Recommendations from the Regional Workshop on Emissions Estimates

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Workshop sponsored by
MARAMA, NESCAUM, NYSERDA, and NARSTO
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"A Renewed Effort to Improve Northeast and Mid-Atlantic Regional Emission Estimates"

In response to recommendations from the 2005 NARSTO Emissions Inventory Assessment

NARSTO Recommendations

1. Reduce uncertainty, focusing on source categories whose control will be most effective
2. Improve speciation estimates for particles, VOC, and toxic air pollutants
3. Develop and improve emissions measurement methods
4. Quantify uncertainty and report it

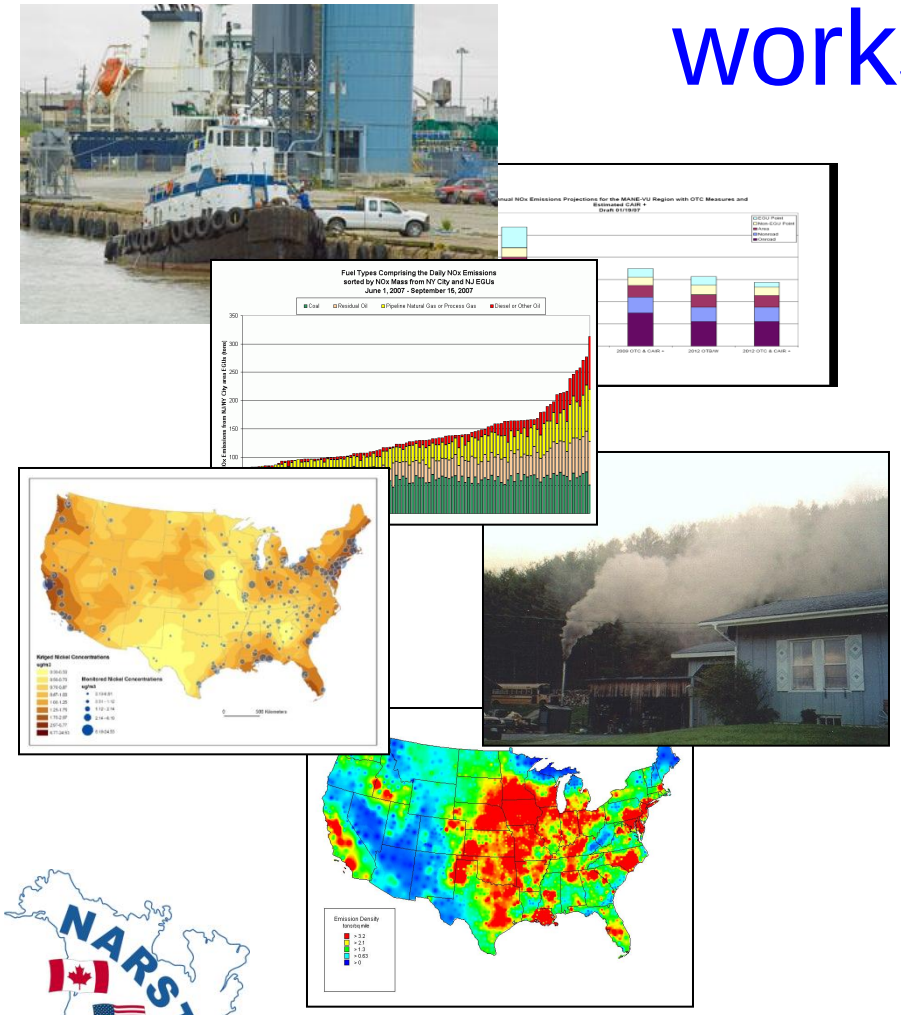
More NARSTO Recommendations

5. Define and implement standards to increase inventory compatibility and comparability
6. Improve access via the internet to emissions inventory data, documentation, and calculation methods
7. Report national data yearly
8. Assess past methods and improve projections of future emissions

Why a NARSTO workshop?

