The Year 2014 Gulfwide Emissions Inventory Study

BOEM Contract No. M13PC00005
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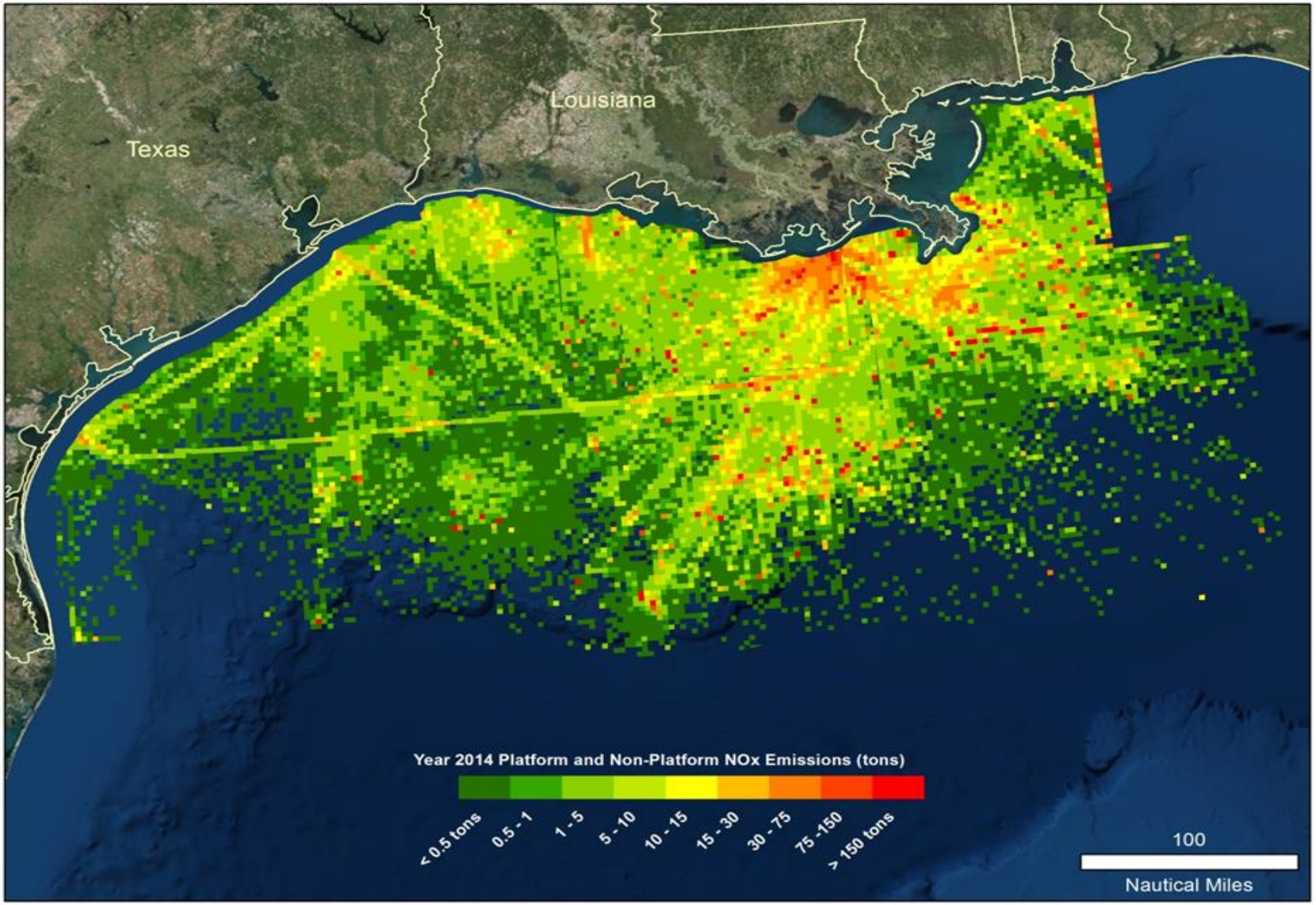

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https://www.boem.gov/espis/5/5626.pdf

