



# **Improvements for the 2014 Industrial, Commercial, and Institutional (ICI) Combustion Emissions Inventory for Texas**

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# Acknowledgments

- **TCEQ**
  - Ms. Paige Sprague, TCEQ Work Order Manager
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- **ERG**
  - Stacie Enoch, Robin Weyl, and Stephen Treimel

Final report located at:

[https://www.tceq.texas.gov/airquality/airmod/project/pj\\_report\\_ei.html](https://www.tceq.texas.gov/airquality/airmod/project/pj_report_ei.html)

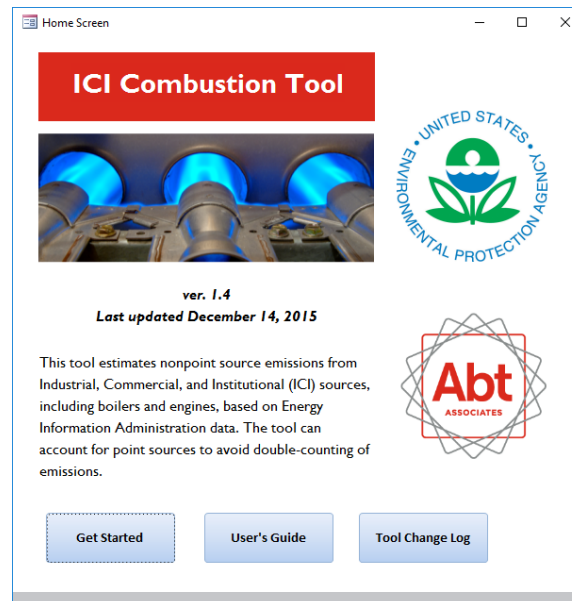


# Overview of the Presentation

- Background/Information
- Project Goals
- Data Sources
- Methodology
- Results
- Emissions Comparison
- Improvements

# Background/Information

- EPA developed the ICI Combustion Tool (“Tool”) to aid states with their 2014 NEI submittal
  - Version 1.4 of the Tool was released in December 2015





# Background/Information

- Tool uses state-level ICI energy consumption data, with adjustments for:
  - nonroad mobile sources
  - fuel used as feedstock for manufacturing
- Allows Users to:
  - Enter point sources activity & emissions adjustments.
  - Modify certain default parameters at the state-level
- Tool calculates county-level emissions and exports to EIS Staging Tables



# Project Goals

- Tool not reflective of 2014
  - Activity data: 2013
  - Census data: 2011/2012
  - Nonfuel Use of Energy Assumptions: 2006



## Project Goals (cont.)

- Defaults not reflective of Texas and its counties
  - Boiler/Engine Split for distillate fuel oil
    - Distillate fuel oil engine emission factors are higher than boiler emission factors
    - In the Tool, one boiler/engine split factor is applied to all the counties.
  - Fuel Use Split
  - TCEQ submitted zero emission values for ICI – Distillate Fuel Oil in Version 1 of the 2014 Nonpoint NEI



# Project Goals (cont.)

- Industrial updates:
  - Distillate Fuel Oil-fired Boilers
  - Distillate Fuel Oil-fired Engines
  - Natural Gas-fired Boilers and Engines
  
- Commercial/Institutional updates:
  - Distillate Fuel Oil-fired Boilers
  - Distillate Fuel Oil-fired Engines
  - Natural Gas-fired Boilers and Engines





## Project Goals (cont.)

- Other ICI updates:
  - Kerosene Fuel Combustion
  - LPG Combustion
  - Residual Fuel Oil Combustion
  - Wood Combustion
- ICI Coal combustion emissions estimates are covered in the point sources emissions inventory.



