EPA Oil and Gas Emissions Estimation Tool Improvements for 2017

Regi Oommen and Mike Pring, Eastern Research Group
Jennifer Snyder, U.S. EPA

July 31, 2019

2019 Emission Inventory Conference

Dallas, Texas

Acknowledgements

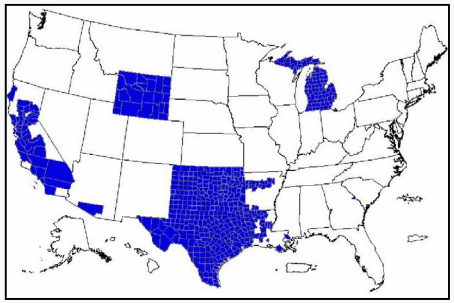
- National Oil and Gas Committee
  - Meets the 2nd Thursday of each month!
- CenSARA
- WRAP
- MARAMA
- ERG Staff
- EPA Contract #GS-00F-079CA

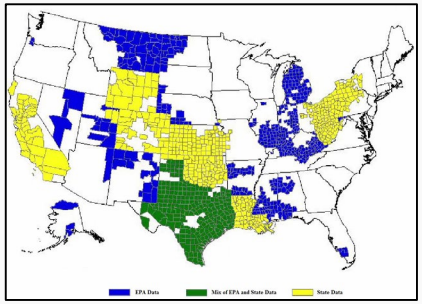
EPA Oil and Gas Emission Estimation Tool

- Access-based emissions estimation calculator
  - County-level activity data
  - County-level process characterization data
  - Emission factors
  - Generates county-level emission estimates by source classification code (SCC)
  - EIS export to National Emission Inventory (NEI)
- State application
  - Portable
  - User-defined inputs
- EPA application
  - Gapfill NEI where no state data available

Tool/NEI Evolution

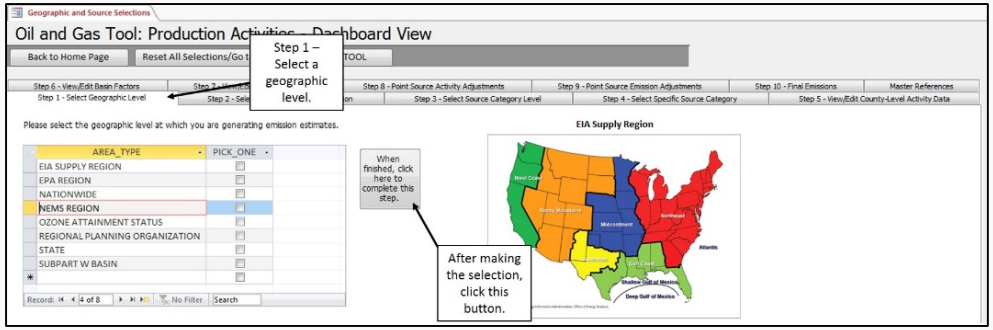
- 2008 NEI
  - State-provided data for 8 states
  - No EPA gap-filling





- 2011 Tool/NEI
  - Tool developed based on CenSARA and TCEQ methodologies
  - Utilized existing EPA, state, and regional data (WRAP, CenSARA)
  - County-level activity and emissions compiled for entire US
  - Used to gap-fill NEI where no state data reported

- 2014 Tool Improvements
  - Enhanced user interface
  - Updated activity analysis
  - Emission factor updates
  - Utilized Greenhouse Gas Reporting Program (GHGRP) Subpart W data



2017 Improvements

- Addition of coalbed methane (CBM) dewatering pumps
- Addition of vapor recovery units as a control option for storage tanks
- GHGRP Subpart W
- Activity data
- Emission factors
- Basin factors
- Miscellaneous

Coalbed Methane Dewatering Pumps

- Used to remove water from the wellbore
- Function similar to pumpjacks at oil wells
- Pump motor may be electric or powered by small engine
- No default data available

Photo: Pring

Vapor Recovery Units

- Used to collect vapors for routing to control device or product stream
- Added as control device for condensate and crude oil tanks
- Data available in GHGRP Subpart W
- Small(?) pump engines used to collect vapors not included in tool
- May be used for other unit operations

GHGRP Subpart W Updates

- Expanded reporting requirements
  - Evolving program year over year
  - Limited data used in 2011 Tool
  - Significant updates for 2014 Tool
  - Additional updates for 2017 Tool
- 2017 GHGRP coverage
  - ~500 reporting facilities
  - 489,055 wells
  - 39 basins
  - 1,466 sub-basins (county + formation type)
  - Reporters cover ~70% of national liquids production

GHGRP Subpart W Updates

- March 2019 Updates (2017 reporting year)
  - Associated Gas Venting and Flaring (fraction flared)
  - Condensate Tanks (VRU and flaring fraction)
  - Crude Oil Tanks (VRU and flaring fraction)
  - Dehydrators (number per well) *new for 2017
  - Fugitives (component counts) *new for 2017
  - Heaters (number per well)
  - Pneumatic Devices (number of low, intermittent, and high-bleed devices per well)
  - Wellhead Compressor engines (number per well)

