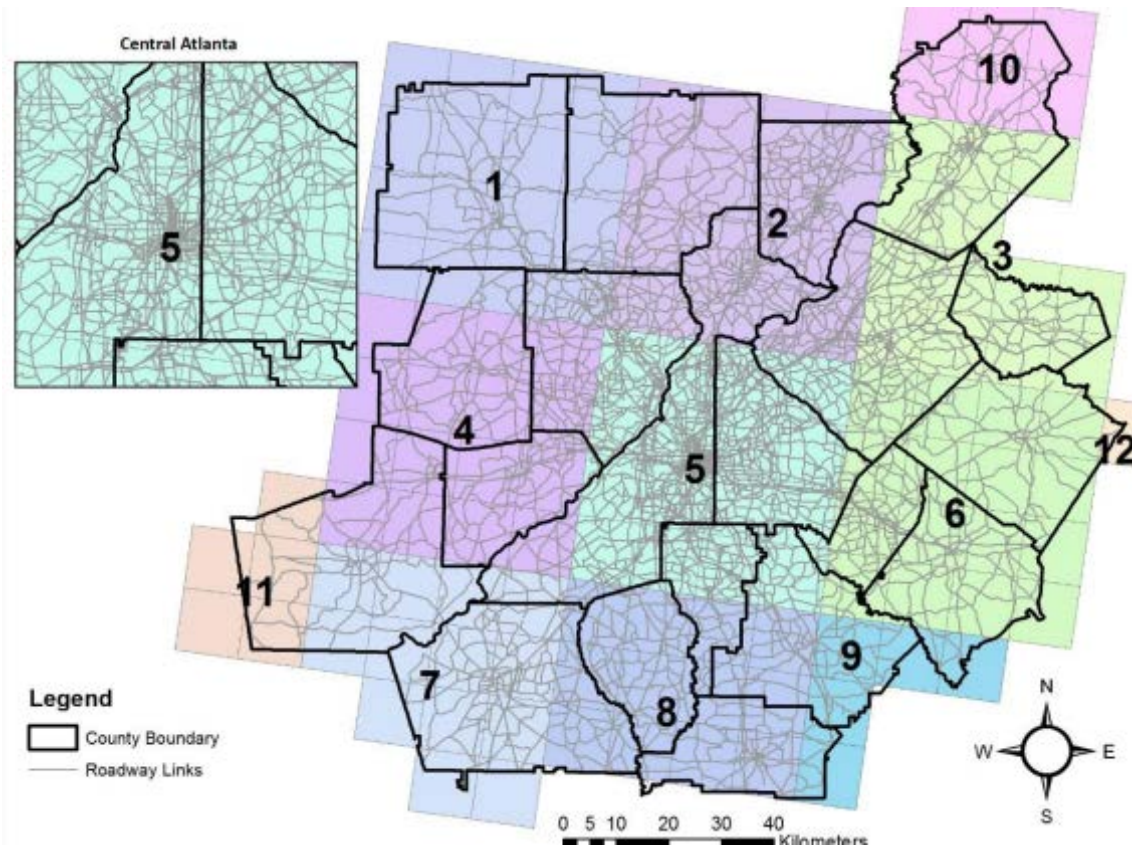
ARC's Travel Demand Model



MOVES – Environmental Protection Agency emissions model



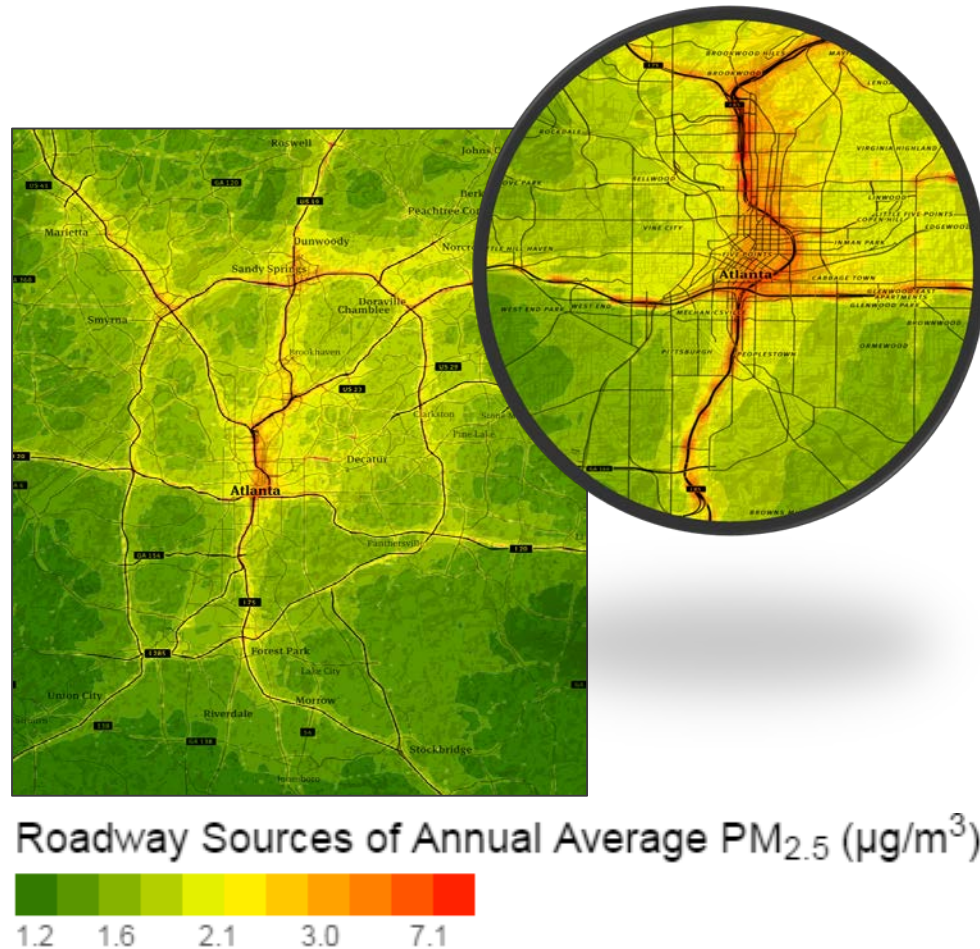
R-LINE dispersion model



The model's total run time is 231 hours (9.6 days)

AREES Findings

- Regionally, the highest concentrations are found around the Downtown Connector, Perimeter Center, I-85N & I-75N
- Downtown and Midtown are bearing a large portion of the transportation pollution burden
- Pollution generally blows east of the interstates



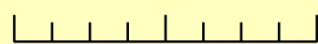
2010 Widen I-75 N Change in Annual Average PM_{2.5} Concentration

PM_{2.5} (µg/m³)