# Data Sources

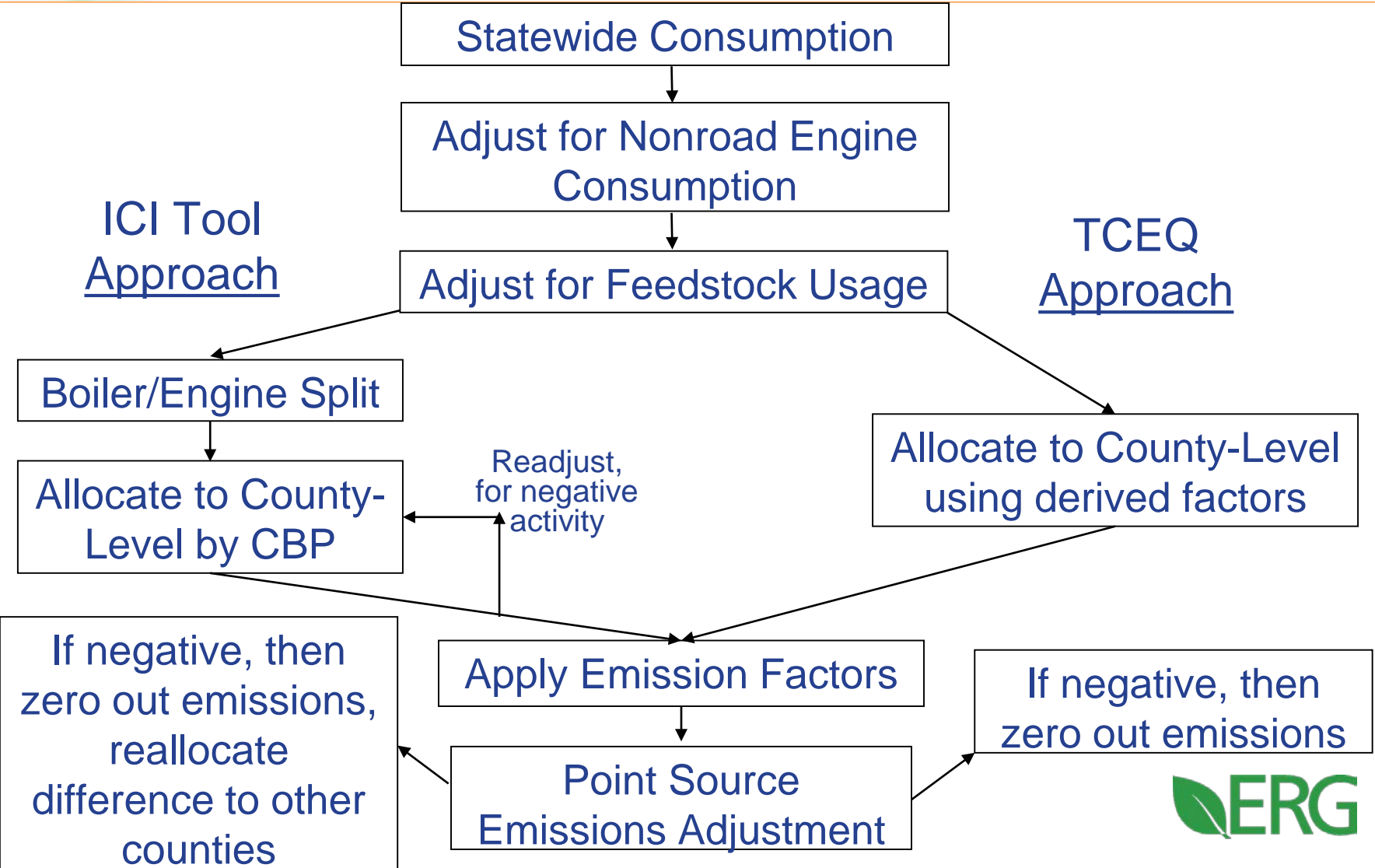
- EPA's Boiler Inspection Data with Projections
- TX Department of Licensing and Regulation Boiler Data Search
- TCEQ New Source Review Permit Information System
- EPA's Greenhouse Gas Reporting System



## Data Sources (cont.)

- Energy Information Administration
- EPA's Point and Nonpoint Sources NEI
- U.S. Census Bureau County Business Patterns (CBP) and Census of Government (COG)
- EPA Regulatory Database for Boilers and Engines

# Distillate Oil Methodology





# Distillate Oil Methodology (cont.)

- Variables needed:
  - 2014 statewide consumption data from EIA
  - Boiler/Engine split – ICI Tool assumes 50/50 split for distillate fuel oil
  - MECS Survey Data – ICI Tool uses 2006 survey data
  - County Allocation Factors – ICI Tool uses 2011 CBP/2012 COG
  - Percent Non-Nonroad – uses data from the “Draft RIA, Estimated Costs of Low-Sulfur Fuels”



# Distillate Oil Methodology (cont.)

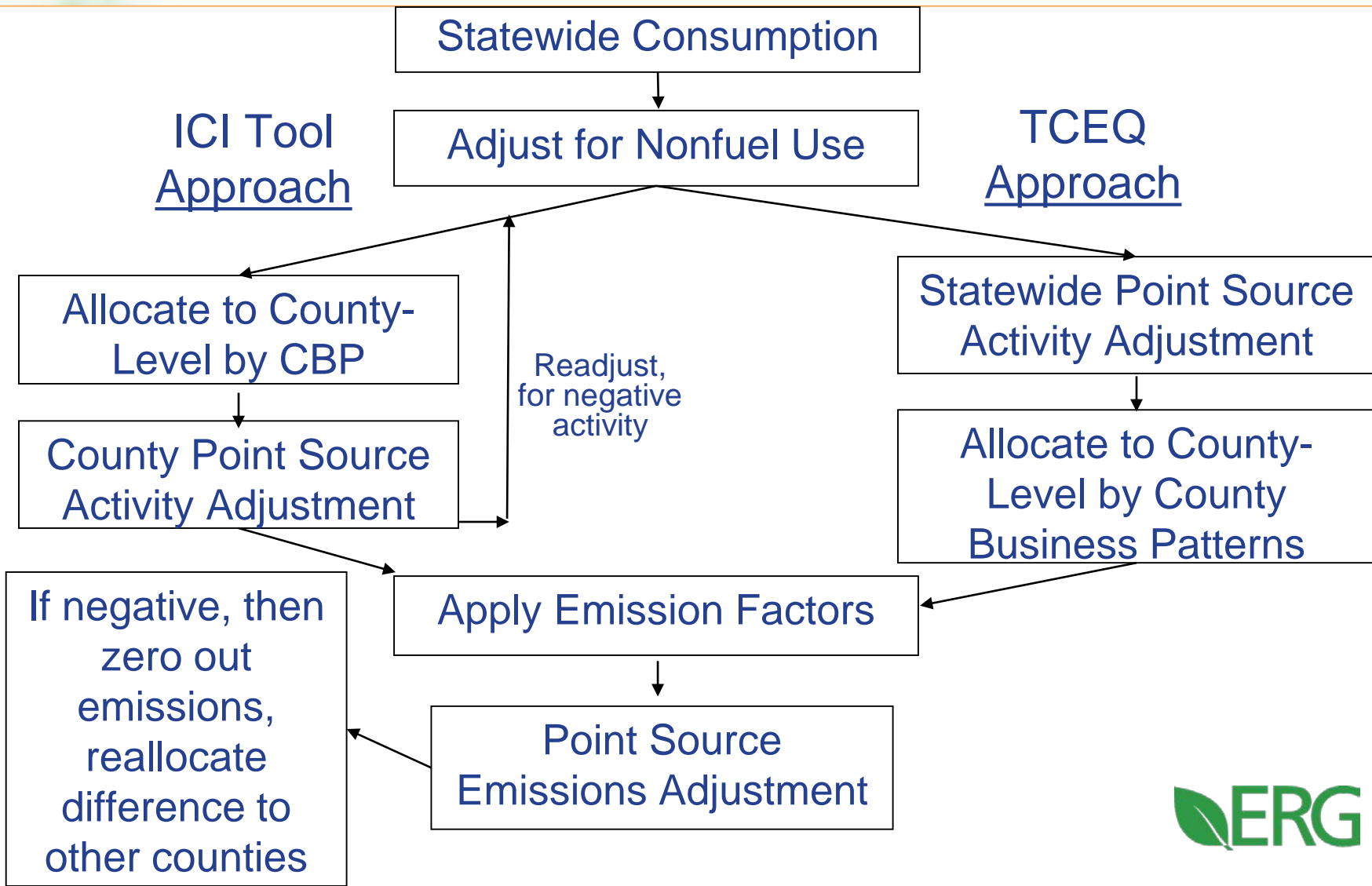
- Boiler/Engine Split – data mined from:
  - Boiler Inspection Database
    - Distillate boilers: 35 TX counties
  - V1 of the 2014 NEI
    - Distillate engines: 71 TX counties
- Reviewed:
  - boiler/engine ratings and capacities
  - Hours of operation
  - Fuel consumed
- Updated from boiler/engine split from 50/50 statewide to 39.5/60.5



