BOLD THINKERS DRIVING REAL-WORLD IMPACT

Adding Particulate Matter to EPA's eGRID Database

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Abstract

Adding Particulate Matter to EPA's eGRID Database

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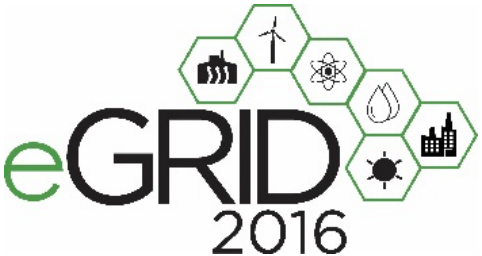
The U.S. Environmental Protection Agency's Emissions and Generation Resource Integrated Database (eGRID) is the preeminent source of information on emissions of greenhouse gases and criteria pollutants from the electric power sector. eGRID contains information on emissions and electricity generation for all electric generating units in the United States, and it is used widely to estimate the emissions associated with electricity use. The database currently includes emissions of carbon dioxide, methane, nitrous oxide, nitrogen oxides, and sulfur dioxide. In the next version of eGRID, U.S. EPA will also include emissions of fine particulate matter ($PM_{2.5}$), an important criteria pollutant with significant negative health impacts, by developing a linkage between eGRID and EPA's National Emissions Inventory. The addition of $PM_{2.5}$ will allow users of eGRID to more completely understand the air pollution implications of electricity use in the United States. This presentation provides an overview of the eGRID database, the methods used to add $PM_{2.5}$ to eGRID and the potential uses of the new $PM_{2.5}$ emissions data.

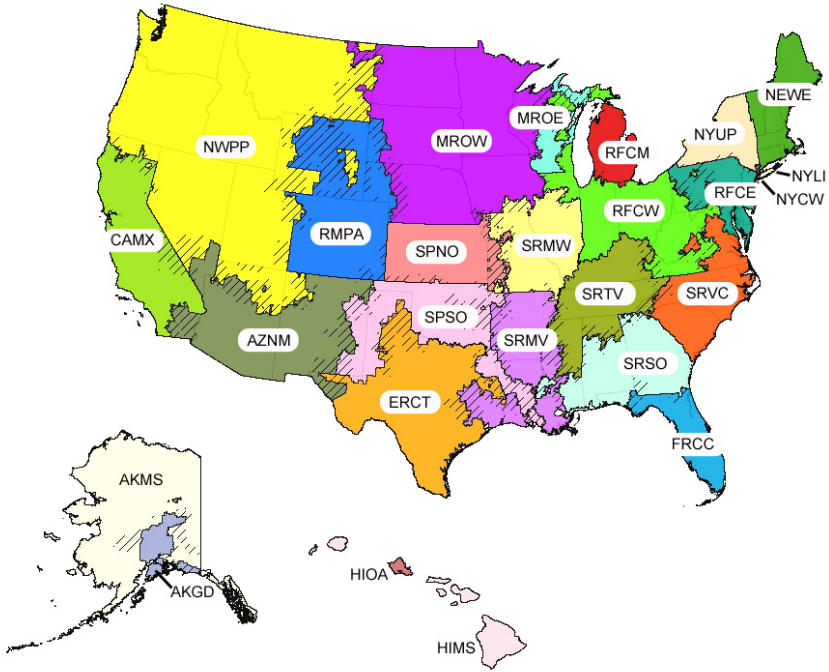
eGRID Overview

- EPA's Emissions and Generation Resource Integrated Database (eGRID)
- Contains electricity generation and emissions data for all power plants in the United States
- The preeminent source of data for carbon-footprinting Scope 2 emissions



eGRID Overview

- eGRID provides data at multiple levels:
  - Unit
  - Plant
  - State
  - Balancing Authority
  - eGRID Subregion
  - NERC Region
  - US