High : 1.44966

Low : -0.348553

0 2.5 5 Miles

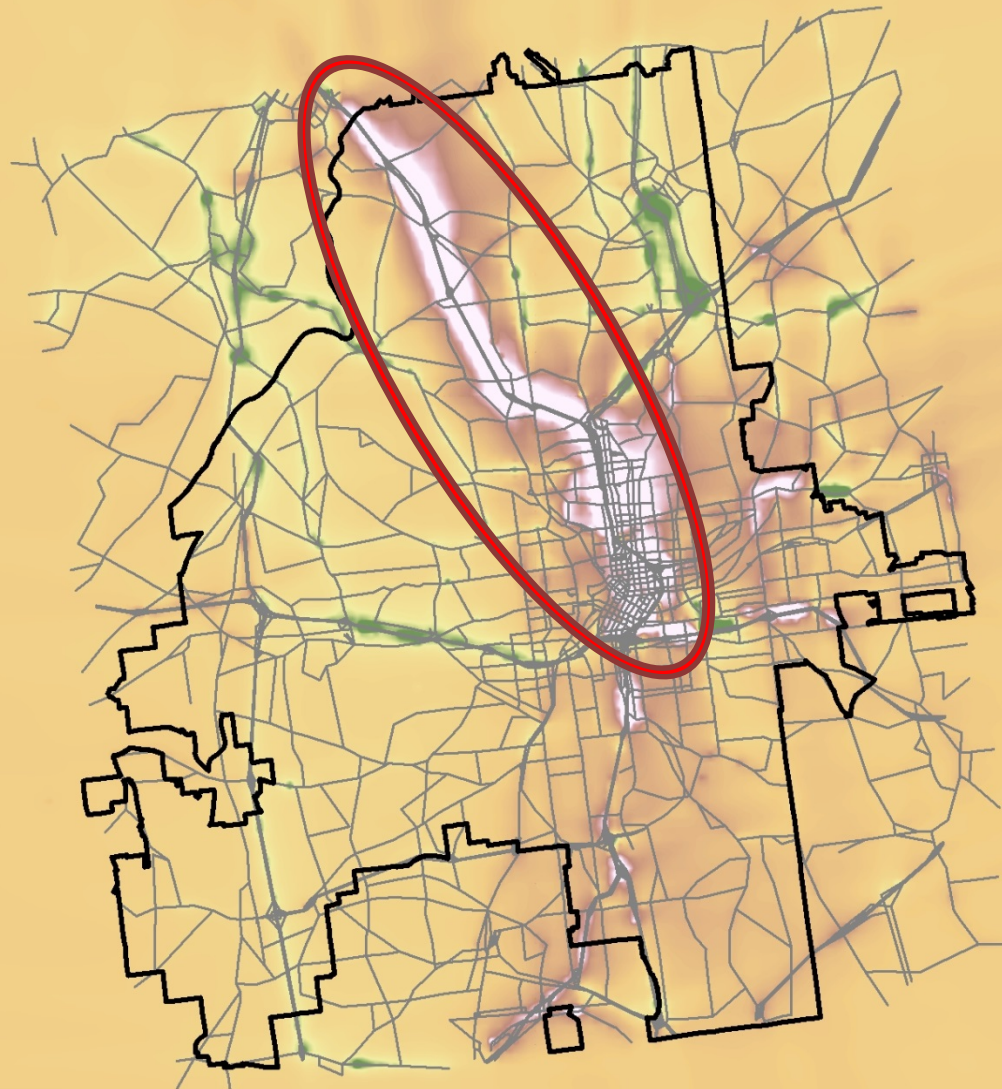


Atlanta City Limits

Road Network

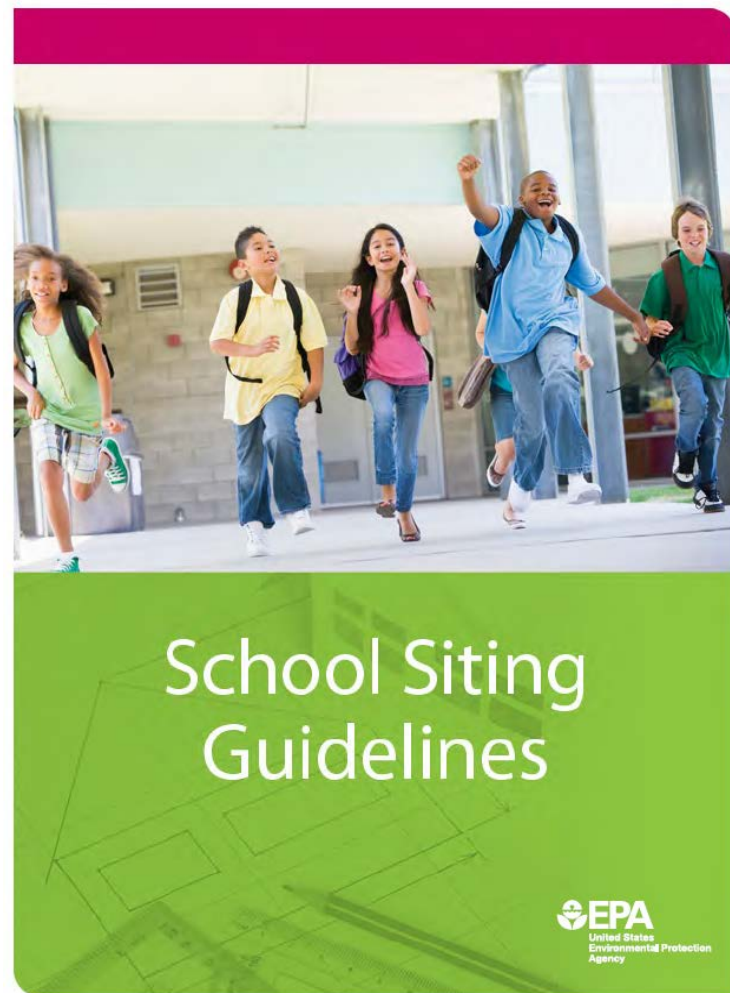
ARC

ATLANTA REGIONAL COMMISSION



Siting of Sensitive Land Uses

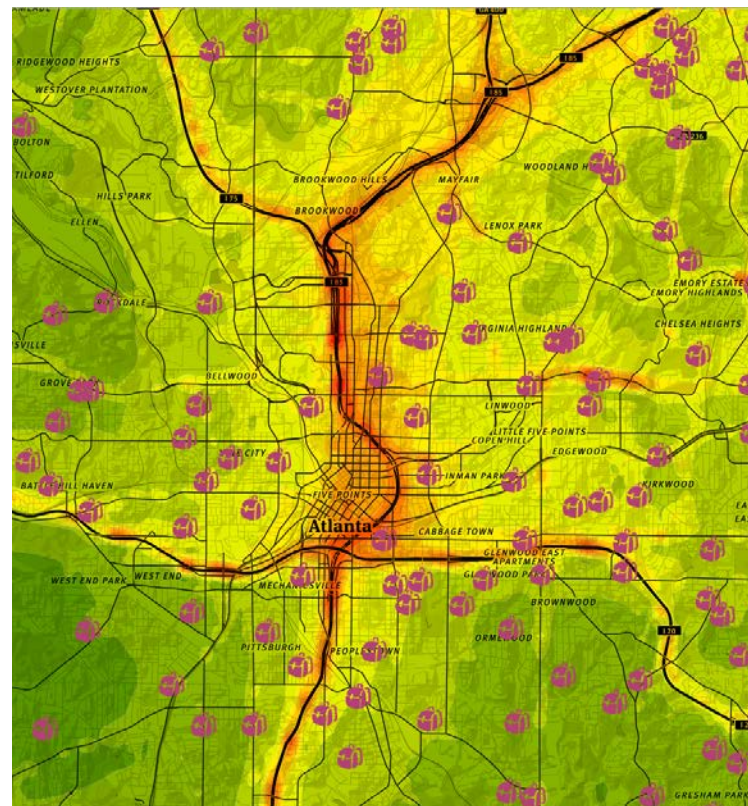
- Studies have tied exposure to traffic emissions to negative health outcomes in children
- Proximity to major roadways has been tied to reduced lung function, asthma, bronchitis
- EPA and some states have prepared guidelines for siting schools near major roadways
- California recommends schools be kept 500 feet away from freeways or urban roads with more than 100,000 vehicles/day or rural roads with more than 50,000 vehicles days



AREES & Targeting Vulnerable Populations

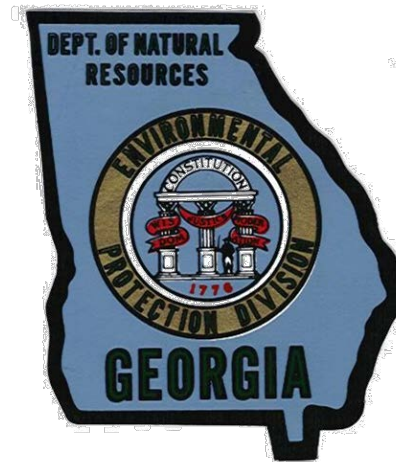
- AREES can help local governments make better informed decisions on siting schools and other important/sensitive land uses

<http://www.atlantaregional.com/arees>



Project Team

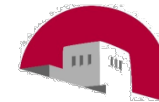
- David D'Onofrio – ARC
- Byeong-Uk Kim, PhD – GA Environmental Protection Division
- Yunhee Kim, PhD – GA Environmental Protection Division
- Kyung-Hwa Kim – ARC



Support / Advice



BAY AREA
AIR QUALITY
MANAGEMENT
DISTRICT



THE UNIVERSITY of
NEW MEXICO



More Air Quality & Climate Change ARC Tools & Reports

- Transportation Project Emissions Calculator
 - <http://www.atlantaregional.com/cmaqcalculator>
- Greenhouse Gas Emission Study & Tool
 - <http://www.atlantaregional.com/climatechange>

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