# Distillate Oil Methodology (cont.)

- MECS Data
  - Updated “South” % feedstock using 2010 data (note: 2014 preliminary data was collected by EIA, but not released in time for this study)
- County-Allocations
  - Combination of Boiler Inspection Database, Version 1 of the 2014 NEI, and 2014 CBP
- Percent Non-Nonroad – Updated for TX:
  - Distillate from Oil Company: 50% to 0%
  - No. 2 Fuel Oil from Commercial: 100% to 0%

# Natural Gas Methodology







# Natural Gas Methodology (cont.)

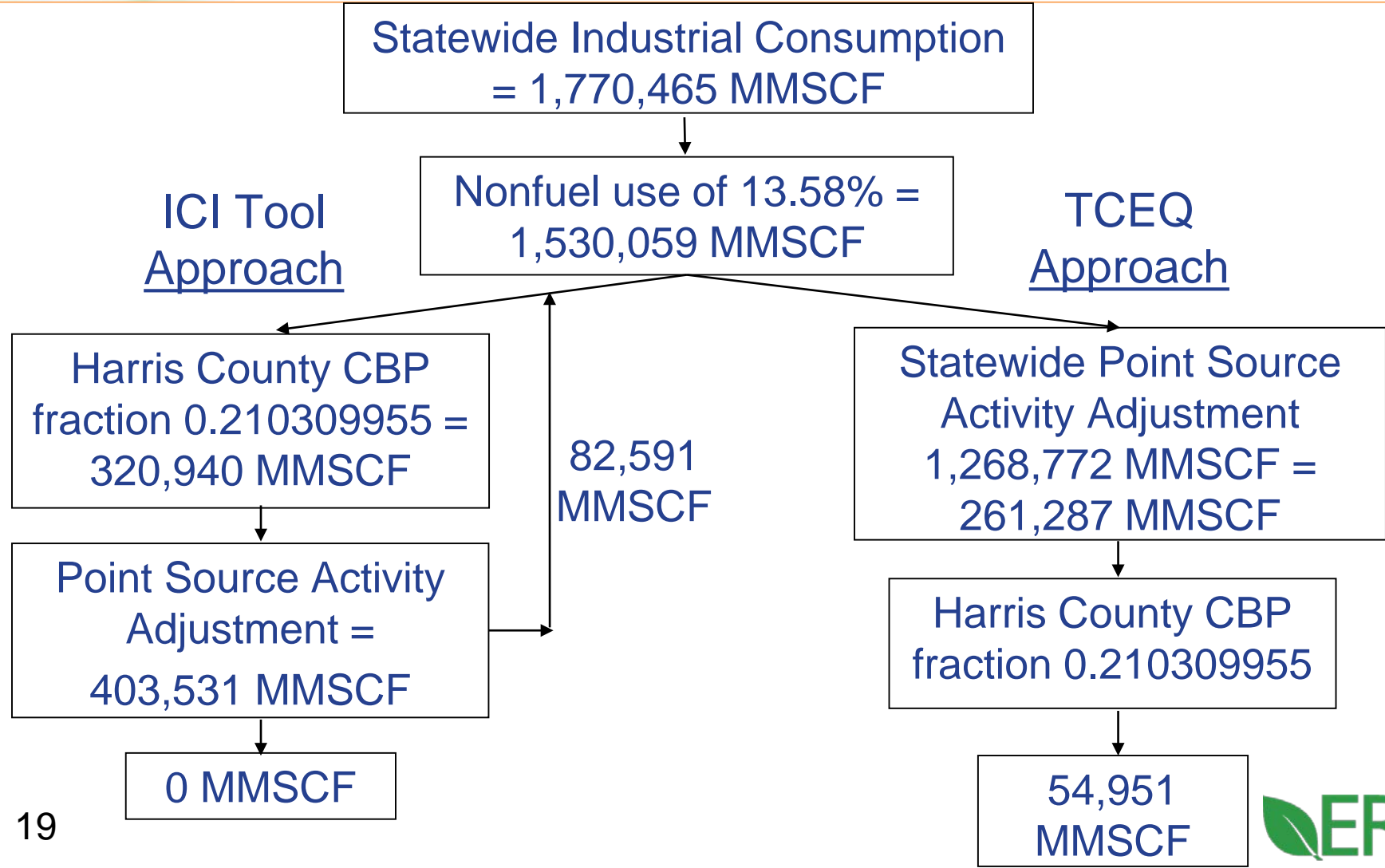
- Rationale for switching order:
  - Allocating first by employment creates “artificial” county-level estimates
  - Point source activity adjustments unintentionally may create zero activity in counties
    - Tool approach - Negative counties are adjusted to zero; the difference is then reallocated to other counties.