Objectives

- Develop a calendar year 2014 Gulfwide air pollutant emissions inventory of OCS sources (platform and non-platform)
- Conduct an Emissions Trends Analysis with detailed comparisons and deviations of all Gulf of Mexico OCS region 2000, 2005, 2008, 2011, and 2014 emissions data
- Conduct a Hazardous Air Pollutant (HAP) Scoping Study for select production platforms

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Introduction

- The *Year 2014 Gulfwide Emissions Inventory Study* is BOEM's fifth consecutive air quality emissions inventory for the Gulf of Mexico OCS
- The inventory cycle corresponds with the USEPA's onshore periodic emissions inventory
- Used by states and Regional Planning Organization's for SIP demonstrations, and by BOEM in the NEPA process and air quality assessments
- Used in the USEPA's Greenhouse Gas Reporting Program

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Data Collection: Platforms

- Gulfwide Offshore Activities Data System (GOADS-2014)
- User's Guide, Installation Instructions, and Frequently Asked Questions (FAQs)
- Support services provided throughout 2014
  - GOADS-2011 "static" data files provided to reduce data entry
  - Responded to operator questions regarding reporting applicability, GOADS usage, and error messages received

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Platform Sources

- Amine units
- Boilers
- Diesel engines
- Drilling equipment
- Flares
- Fugitives
- Glycol dehydrators
- Loading losses
- Losses from flashing
- Mud degassing
- Natural gas engines
- Natural gas, diesel, and dual fuel turbines
- Pneumatic pumps
- Pressure/level controllers
- Storage Tanks
- Vents

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Development of Platform Estimates

- Activity data file submittal required by April 15, 2015
- Extensive QA/QC conducted
- Gulfwide DBMS software was updated
  - Oracle-based software used to estimate platform emission estimates
  - Updated emission factors, emission estimation methods
  - Estimates for glycol dehydrators and amine units calculated outside the DBMS

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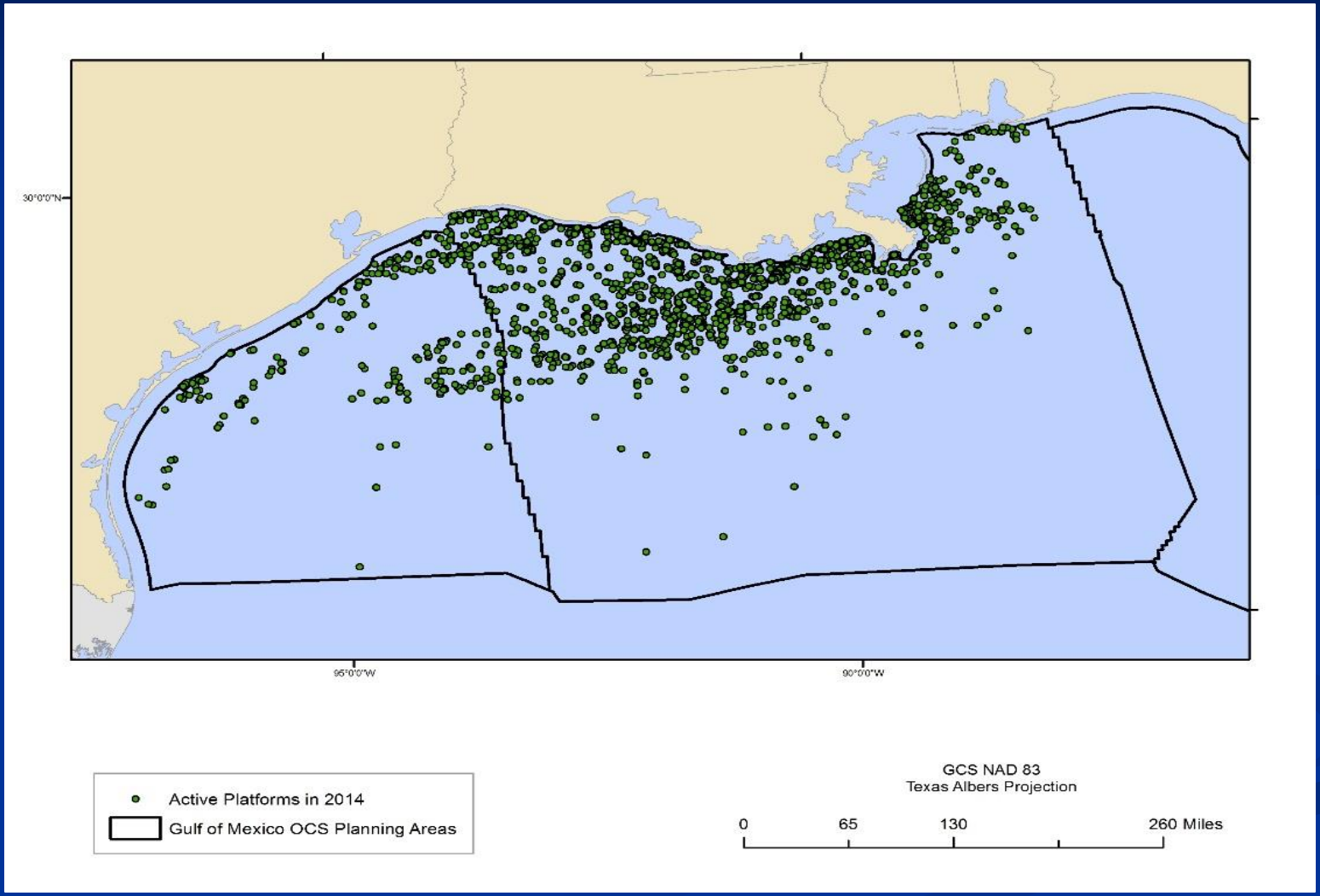
Active Platform Locations