- Focus on this region
- Identify important regional issues
- Recommend actions for national, regional, state, or local action
- Identify key people, data, and other resources

Challenges identified for this workshop



- How can we improve the inventory for:
  - On-road Mobile Sources
  - Non-road Mobile Sources
  - Emissions on High Electricity Demand Days
  - Space Heating (liquid fuels)
  - Space Heating (biomass/wood)
  - Agricultural/Ammonia Sources

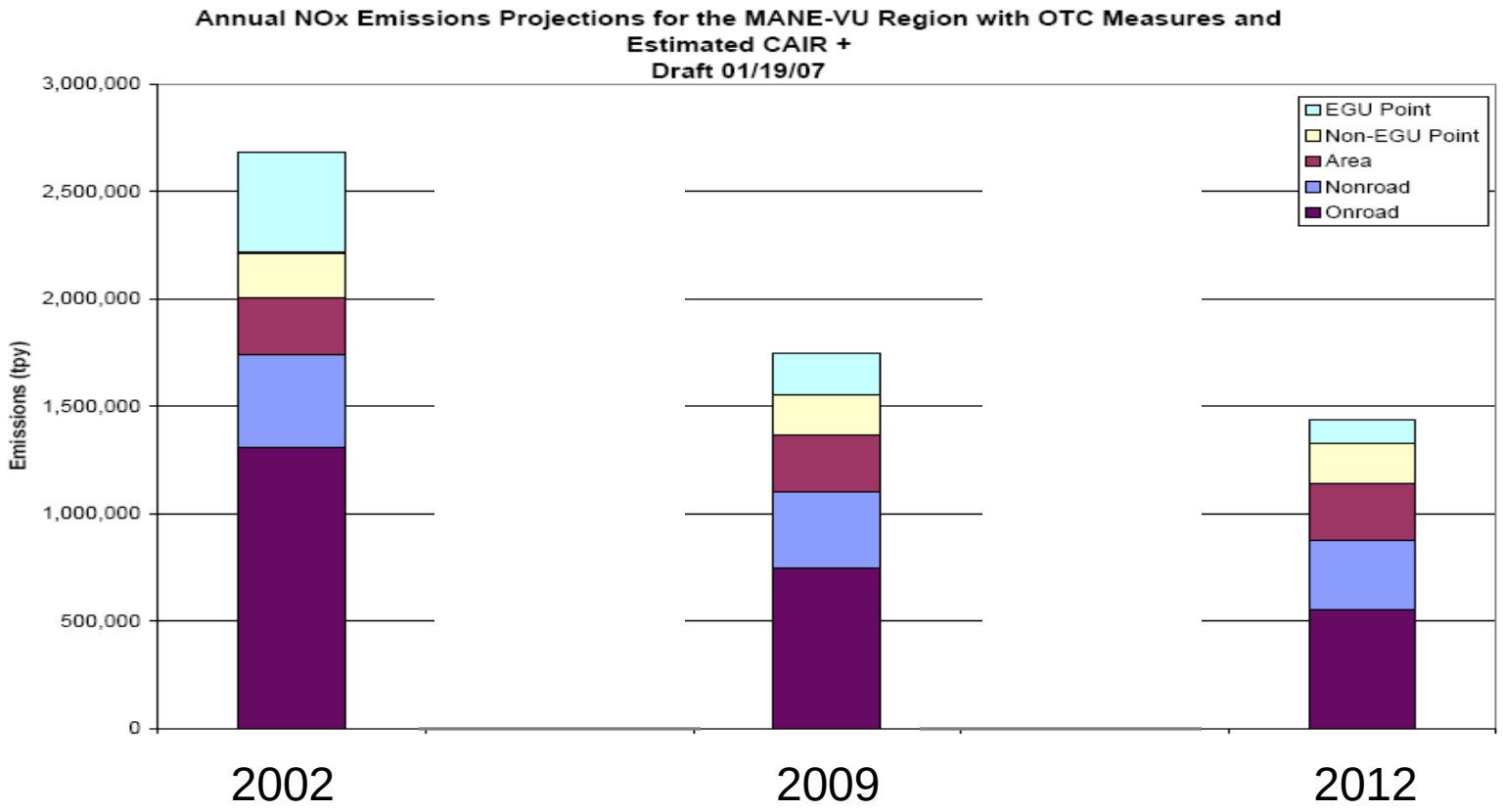
Workgroups were asked:

- What are the gaps in current estimates?
- What future trends will influence emissions?
- What tools exist to improve estimates?
- What specific studies or actions should be taken to improve the inventory?