# Natural Gas Methodology (cont.)

- Example: Harris County, TX
  - 2014 NEI V1 contains 137 industrial point source facilities
  - Census Bureau: largest industrial (NAICS 31-33) employer in Texas (2014)
    - ~4,100 industrial establishments
    - ~175,000 industrial employees
  - Total TX employment = 835,348
    - Fraction of Harris County, TX employment to TX statewide employment = 0.210309955

# Natural Gas Methodology (cont.)





# Natural Gas Methodology (cont.)

- By not switching the order:
  - 48 TX counties were zeroed out for industrial natural gas consumption
  - 9 TX counties were zeroed out for commercial/institutional natural gas consumption



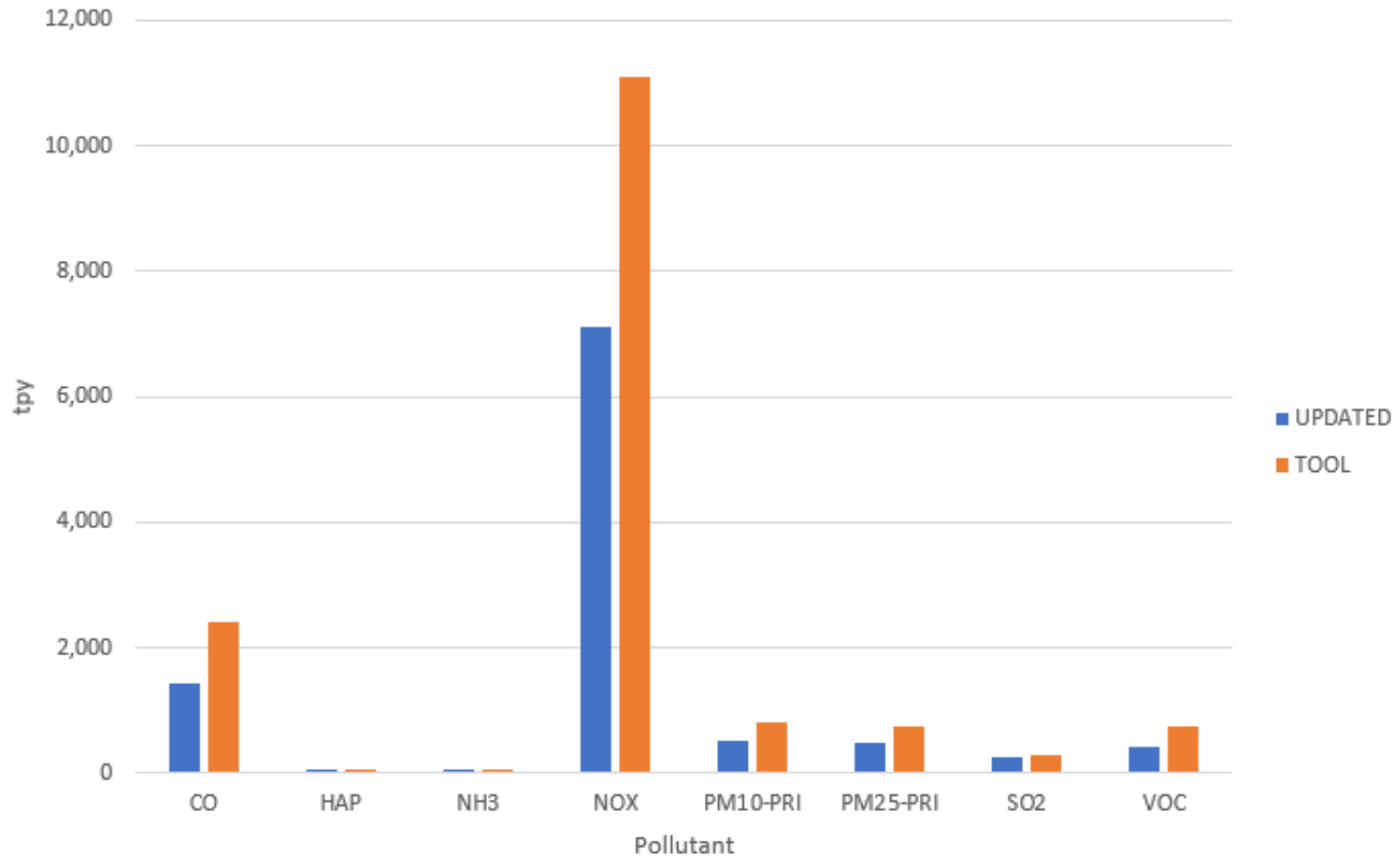
# Other Source Categories Methodology

- Updated the Tool with 2014 consumption data
- Updated County Allocation factors for TX to 2014 CBP and 2015 COG
- Updated MECS to 2010 for:
  - LPG
  - Residual Fuel Oil
- Per TCEQ direction, zeroed out coal and wood combustion