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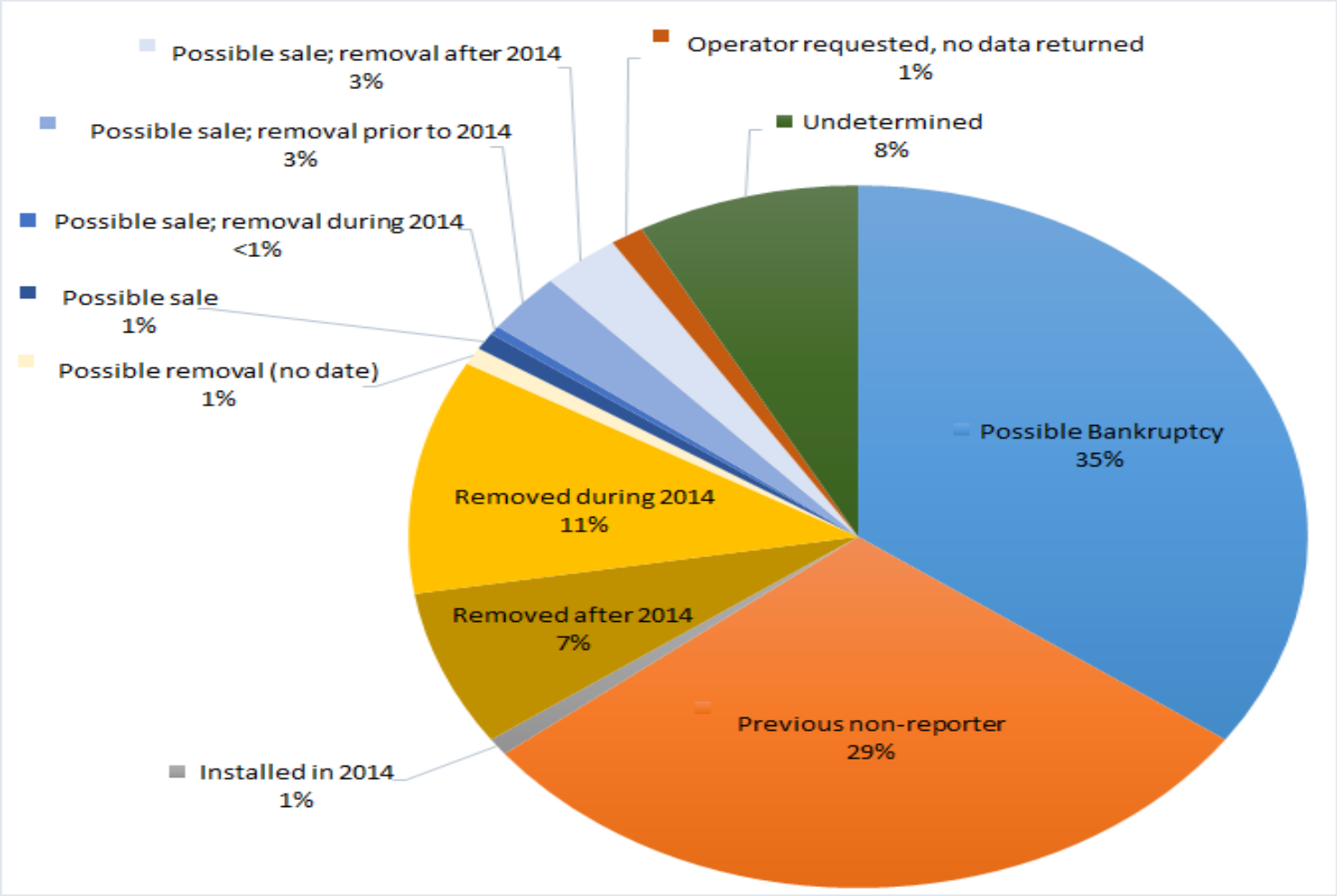
Non-Reporters



