Who Cares About 2011? The Policy, Science, and Timing of the National Emissions Inventory

Marc Houyoux

2015 International Emissions Inventory Conference
San Diego, California
April 13-16, 2015
Inventory Origins

**Policy**
- Clean Air Act (CAA)
- National Ambient Air Quality Standards
- Air toxics
- For regulation and decision making
- As an input for modeling
- To inform the public

**Science**
- For research sake
- Desire to understand the environment
- As an input for modeling
- To inform the public
Different Origins Lead to Many Inventories

This Complexity Can Cause Confusion
The time needed to create inventories can cause challenges for meeting both policy and science needs.

Meeting these multiple needs gives rise to one particular inventory that will be different from inventories meeting other needs.

Including new science may mean diverging from previous policy-accepted method.

**Two Key Points to Explore:**

- The time needed to create inventories can cause challenges for meeting both policy and science needs.
- The different results among inventories can cause confusion.
NEI Process

• The NEI is on a 3-yr cycle (e.g. 2008, 2011, 2014)
  • Stationary point and nonpoint (county), mobile, fires, biogenic soil and vegetation

• States, locals, and tribes (S/L/Ts) are required to submit CO, SO₂, NOₓ, VOC, PM₁₀, PM₂·₅, NH₃, and Lead.
  • Origin is the National Ambient Air Quality Standards (NAAQS) parts of the Clean Air Act
  • Hazardous Air Pollutants (HAPs) and GHGs can also be voluntarily submitted
  • Data required to be submitted one year after end of inventory year

• EPA develops emissions methods and fills inventory gaps when needed
  • In collaboration with S/L/T air agencies, regional groups, other EPA programs, other federal agencies, and other researchers
Four Key NEI Goals

- Complete
- Represents the year of the inventory
- Uses best available information
- Transparent - includes the emissions origin (who provided, factor, activity, method)

- What About Timing? The 2011 NEI as an example...
2011 NEI Timeline

- **2011**: Emissions Occurring
- **2012**: Gathering/Methods
- **2013**: Compiling & QA
- **2014**: Using & Revising
- **2015**: Using

**S/L/Ts report**

**2011 v1 done**

**Public comment**

**2011 v2 done**

**High spring fire season**

- Oil & gas production up
- Economy improving

**Then**

**Worsening drought**

- Oil prices falling
- Economy keeps growing

**Now**
Wildfires – 2011 Real World

- Wet 2010 & dry early 2011 led to high spring wildfire season in TX, AZ, and NM
- TX Jan-Apr 2011 burned 2.2 million acres
- AZ Wallow Fire in May-June largest ever in state
- NM Las Conchas fire in June-July largest ever in state
Wildfires – 2011 NEI

## Wildfires – 2014 Real World

<table>
<thead>
<tr>
<th>Year</th>
<th>Fires</th>
<th>Acres</th>
</tr>
</thead>
<tbody>
<tr>
<td>2014</td>
<td>63,312</td>
<td>3,595,613</td>
</tr>
<tr>
<td>2013</td>
<td>47,579</td>
<td>4,319,546</td>
</tr>
<tr>
<td>2012</td>
<td>67,774</td>
<td>9,326,238</td>
</tr>
<tr>
<td>2011</td>
<td>74,126</td>
<td>8,711,367</td>
</tr>
</tbody>
</table>

Source: NIFC, [http://www.nifc.gov/fireInfo/fireInfo_stats_totalFires.html](http://www.nifc.gov/fireInfo/fireInfo_stats_totalFires.html)

---

*U.S. Drought Monitor*  
*September 30, 2014*  
*(Released Thursday, Oct. 2, 2014)*  
*Valid 8 a.m. EDT*  

*Source: NIFC,*  
*[http://droughtmonitor.unl.edu/](http://droughtmonitor.unl.edu/)*
Oil and Gas – 2011

Gas Production:
up 14%

Oil Production:
up 15%

Graphic: Aguilera and Radetzki, Oil and Gas Journal, December 2013.
Oil and Gas – NEI 2008 to 2011

Oil and Gas:
- NOx increased 64%
- VOC increased 62%
- Partly due to improved characterization of emissions in the 2011 NEI
Oil and Gas – NEI 2011 v2 by county

NOx (tons/year)  VOC (tons/year)
Oil & Gas – 2013 Real World

2011 to 2013

Gas Production: Up 12%
Oil Production: Up 42%

Graphic: Aguilera and Radetzki, Oil and Gas Journal, December 2013.
Why Care About 2011?