# Distillate Oil Results

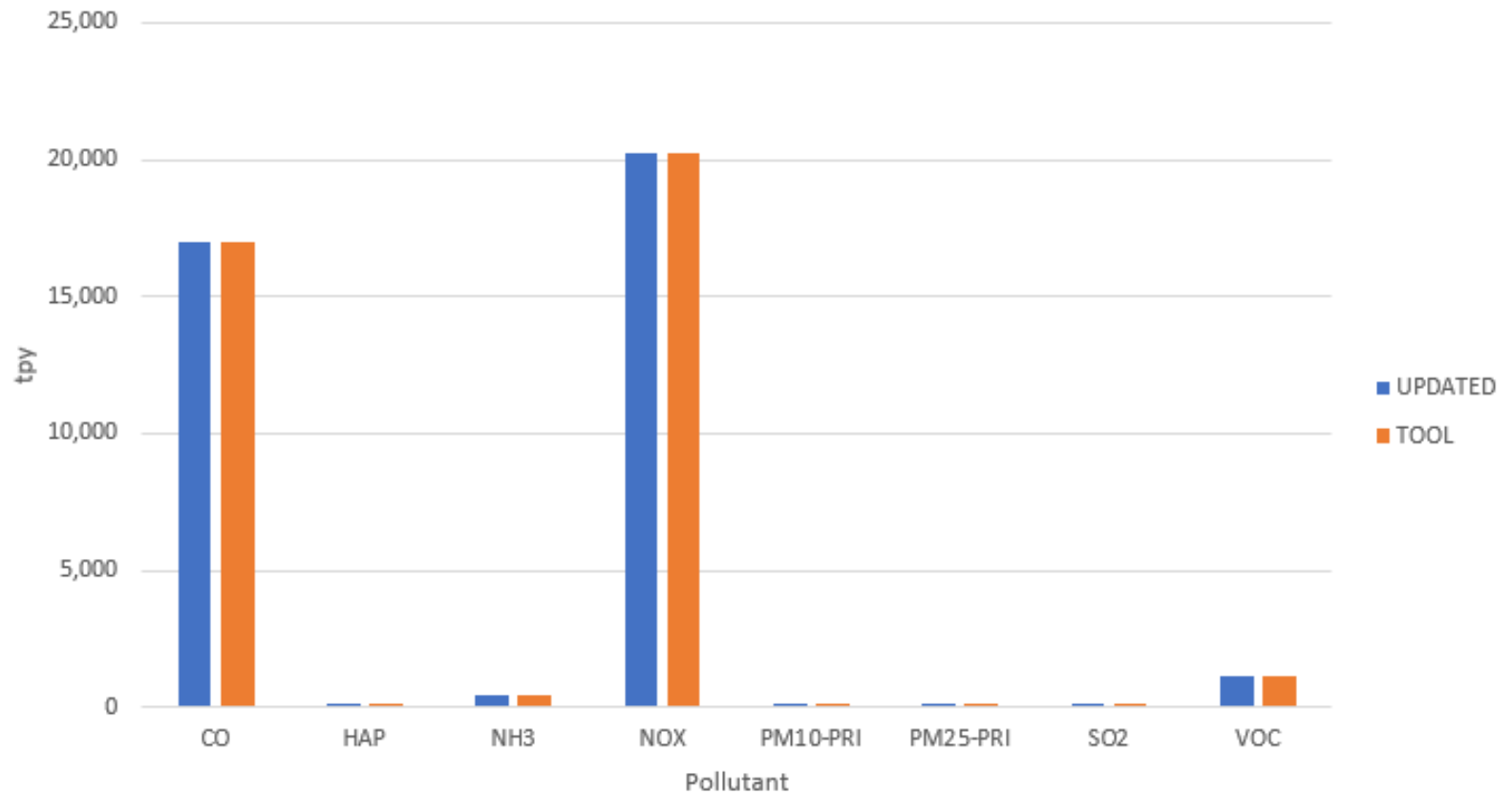
ICI - Distillate Fuel Oil: Updated Vs. Tool Emissions