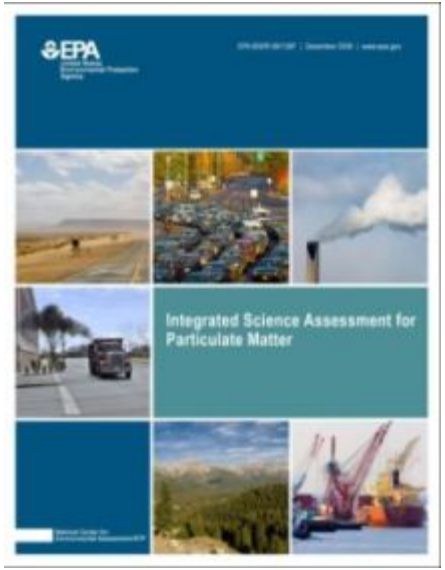


eGRID Overview

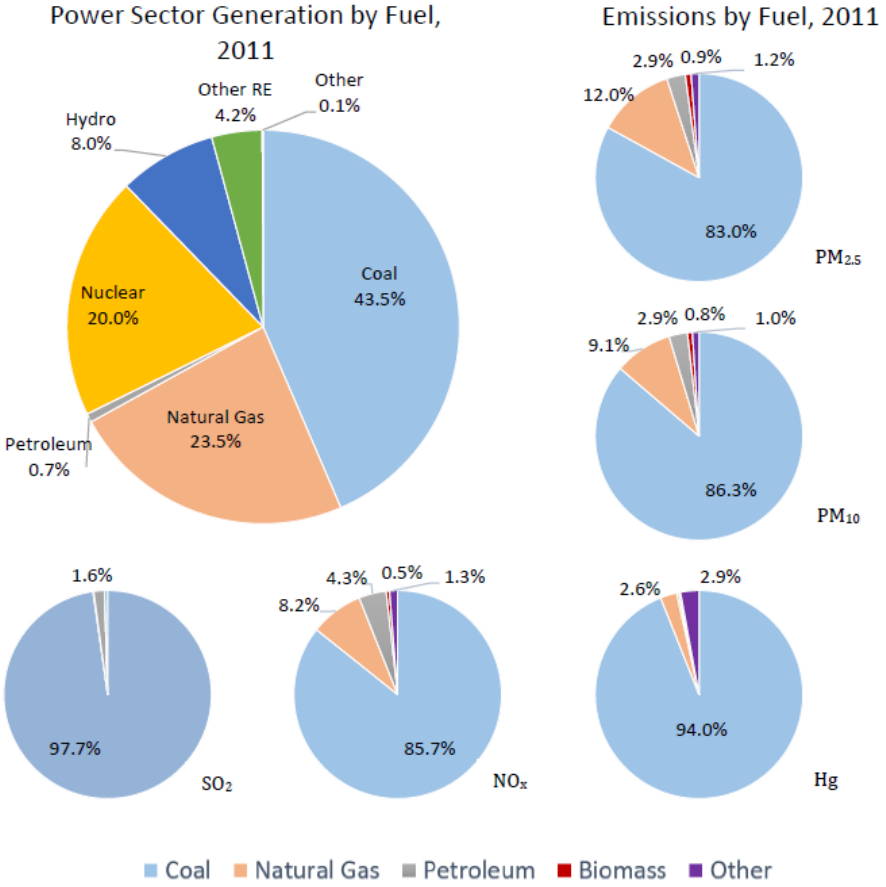
- eGRID provides data on:
  - Net generation
  - Nameplate capacity
  - Fuel consumption
  - Emissions and emissions rates for:
    - CO_2, NO_x, SO_2, CH_4, N_2O, and CO_2e
  - **It currently does not include fine particulate matter ($PM_{2.5}$)**

$PM_{2.5}$ Overview

- $PM_{2.5}$ results in significant negative health impacts
- Causal link between $PM_{2.5}$ and premature mortality, respiratory effects, and cardiovascular effects
- Potentially linked to 55,000 deaths per year in the United States

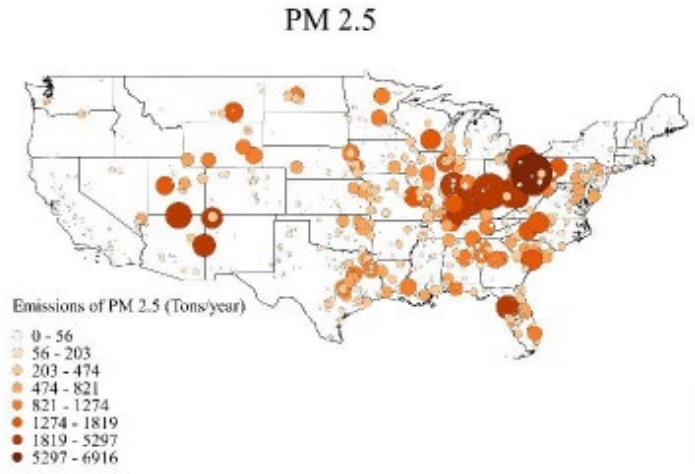


$PM_{2.5}$ Emissions from Power Generation



Power Sector Generation and Emissions of Select Criteria Air Pollutants and Mercury in 2011

(~180,000 tons $PM_{2.5}$)