Comparison to 2011 Inventory: Production Platforms

Calendar Year	CO Emissions (tpy)	NO_X Emissions (tpy)	PM_{10}-PRI Emissions (tpy)	SO_2 Emissions (tpy)	VOC Emissions (tpy)
2014	50,052	48,691	668	502	48,210
2011	70,339	84,128	838	3,197	54,724
Percent Difference	-29%	-42%	-20%	-84%	-12%

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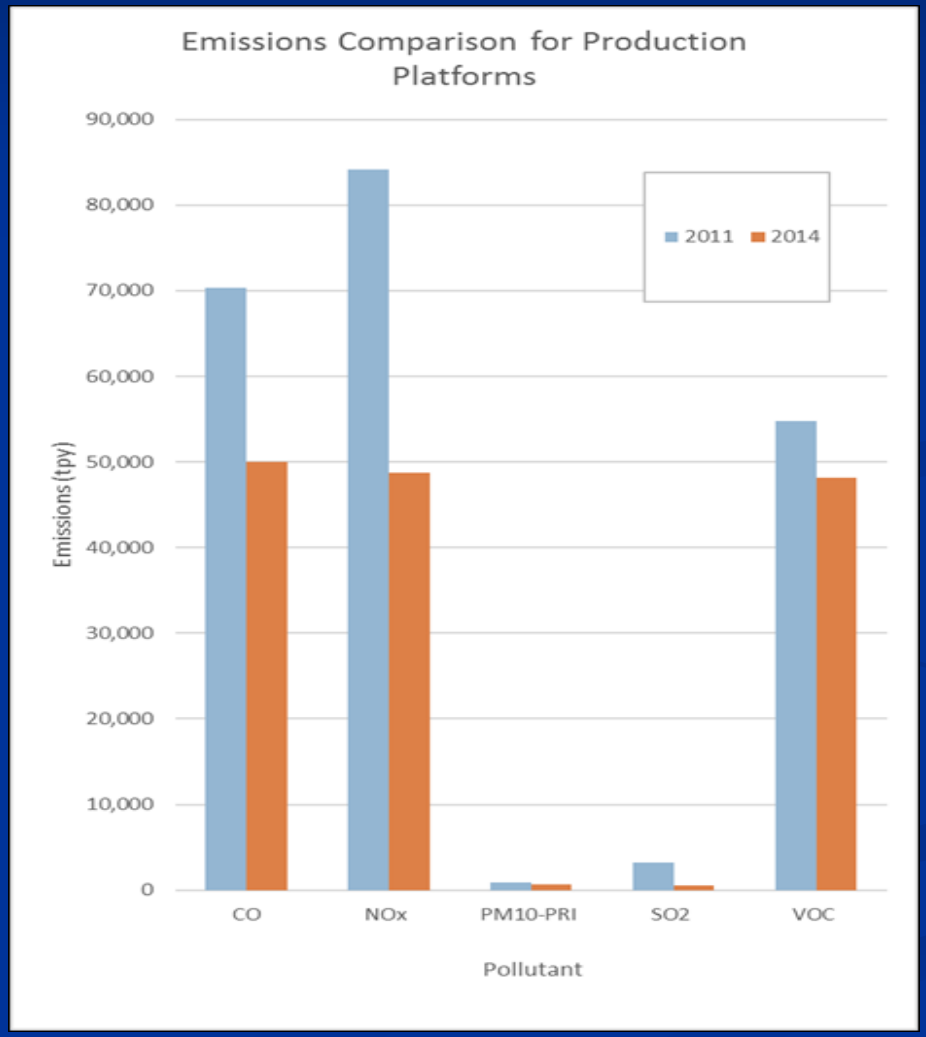
Comparison to 2011 Inventory: Production Platforms