- For policy purposes, the NAAQS process needs (and the CAA requires) a reference point
  - Nonattainment designations
  - Subsequent state implementation plan development (including air quality modeling)
  - Track progress in reducing emissions over time
  - Allow the time needed for the regulatory process to work with participation from many groups
- For science purposes, research takes time and researchers cannot constantly adjust to a new inventory year
Why Care About Current and Consistent Inventories?

• To inform the public, old inventories have many flaws
  • Do not reflect reductions from new regulation
  • Do not reflect reductions or increases from production changes
  • Do not reflect new underlying information (e.g., emissions tests)
  • Public expects up to minute information

• Inconsistent inventories confuse and can undermine trust
  • Don’t the regulators know the amount of emissions?
  • Aren’t all emissions always measured?

• Point source inventories are well suited for more current public information
E-Enterprise and Air Emissions

- E-Enterprise for the Environment is jointly governed by states and the EPA to collaboratively modernize EPA business processes
  - To improve environmental results
  - To enhance services to the regulated community and the public by making government more efficient and effective
- A “Combined Air Emissions” project has arisen from two similar proposals in the spring of 2014, made by Arizona and the EPA
- In summer 2014, the E-Enterprise Leadership Council (senior level state and EPA members) selected five project for scoping and return-on-investment (ROI) analyses
- Implementation depends on the results of the ROI and would include continued state-EPA collaboration
Air Emissions - Project Goals

• Reduce industry burden
• Improve timeliness and transparency of data
• Create consistent information across air emissions programs
• Improve data quality
• Make data more accessible and useable
E-Enterprise Air Emissions Focuses on Point Sources

• Focuses on four major air reporting programs (different policies & science)

<table>
<thead>
<tr>
<th>Toxics Release Inventory</th>
<th>Greenhouse Gas Reporting Program</th>
<th>Compliance and Emissions Data Reporting Interface</th>
<th>National Emissions Inventory</th>
</tr>
</thead>
<tbody>
<tr>
<td>• Air Toxics</td>
<td>• Greenhouse Gases</td>
<td>• Largely air toxics focused</td>
<td>• Criteria pollutants and air toxics</td>
</tr>
<tr>
<td>• Emissions to all media</td>
<td>• Specific industries</td>
<td>• CAA Part 60 and 63 compliance – many industries</td>
<td>• Facilities report to S/L/T air agencies who report to the EPA</td>
</tr>
<tr>
<td>• Many industries</td>
<td>• Prescriptive methods</td>
<td>• Stack test data</td>
<td>• “Best” methods</td>
</tr>
<tr>
<td>• “Best” methods</td>
<td>• Direct facility</td>
<td>• Direct facility</td>
<td>• Evolving program</td>
</tr>
<tr>
<td>• Direct facility</td>
<td>• Young program</td>
<td>• New approach</td>
<td></td>
</tr>
<tr>
<td>• Mature program</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Air Emissions - Approach

- Team with members from state and local agencies, ECOS, EPA from all four reporting programs, and others at the EPA
- Starting fall 2014, developed a team charter, problem statement, and defined the scope of the project
- Developed detailed information on the “As Is” or baseline case
  - Key variables are program costs, reporting facility burden, and time to access collected data
- Developed detailed “value stream maps” (VSMs) for the four programs + the state NEI
  - A flow chart that shows connections of value-added steps and timing
- Held a 3-day in person “lean” facilitated event (February 10-12), which identified a “To Be” solution
  - “Lean” is based on manufacturing concepts of identifying and eliminating inefficiencies
- Involved industry stakeholders through Fall 2014 meeting and lean event in February 2015
- Currently clarifying the “To Be” State and building ROI analysis
Air Emissions – “As Is” Value Stream Maps