Adding $PM_{2.5}$ to eGRID

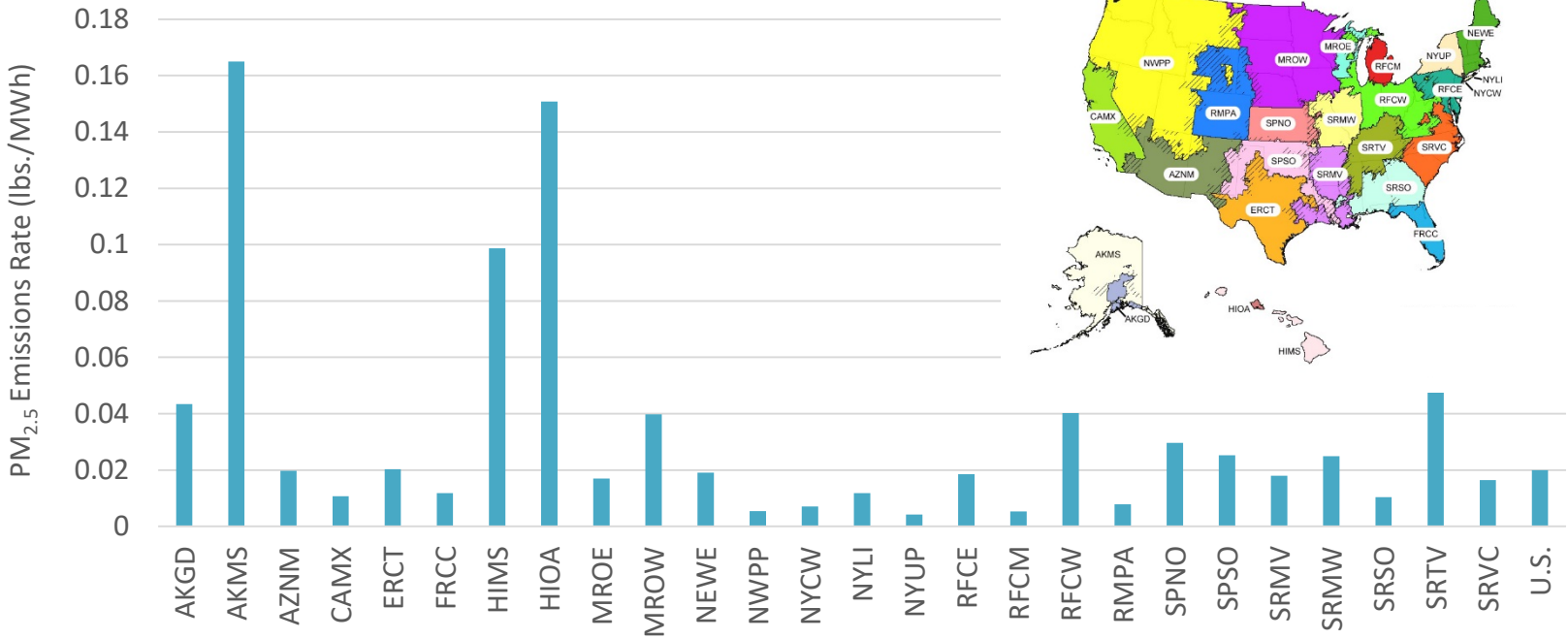
- eGRID uses data reported to EPA from Continuous Emissions Monitors (CEMS) pursuant to 40 CFR Part 75
- Electric Generating Units (EGUs) generally do not report $PM_{2.5}$ emissions from CEMS
- Used $PM_{2.5}$ data from EPA's National Emissions Inventory