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Non-platform Sources

- Oil/Gas Production Sources
  - Drilling rigs
  - Pipelaying operations
  - Support helicopters
  - Support vessels
  - Survey vessels
- Non-Oil/Gas Production Sources
  - Biogenic and geogenic sources
  - Commercial fishing vessels
  - Commercial marine vessels
  - LOOP
  - Military vessels
  - Recreational vessels
  - Vessel lightering

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Data Collection: Non-platform Sources

- Oil/gas production source activity data obtained from:
  - BOEM
  - PortVision Automatic Identification System (AIS) data
  - Information Handling Service (IHS) Register of Ships
  - Rigzone drilling rig attribute data
  - Helicopter Safety Advisory Conference safety report

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Data Collection: Non-platform Sources

- Non-oil/gas production source activity data obtained from:
  - PortVision AIS data
  - IHS Register of Ships
  - NOAA - National Marine Fisheries Service
  - U.S. Coast Guard

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Development of Non-platform Estimates

- Most up-to-date emission factors for marine diesel engines obtained from the USEPA
- LOOP and vessel lightering evaporative and ballasting emissions estimated
- Use of AIS data in conjunction with IHS & Rigzone vessel attribute data for accurate vessel emission estimates

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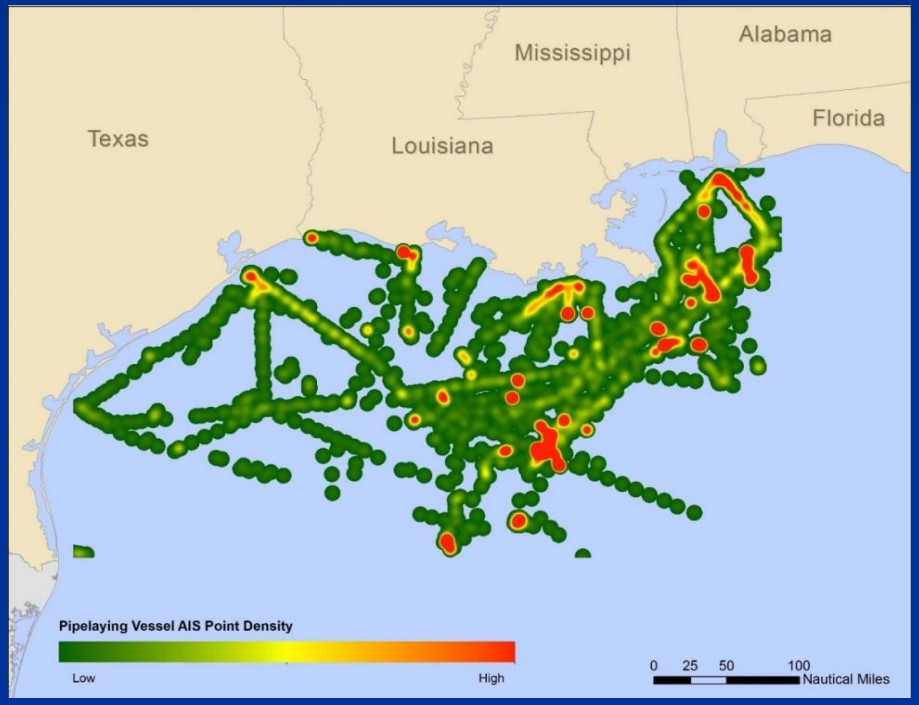
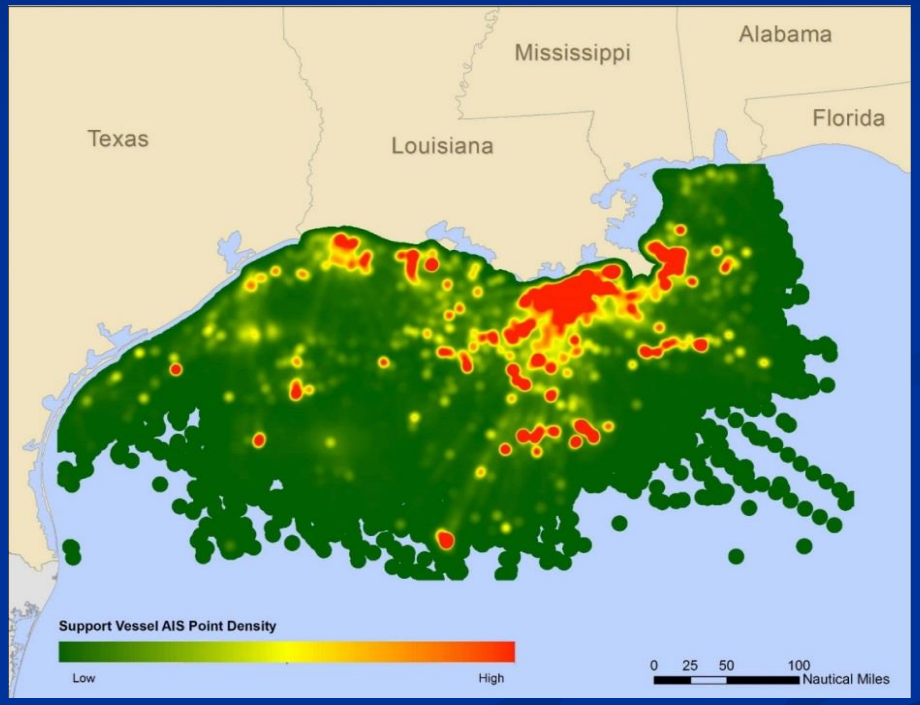
Pipelaying & Support Vessel Density





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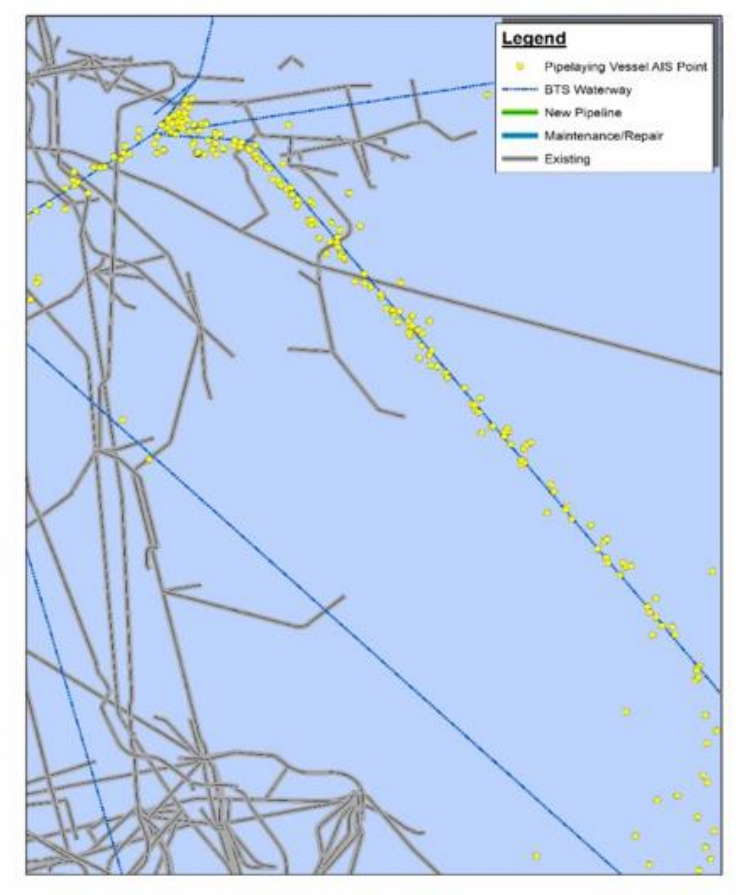
Example of AIS Accuracy: Pipelaying