# Natural Gas Results

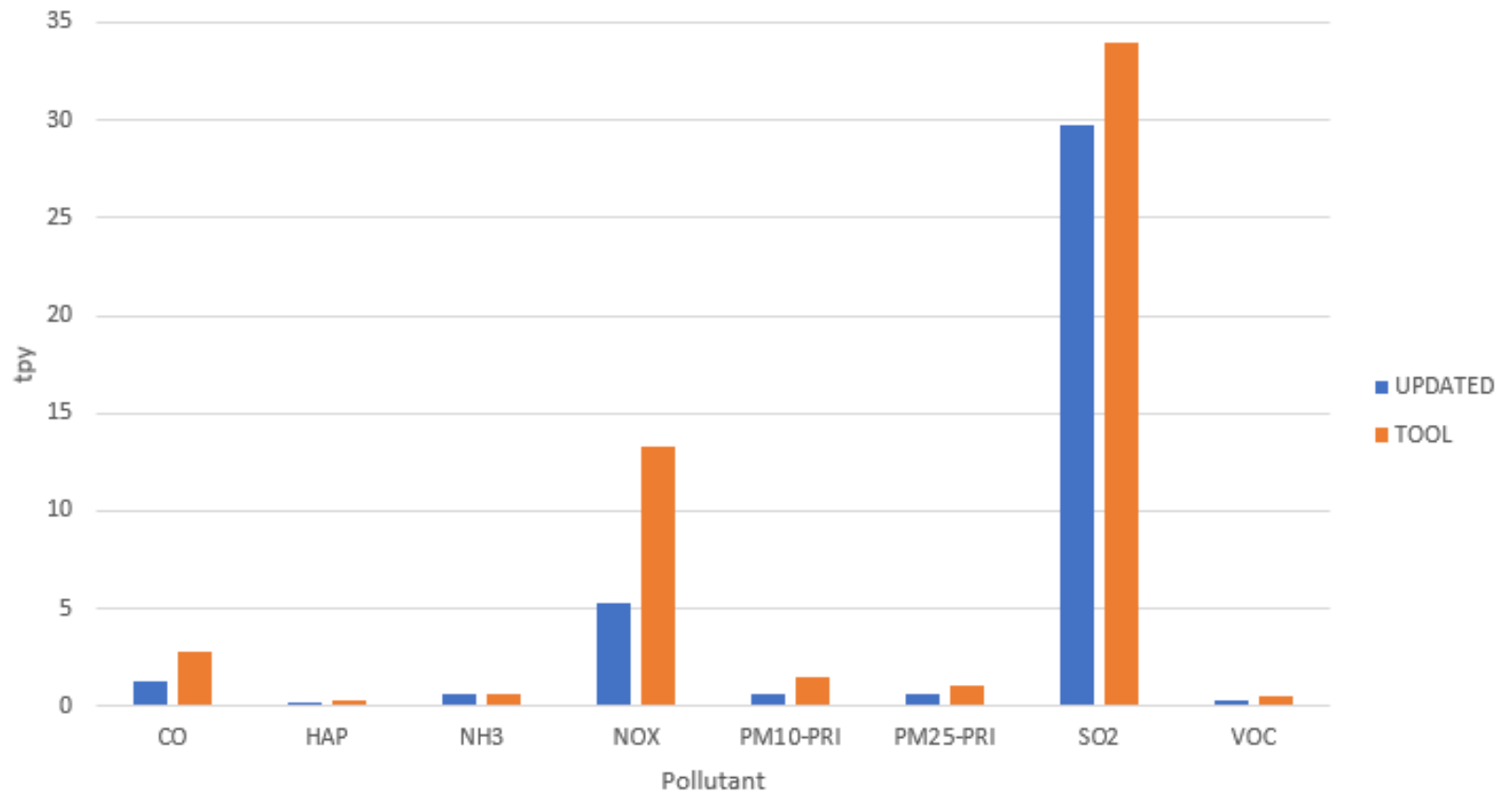
### ICI - Natural Gas: Updated Vs. Tool Emissions