Adding $PM_{2.5}$ to eGRID

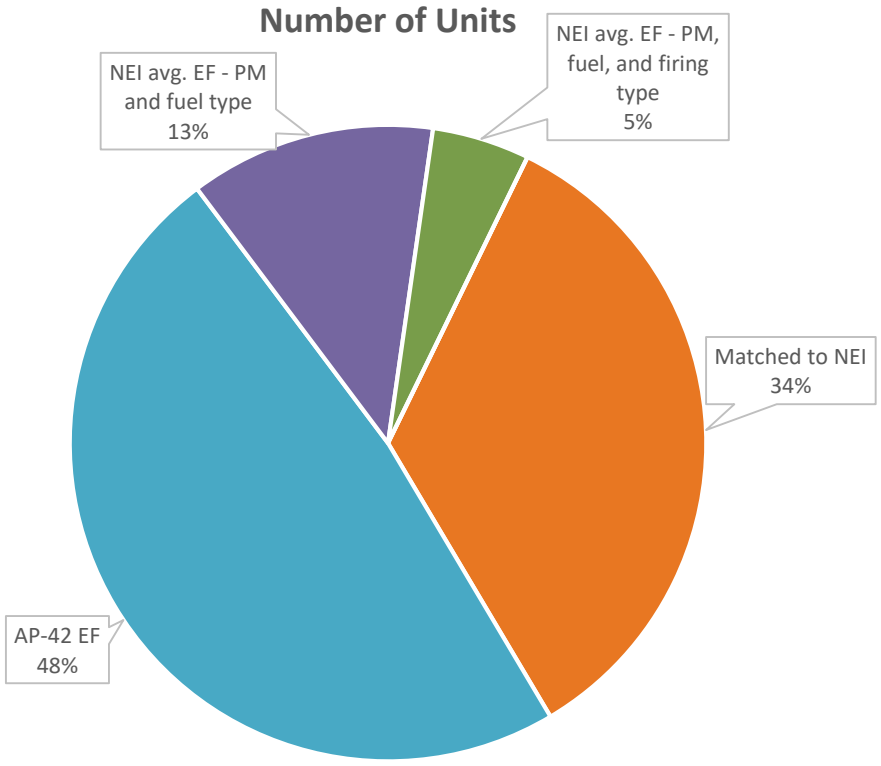
- 4-step process for adding $PM_{2.5}$ emissions to eGRID (13,231 units in total)
  1. Direct unit-level match between eGRID and NEI (4,040 units)
  2. Average emissions factors by fuel type, unit firing type, and prime mover (570 units)
  3. Average emissions factors by fuel type and prime mover (2,922 units)
  4. Emissions factors from EPA's AP-42 (5,699 units)

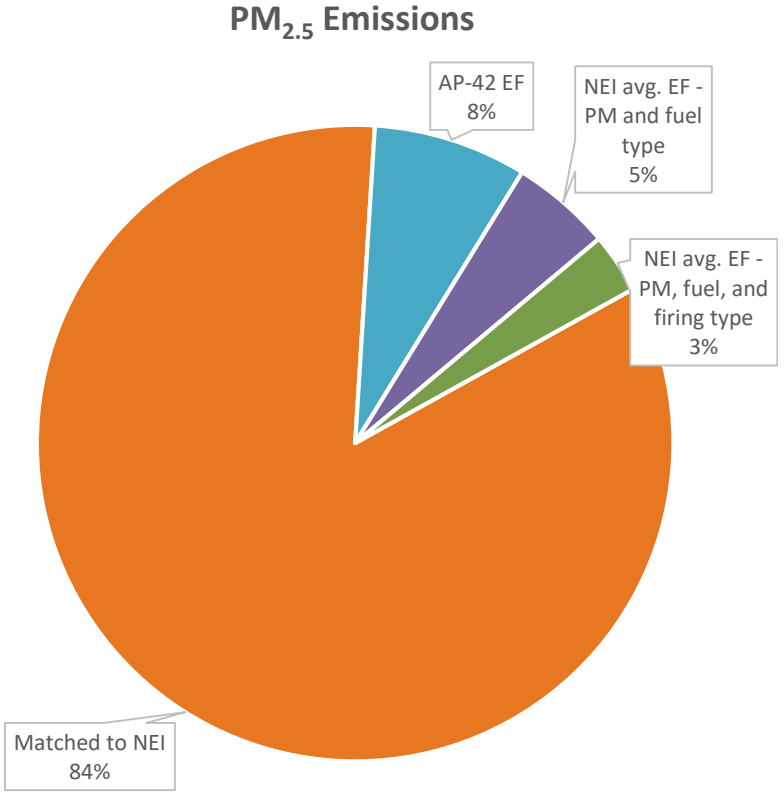
Results

$PM_{2.5}$ emissions rates (lbs./MWh) by eGRID Subregion



Results


Number of Units
NEI avg. EF - PM and fuel type 13%
NEI avg. EF - PM, fuel, and firing type 5%
Matched to NEI 34%
AP-42 EF 48%


PM2.5 Emissions
AP-42 EF 8%
NEI avg. EF - PM and fuel type 5%
NEI avg. EF - PM, fuel, and firing type 3%
Matched to NEI 84%

Conclusions

- eGRID2018, scheduled for release later this year, is being updated to include $PM_{2.5}$ emissions
- PM2.5 emissions are a significant source of health impacts and premature death in the United States.
- Understanding $PM_{2.5}$ emissions rates for electricity generating units will provide for a better understanding of how a change in electricity generation impacts emissions and ultimately ambient air quality and human health effects
- White paper detailing the methodology of adding $PM_{2.5}$ emissions to eGRID will be released later this year
- eGRID website is also being updated and will include interactive data exploration and visualization

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