What trends will influence emissions?

- Economic downturn
  - Reduced VMT & energy use
  - New vehicle purchasing patterns
- Incentives for woodstove replacements
- Comparative fuel costs (oil, gas, wood, coal…)
- New emissions standards, new vehicles & equipment, & cleaner fuels
- Programs to reduce idling, diesel retrofits
- Emphasis on efficiency, renewable fuels
- Tracking of GHG emissions
- Transmission system developments
- Weather

1. On-road Mobile— Largest Regional NOx Source



Gaps in current on-road mobile emissions estimates

- Detailed data on VMT, speed, type of vehicle, age, etc.
  - Too general for small-scale analyses
- High emitters
  - Where? When? How much?
- Emissions from existing HDD vehicles
  - And impacts of control programs
- Data on condensable particle emissions, ultra-fine particle emissions, toxics
- Quick screening tools to test scenarios

What tools exist to improve on-road mobile source estimates?

- New MOVES model will be required
- On-road portable emissions measurement systems (PEMS)
- Existing data on vehicle operations
  - E-Z pass, traffic management data, truck/taxi/bus operation data, etc.

Studies or actions needed to improve on-road inventory

- Vehicle Activity:
  - Develop regional and local inputs for MOVES model
  - Explore previously unused sources of information
  - Compare data gathered for different purposes/scales

Studies or actions needed to improve on-road inventory

- Emissions Profiles—light duty vehicles
  - Deterioration of cold-start emissions
  - Increases in PM emissions
  - Impacts of alternative fuels
- Emissions Profiles—heavy duty
  - Measure vehicle emissions
- Emissions & fuel use for GHG studies
- Validate MOVES estimates

Studies or actions needed to improve on-road inventory

- Ultra-fine PM and Toxics
  - Standardize test methods for exhaust
  - Link ambient measurements to emissions
  - Adapt regional-scale tools for use in near-roadway and other small scale studies
  - Recognize sources: direct PM emissions, condensable PM, tire wear, break wear, road dust
  - Foster collaboration among groups

2. Non-road mobile sources

What gaps exist in current emissions estimates?

- Multitude of equipment types and activity patterns
- Data for regional, local, and project-scale analyses is limited
- Lack of data on hazardous air pollutants, greenhouse gasses, and PM species and size fractions

What tools exist to improve off-road emissions estimates?

- EPA will be developing new MOVES model for non-road sources
- Numerous projects to reduce diesel emissions