Activity Data

- DrillingInfo
- State O&G commission data sets
  - AZ, ID, IL, IN, KY, MD, TN
- State supplied updates
  - IL
  - KS
  - OH
  - OK
  - PA
  - TX
  - WV

Emission Factors

- Drilling rig and hydraulic fracturing engines
  - Based on MOVES model for 2017
- Oil well completions
  - CenSARA Emission Factor (EF) for conventional
  - Greenhouse Gas Emission Inventory EF for unconventional
- PM10 filterable, PM2.5 filterable, and PM condensable EFs added
  - Drilling and hydraulic fracturing
  - Artificial lift
  - CBM dewatering pumps
  - Dehydrators
  - Heaters
  - Wellhead and lateral compressors

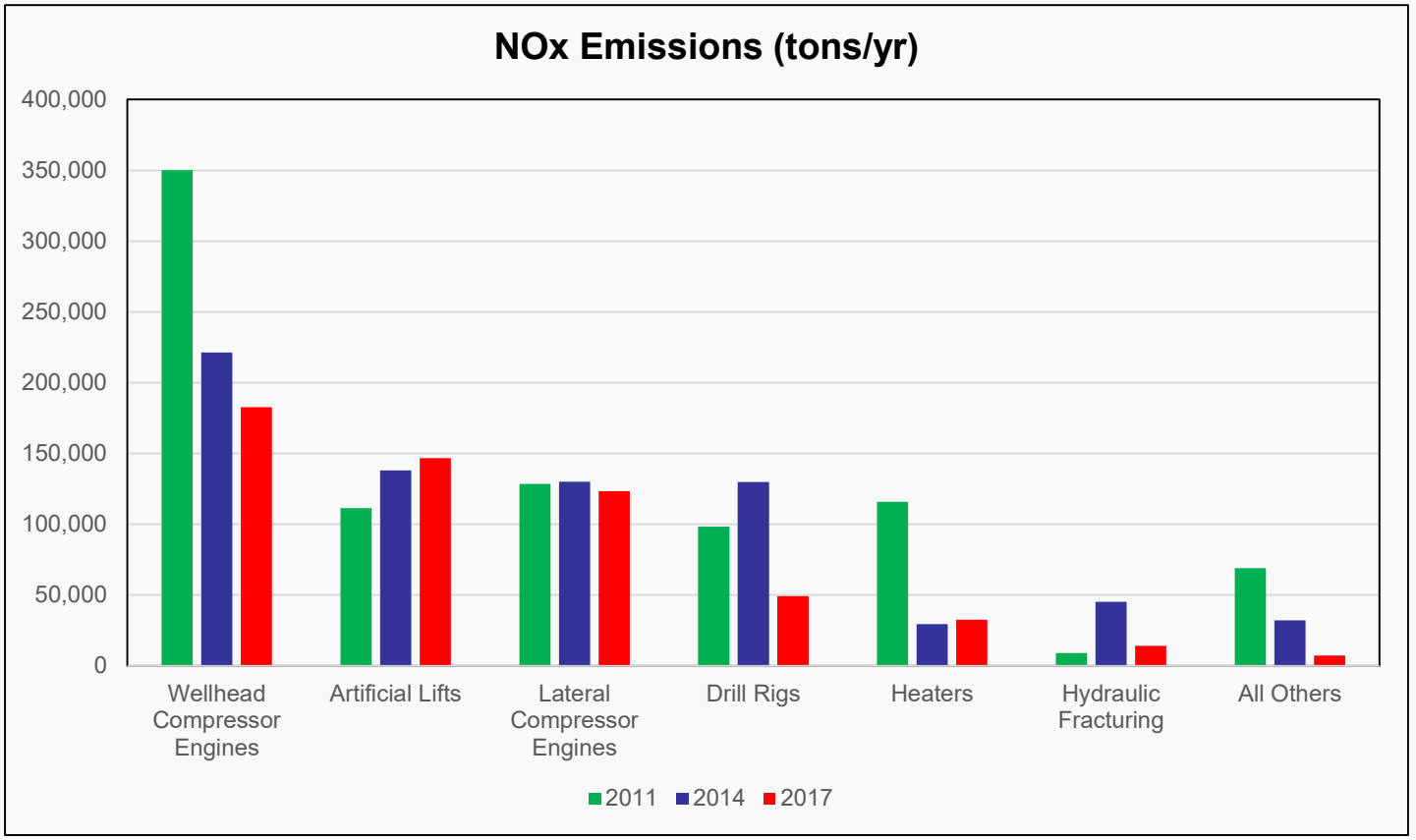
Basin Factors

- Pennsylvania Gas Speciation Profiles
  - Gas-actuated pumps
  - Fugitives
  - Pneumatics
- SPECIATE data for liquids unloading (Uinta Basin)
- West Virginia EPA/ORD Study
  - Gas composition data (canister analysis)
  - Site visit notes
  - Permit application review