# Kerosene Results

ICI - Kerosene: Updated Vs. Tool Emissions

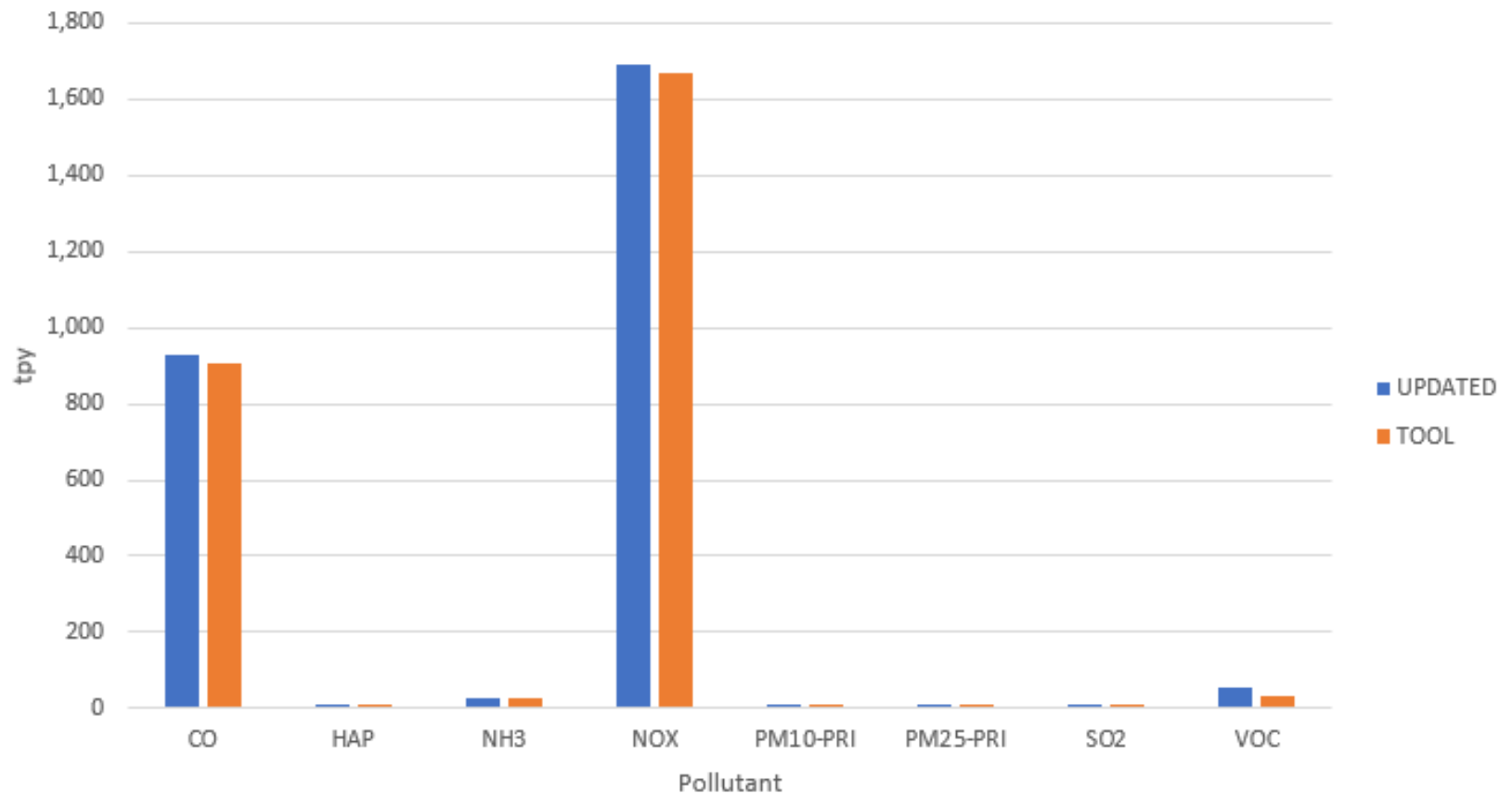






# LPG Results

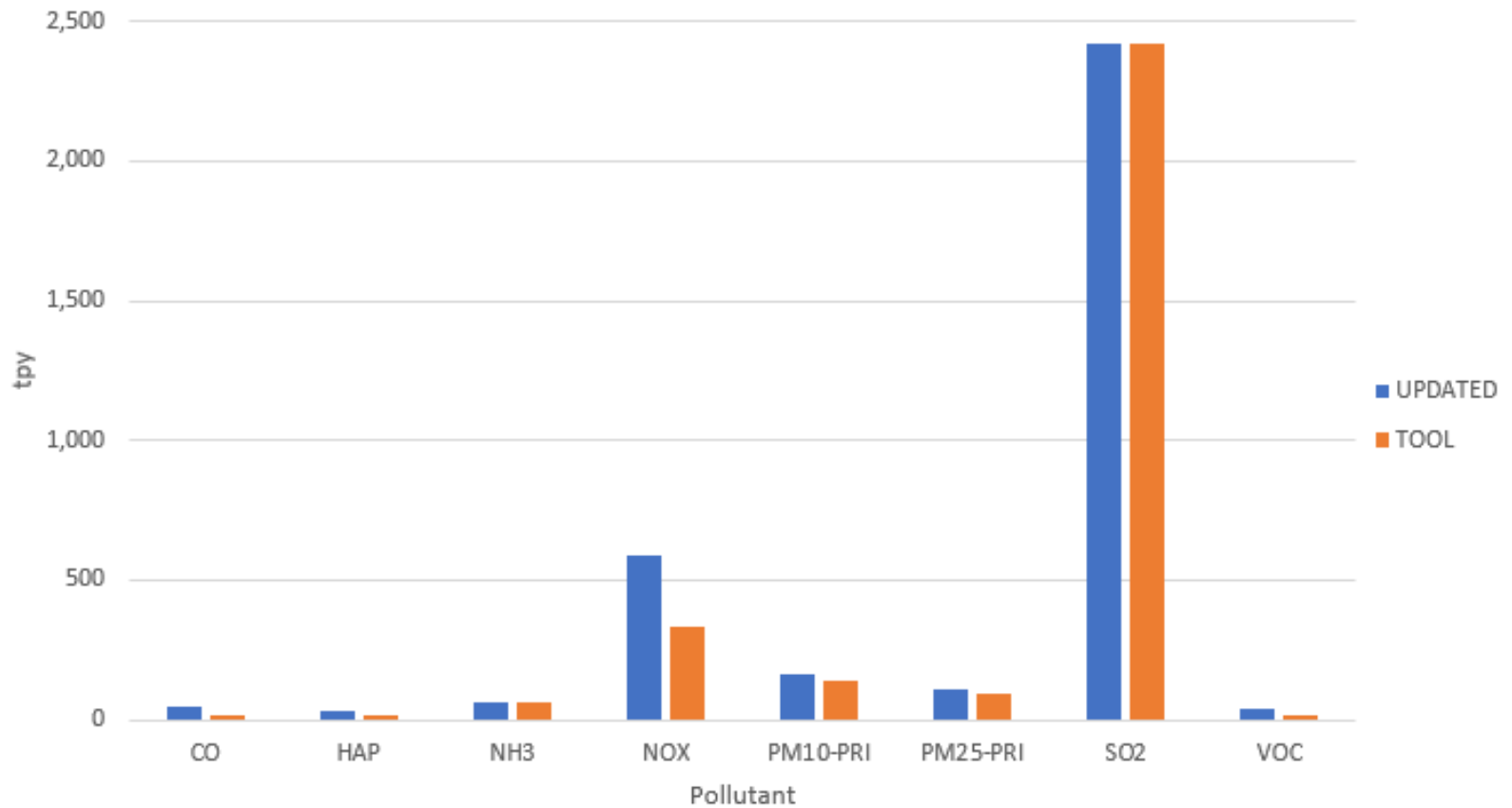
### ICI - LPG: Updated Vs. Tool Emissions