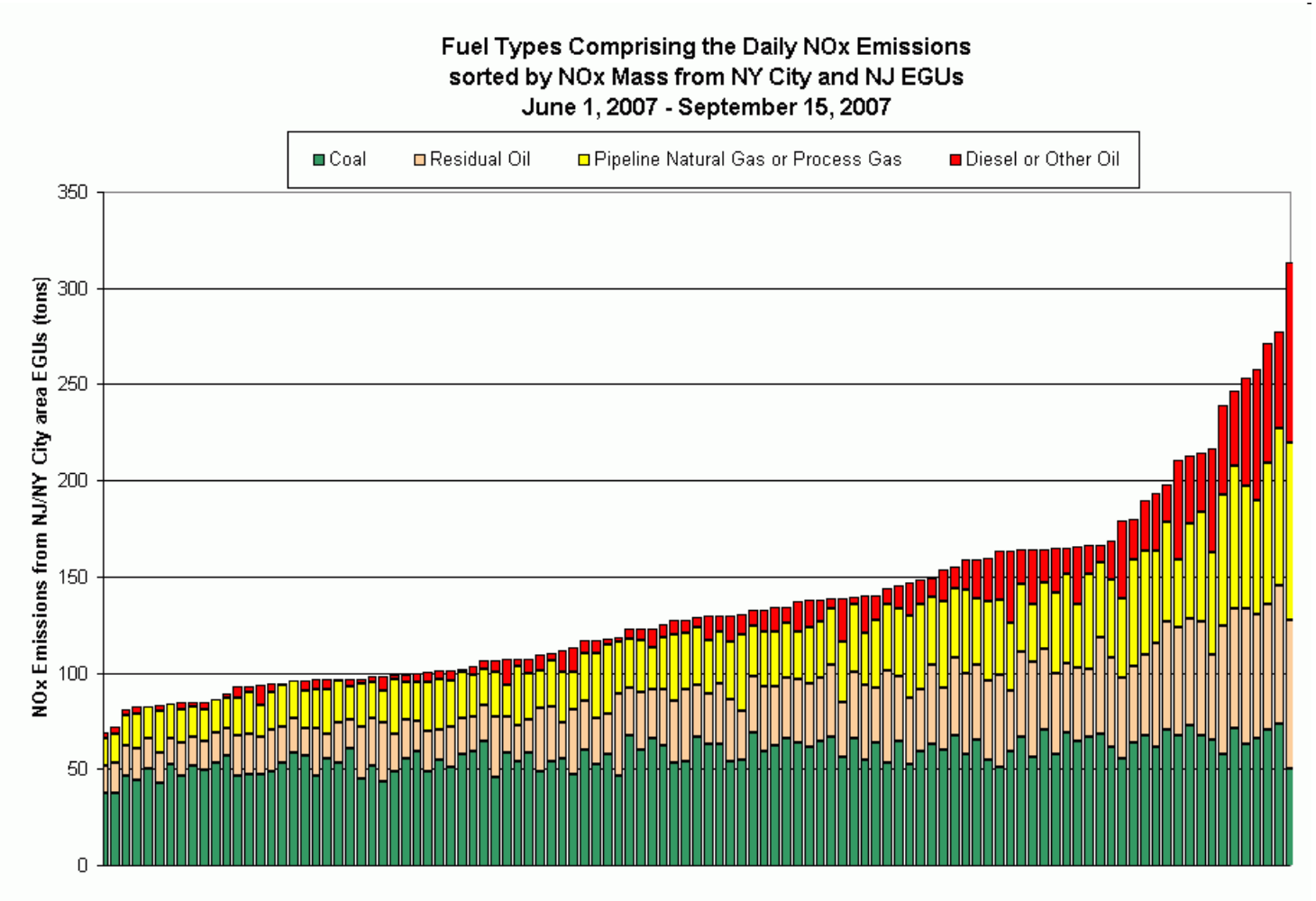
Studies or actions needed to improve non-road estimates

- States/localities should work with EPA to improve emissions models
- Create a regional database of sources & emissions estimates

Studies or actions needed to improve non-road estimates

- Standardize techniques, guidance for estimating marine vehicle emissions
- Initiate an urban-centered regional study of equipment activity and emissions
- Refine methods to measure emissions and assess ambient contributions

3. High Electricity Demand Days



What gaps exist in current emissions estimates?

- Current emissions data based on typical ozone season day
- Peak day emissions much higher and often on hot days with weather conducive to ozone formation
- Little data on small generators
- Need reliable data on current and projected future HEDD emissions

What tools exist to improve HEDD emissions estimates?