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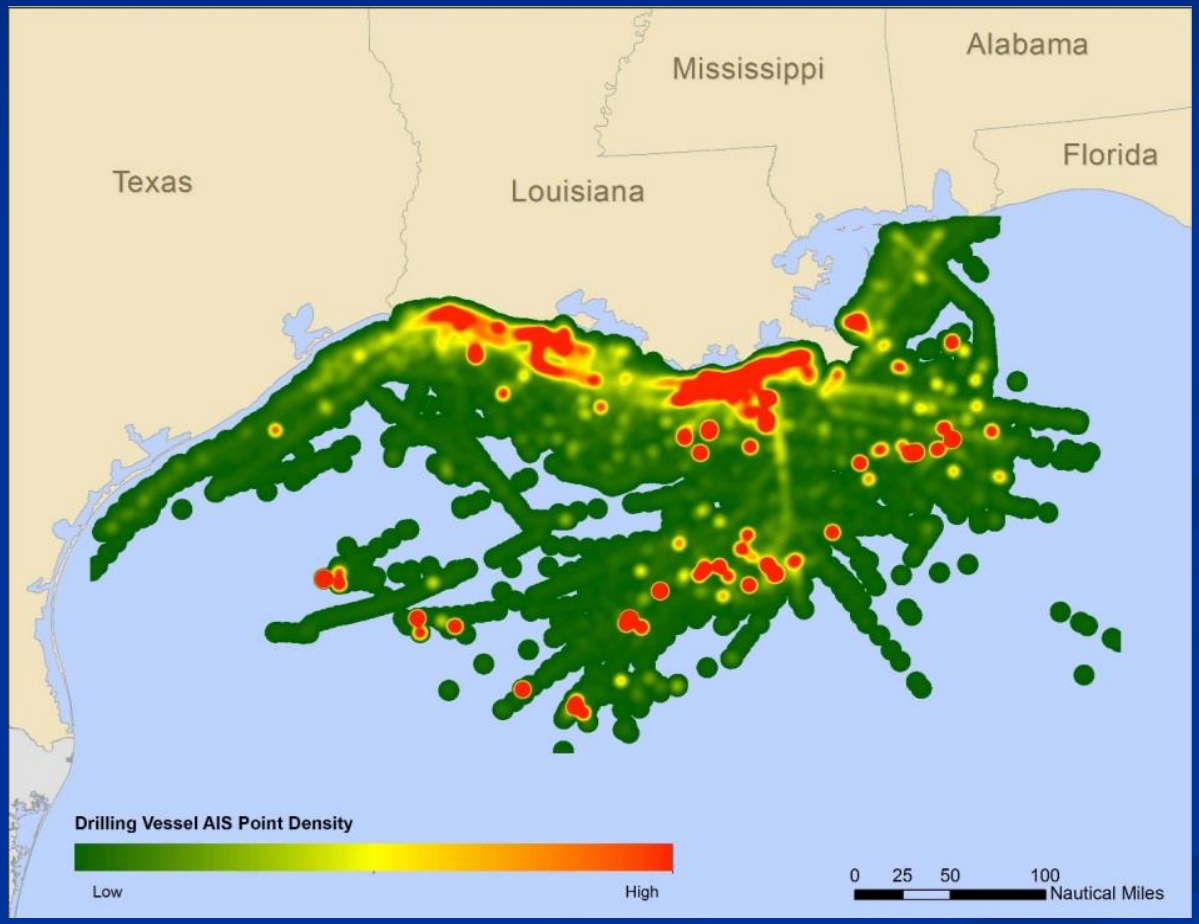
Drilling Vessel Density