# Residual Fuel Oil Results

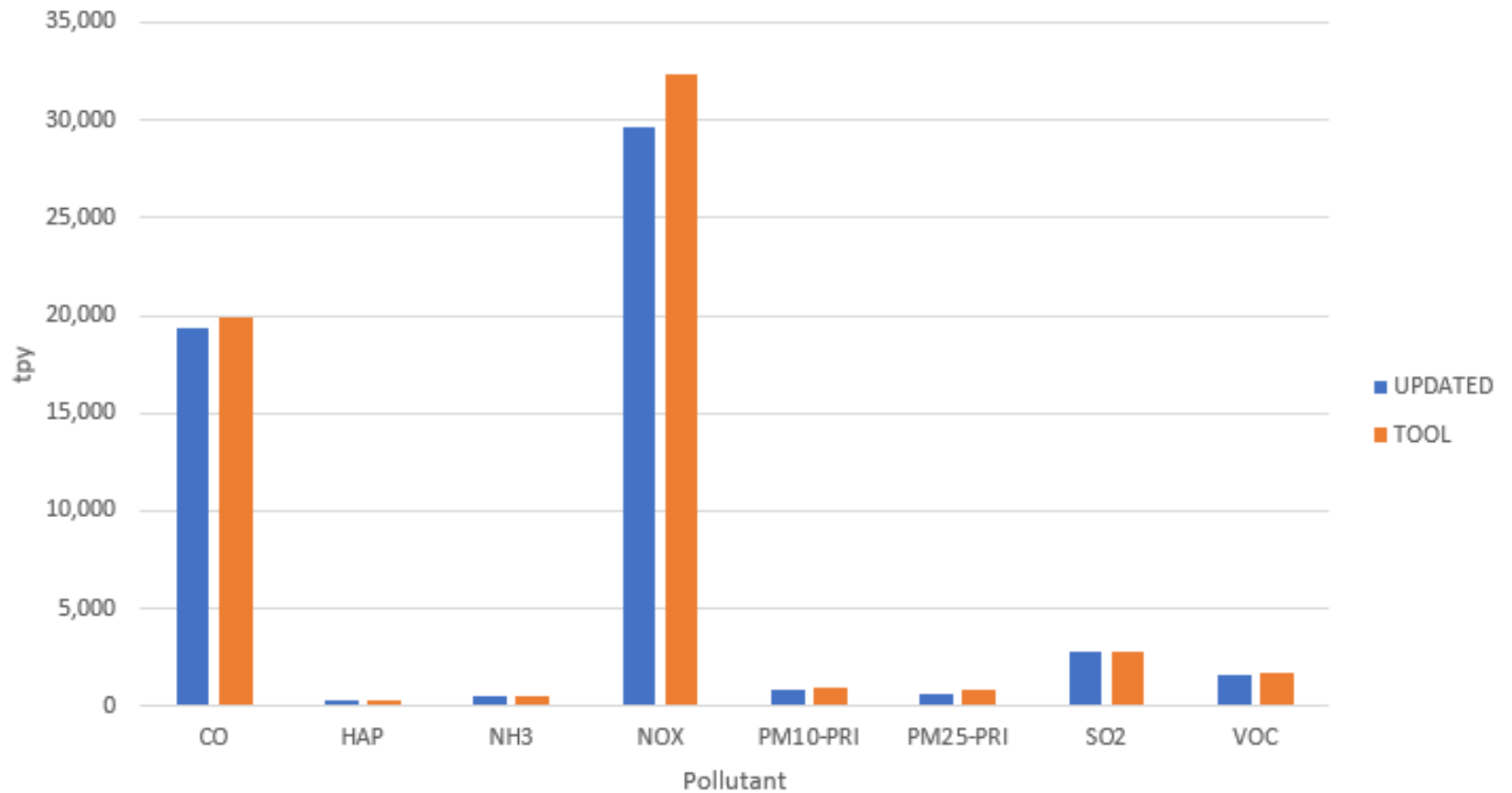
ICI - Residual Fuel Oil: Updated Vs. Tool Emissions





# Emissions Comparison

ICI - Statewide: Updated Vs. Tool Emissions



# Emissions Comparison (cont.)

Sector	Pollutant	ICI Tool Emissions (tpy)	TCEQ Emissions (tpy)	% Change
Industrial	CO	13,627	13,116	-4
	HAP	18	19	5
	NH3	478	478	0
	NOX	24,657	21,969	-11
	PM10-PRI	937	755	-19
	PM25-PRI	821	644	-22
	SO2	2,656	2,737	3
	VOC	1,295	1,170	-10

# Emissions Comparison (cont.)

Sector	Pollutant	ICI Tool Emissions (tpy)	TCEQ Emissions (tpy)	% Change
Commercial/ Institutional	CO	6,278	6,282	<0.5
	HAP	6	6	<0.5
	NH3	37	37	<0.5
	NOX	7,655	7,656	<0.5
	PM10-PRI	41	42	<0.5
	PM25-PRI	33	34	<0.5
	SO2	95	95	<0.5
	VOC	412	412	<0.5

# Harris County, TX Comparison

County	Pollutant	ICI Tool Emissions (tpy)	TCEQ Emissions (tpy)	% Change
Harris County, TX	CO	1,505	3,781	151%
	HAP	3	4	45%
	NH3	18	104	475%
	NOX	3,658	4,916	34%
	PM10-PRI	187	68	-64%
	PM25-PRI	167	52	-69%
	SO2	555	539	-3%
	VOC	194	254	31%



# Improvements

- Updated distillate fuel oil boiler/engine split to better reflect Texas conditions
  - Includes better allocations at the county level
- Updated CBP and COG data for 2014/2015
- Updated natural gas and distillate fuel oil methodologies
  - Increase county-level coverage



Thanks!

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