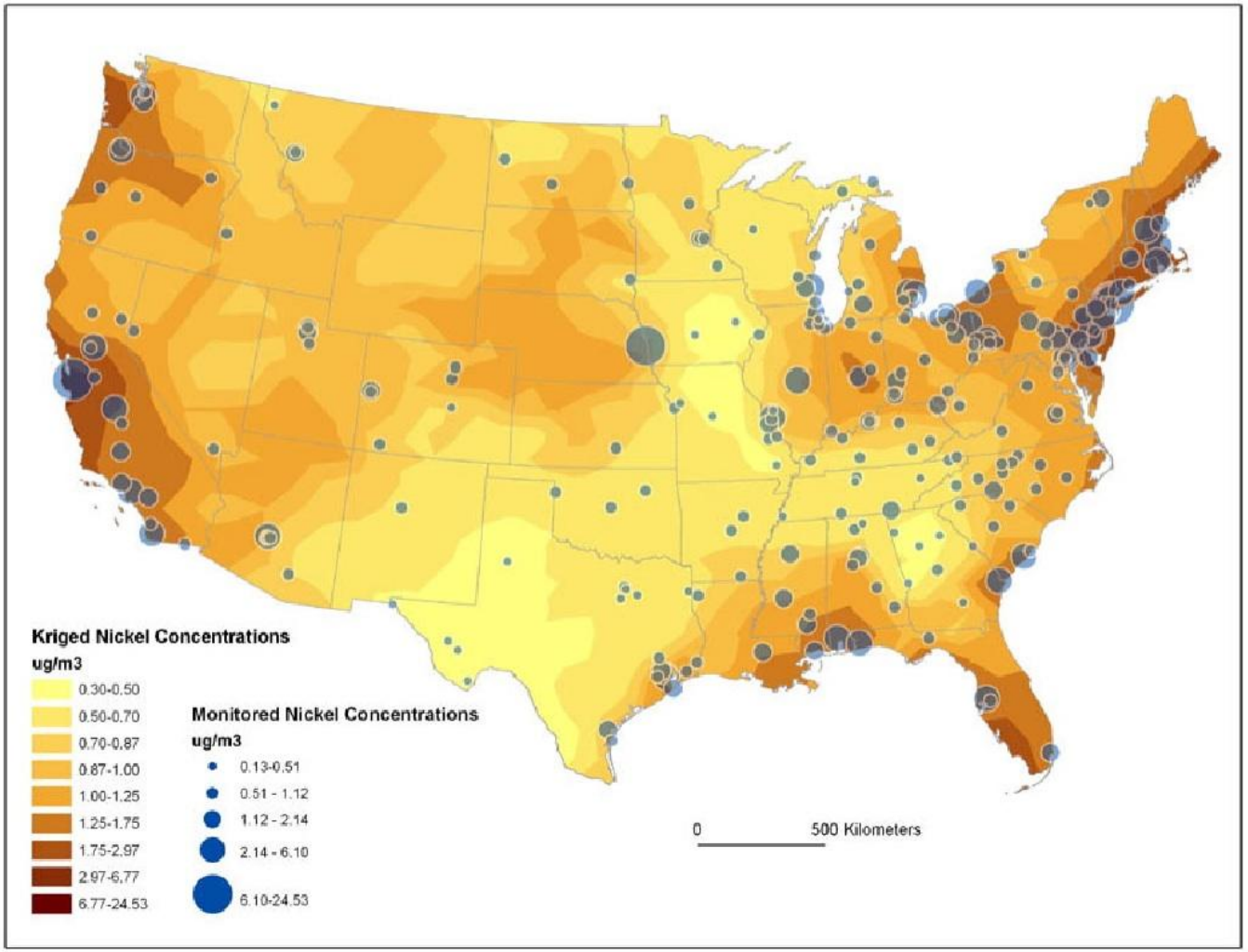
- Continuous monitoring data for large units
- Data from energy system operators or suppliers
- Collaboration between regional, state, and local agencies

Studies or actions needed to improve HEDD estimates

- Adjust reported emissions to more accurately reflect actual hourly emissions
- Identify local sources of data on generators
  - Survey sample areas, expand to region
- Develop methods to project future peak emissions
- Identify health consequences of temperature stress and air quality

4. Space Heating with Liquid Fuels

Spatial US Variability of Ni Concentrations (based on PM2.5 speciation data)



What gaps exist in current emissions estimates?

- Lack of information on small generators—location, use, emissions
- Actual sulfur and trace metal content of heating fuel and residual oil
- Age and replacement rate of equipment

What tools exist to improve estimates?

- NESCAUM survey of trace metals in fuel oil
- NYSERDA study of emissions factors for biodiesel blends
- Data from Title V permits on sulfur in oil to represent county average
- NYSERDA information on emergency generators
- Developing GHG emissions inventories

Studies or actions needed to improve liquid fuel estimates

- To improve spatial allocation:
  - Investigate urban/rural allocation or use of employment data
  - Investigate use of sales tax information
- To improve temporal allocation:
  - Use heating degree days instead of seasonal adjustment factor
- To improve emissions factors
  - Analyze Title V Sulfur content information
    - Improve estimates of S content in area source information
  - Evaluate studies underway that might help improve emissions factors for trace emissions including Ni and V

5. Space Heating with Biomass

What gaps exist in current biomass emissions estimates?