- Example of 2014 inventory year
Key Inefficiencies to be Eliminated

- Duplicative and inconsistent facility info / facility matching
- Duplicative data entry and revisions by facilities of data elements that are included in several separate emissions programs
- Wait time caused by current state/EPA NEI process
- Some duplicative post-submission QA by EPA and states
- Inconsistent emissions data across programs and associated work (e.g. reconciliation)
- NEI augmentation steps
Air Emissions – “To Be” Result

Portal

Attributes Entry

Previous emissions

Emissions Entry

Prepopulate facility attributes

Distribute data to programs

Shared Facility Attributes System

TRI Database

CEDRI, Webfire/EFs

NEI Database

State Databases

GHGRP Database

Unified Data Public Access

Shared data Roles for QA/QC
“To Be” Shared Facility Attributes

- Would include all details of facility needed for EPA and S/L/T air emissions systems such as name, address, latitude/longitude, units, processes, contacts, and controls
- Facility information collected once and shared among EPA programs and state/locals
- Could include S/L/T QA and/or a sign-off role where appropriate

Key potential benefits
- One cross-program definition/understanding of “facility” generally and each facility specifically
- Common IDs would eliminate cross-program data matching for facilities and sub-facilities

Key open issues
- How to leverage existing systems (i.e., Facility Registry Services (FRS) and state systems)?
- What is centrally maintained and what relies on appropriate state systems?
- How to handle the regulatory and statutory definitions of facility?
“To Be” Single Data Entry Portal

- Facilities would report attributes and emissions through a single portal
  - Seek to unify the submission experience (i.e., interface) for industry
  - Accommodate multiple reporting deadlines as needed
- Allows coordinated communication to industry of changes to data submission forms
- Shares pre-population (smart submission) across programs
- Shares pre-submittal data validation

Key potential benefits
- Simpler for industry
- Makes NEI timeline much shorter
- Eliminates many inconsistencies in emissions data
“To Be” Distributed and Connected Program Databases

- Back-end emissions databases for programs (including states) remain separate
- A single database solution was considered too unwieldy with the many different underlying programs, regulations, and purposes for the data
- Post-submission QA roles would be defined across all programs (including states)
- Previously identified roles for CEDRI relating to other programs fits nicely into this model

Key potential benefits
- Allows for improving interconnectivity
- Facilitates compliance test data for CEDRI to be used for emission factors and emissions
- Eliminates duplicative QA and different programs asking the same questions to facilities; makes data better faster
The Future

• E-Enterprise will set the stage for new ways of doing inventories

• EPA, S/L/T agencies, the public, and industry share the common interest in accessing timely and accurate facility emissions data
  • How can we leverage this interest to improve the future?
“Real-Time” Emissions Inventory

• For EPA’s risk modeling needs, the latest emissions information is crucial
  • This has been collected historically by Information Collection Requests because other sources of information (including TRI and NEI) were not sufficient
  • These are costly and time consuming, in part because of the issues that E-Enterprise seeks to fix

• For the public, current and accurate information is expected

• A “Real-Time” inventory could be updated on an ongoing bases using
  • Shared Facility Attributes, including the latest control information,
  • The most recent and applicable source tests (CEDRI),
  • Updated emission factors (Webfire), and
  • Current activity information (e.g., GHGRP)
A Vision for the Future

- More timely and accurate inventories better meet policy needs, research needs, and needs of the public
- With vastly improved, efficient inventory processes, all stakeholders focus most inventory work to improve underlying data
  - Emissions/field testing
  - New measurement and estimation methods
  - Better QA and error prevention
- High quality underlying data and new efficient processes create consistent inventories across multiple programs
- Better emissions information allows regulators, industry, environmental groups, and other stakeholders to more quickly achieve consensus on the data, moving the focus to lowering emissions