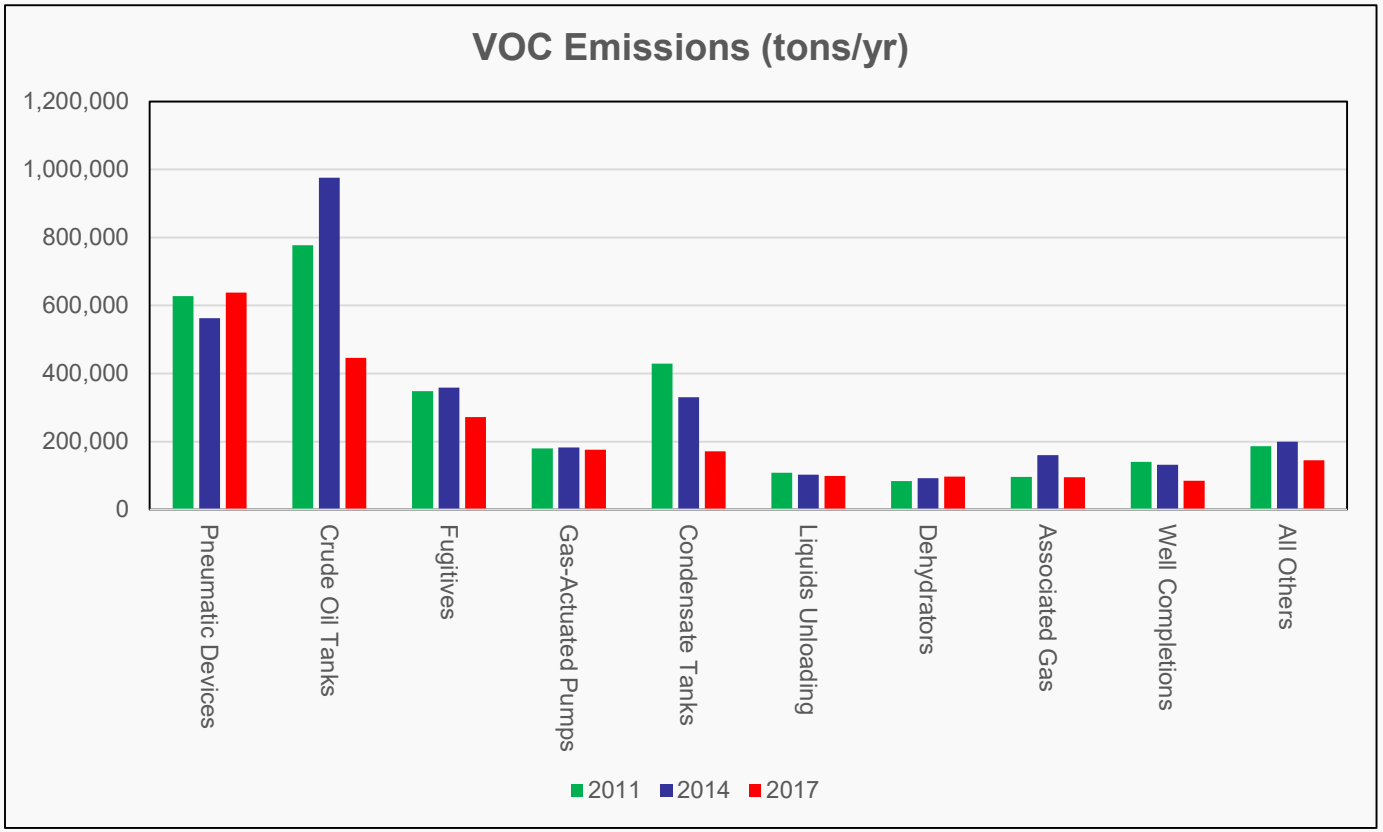
Miscellaneous Updates

- 2017 temperature data
- State/county code changes (South Dakota, Alaska)
- Ozone attainment status
- SCC updates
  - Produced water emissions disaggregated for oil, gas, and CBM
  - Associated gas venting/flaring
  - Artificial lift engines

Tool Results - NOx



Tool Results - VOC



Improvements Planned for 2020

- Addition of control options for produced water tanks
- Addition of geographic resolution for tribal areas
  - Allow for EIS output for tribal inventories
- Additional control options/scenarios
  - Electric-powered compressor engines
  - Electric-powered exploration engines (drilling, fracturing)
  - VRU controls on other source types

Questions?

Regi Oommen (regi.oommen@erg.com)
Mike Pring (mike.pring@erg.com)
Jennifer Snyder (snyder.Jennifer@epa.gov)