- Location and use of wood-fired units
- Temporal pattern of use
- Fuel used: type of wood and fuels other than wood
- Urban and rural rates of use of wood
- Proportion of newer, cleaner units

What tools exist to improve estimates?

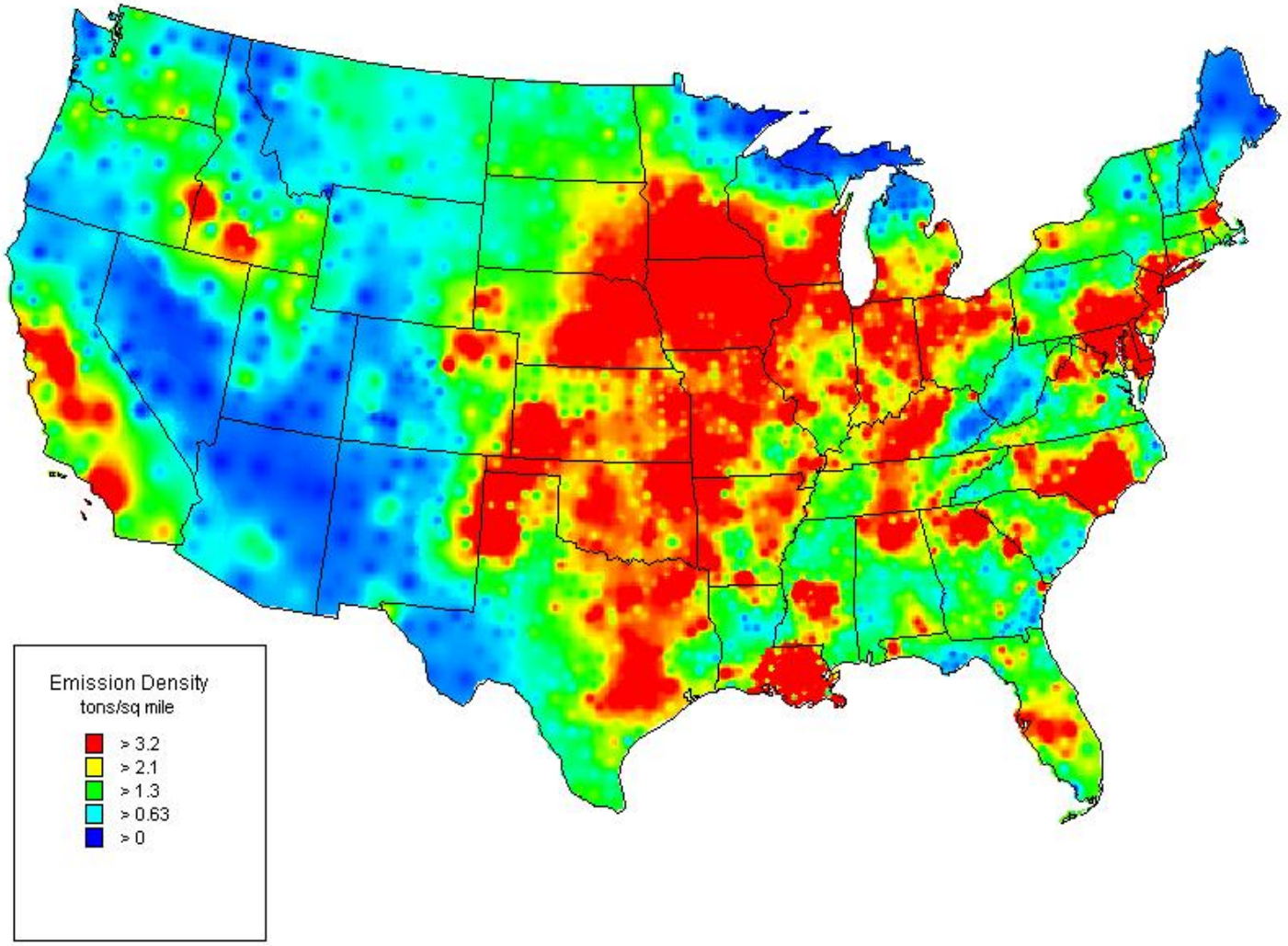
- Consider individual state activities
  - Energy
  - Forestry
  - Environmental – impacts of states' push for renewables
- Trade association data
  - National data
  - Not representative of all units
- Census data
- EPA obtain information from manufacturers
  - Requires OMB approval to go to more than nine manufacturers
  - Can be required to support regulatory development
  - Better understanding of how many units have been sold and what states

Studies or actions needed to improve the biomass inventory

- Update information on equipment and fuel use
- Develop emissions profiles for each type of equipment and fuel used
- Share information with other agencies promoting wood combustion or replacement units
- Focus on education and outreach

6. Ammonia Emissions

Density Map of 1998 Ammonia Emissions by County (OAQPS, 2002)



What gaps exist in current emissions estimates?

- Emissions factors are very uncertain
- Temporal and spatial variation not well characterized

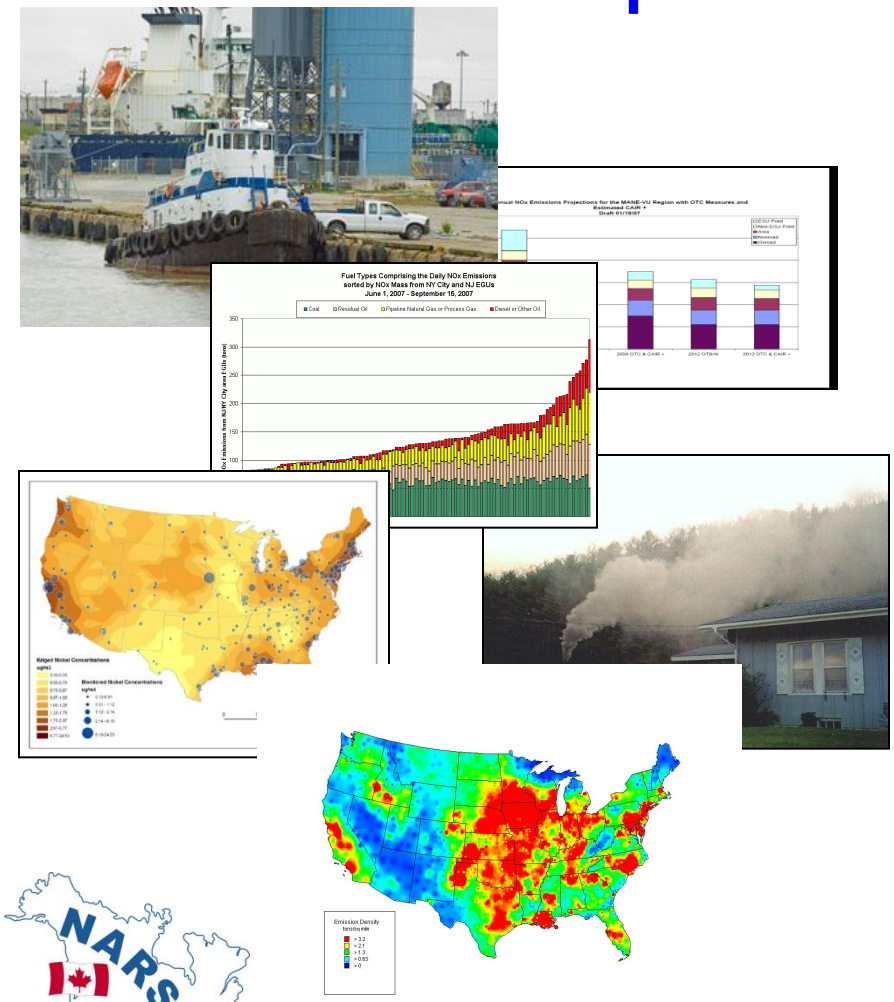
What tools exist to improve estimates?

- 2007 Census of Agriculture
- National air emissions monitoring study
- Increasing requirements for NPDES permits for water discharges

Studies or actions needed to improve the ammonia inventory

- Incorporate information from 2007 Census of Agriculture
- Treat large CAFOs as point sources for air quality modeling
  - Develop information based on NPDES permits
  - Utilize results of national study when available
- Use “inverse modeling” to compare ambient measurements, model results, and emissions estimates

Workshop Recommendations



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General recommendations

- Explore previously unused sources of information
- Compare data gathered for different purposes/scales
- Collaborate with other agencies

Key Recommendations

•On-road Mobile	•Develop specific MOVES input data
•Non-road Mobile	•Use updated methods •Create clearinghouse to share information
•High Electric Demand Days	•Use CEMs data •Develop better data on generators

Key Recommendations

•Space Heating – Liquid Fuels	•Improve spatial & temporal allocation •Review Title V data on fuel S
•Space Heating – Biomass	•Improve equipment and fuel use data •Develop emissions profiles
•Ammonia	•Use new Census of Agriculture •Investigate NPDES data

Thanks to the organizing committee

- Ellen Burkhard, NYSERDA
- Bill Pennell, NARSTO
- Susan Wierman & Julie McDill, MARAMA
- Praveen Amar, NESCAUM

Also the Advisory Committee

- Praveen Amar, NESCUAM
- Ellen Burkhard, NYSERDA
- Steven Cadle, retired from General Motors
- Raymond Forde, EPA Region II
- Oliver Gao, Cornell University
- George Hidy, Envair
- Barry Liebowitz, NYSERDA
- Julie McDill, MARAMA
- Sandra Meir, Environmental Energy Alliance of NYS
- Andy Miller, EPA
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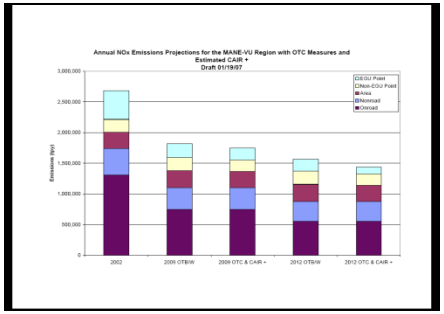
- Susan Wierman, MARAMA

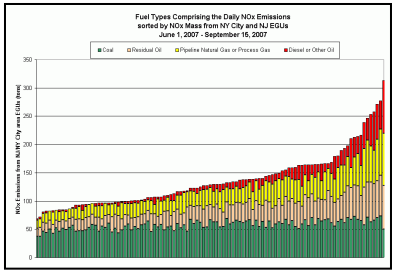
And the White Paper Authors

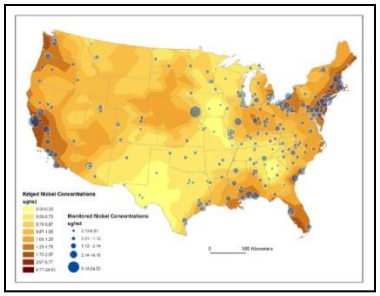
- On-road: Oliver Gao, Cornell University
- Non-road: Barry Liebowitz, NYSERDA
- HEDD: NESCAUM
- Fuel Combustion: John Graham, NESCAUM
- Biomass Combustion: Paul Miller & Lisa Rector, NESCAUM
- Ammonia: Praveen Amar, NESCAUM, & Julie McDill, MARAMA

Also the Plenary Speakers, Session Leaders, and Invited Participants

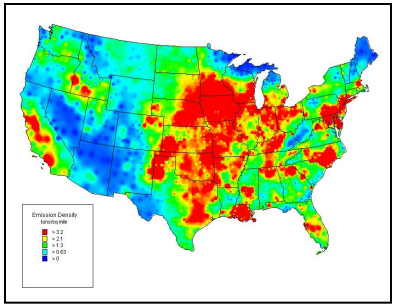
Bill Pennell is preparing a summary report.


Annual NOx Emissions Projections for the MANE-VU Region with OTC Measures and Estimated CAIR +
Draft 01/19/07
3,000,000
2,500,000
2,000,000
1,500,000
1,000,000
500,000
0
2002
2005 OTB/W
2009 OTC & CAIR +
2012 OTB/W
2012 OTC & CAIR +


Fuel Types Comprising the Daily NOx Emissions
sorted by NOx Mass from NY City and NJ EGUs
June 1, 2007 - September 15, 2007
Coal
Residual Oil
Pipeline Natural Gas or Process Gas
Diesel or Other Oil
350
300
250
200
150
100
50
0


Kriged Nickel Concentrations
ng/m3
Monitored Nickel Concentrations
ng/m3

Questions?


Emission Density
tons/sq.mile