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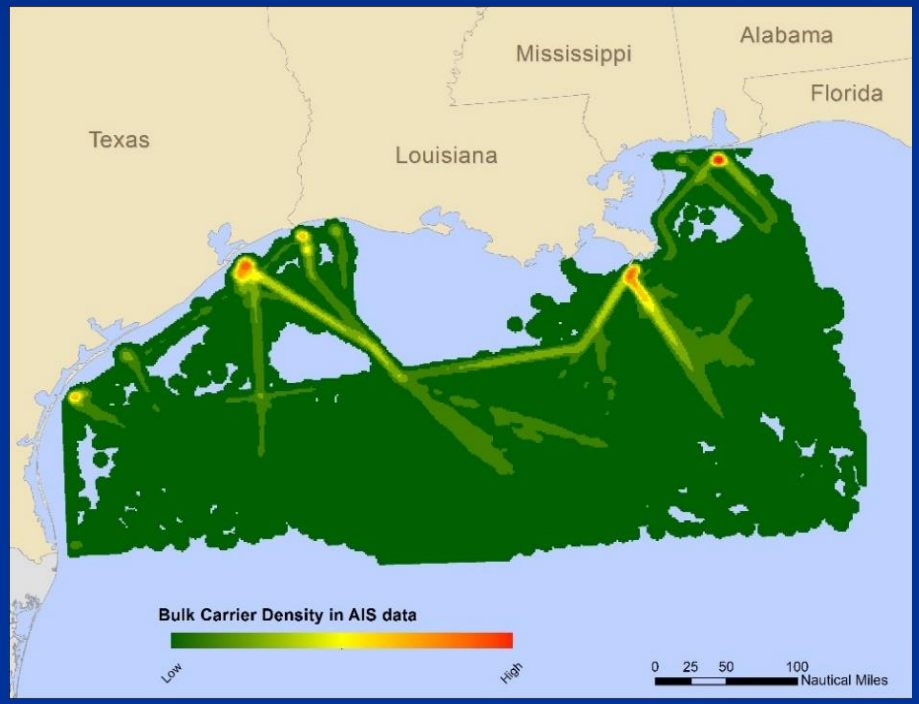
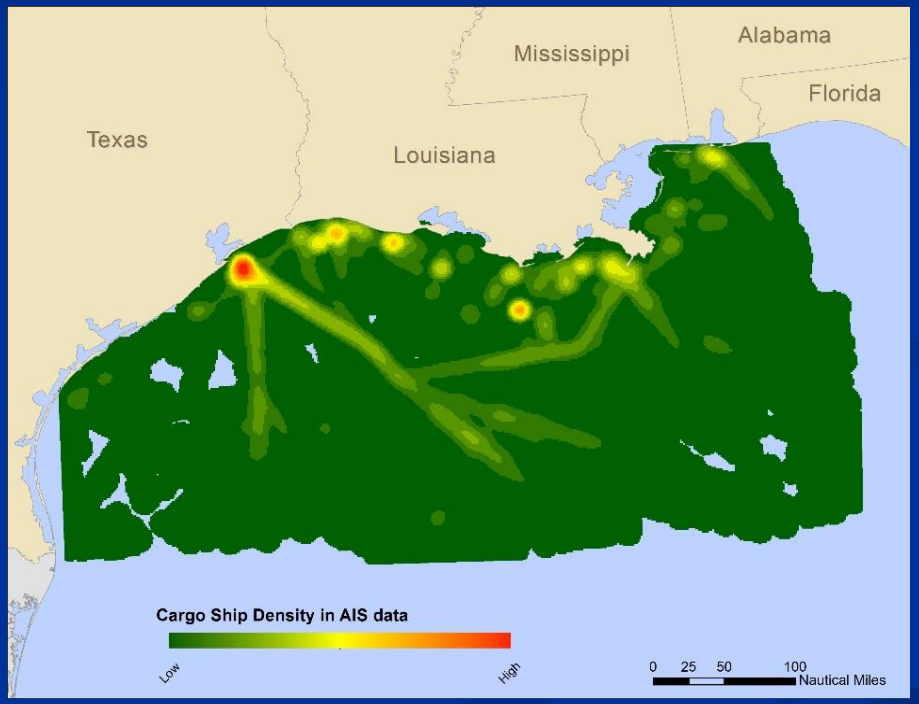
Bulk Carrier & Cargo Ship Density





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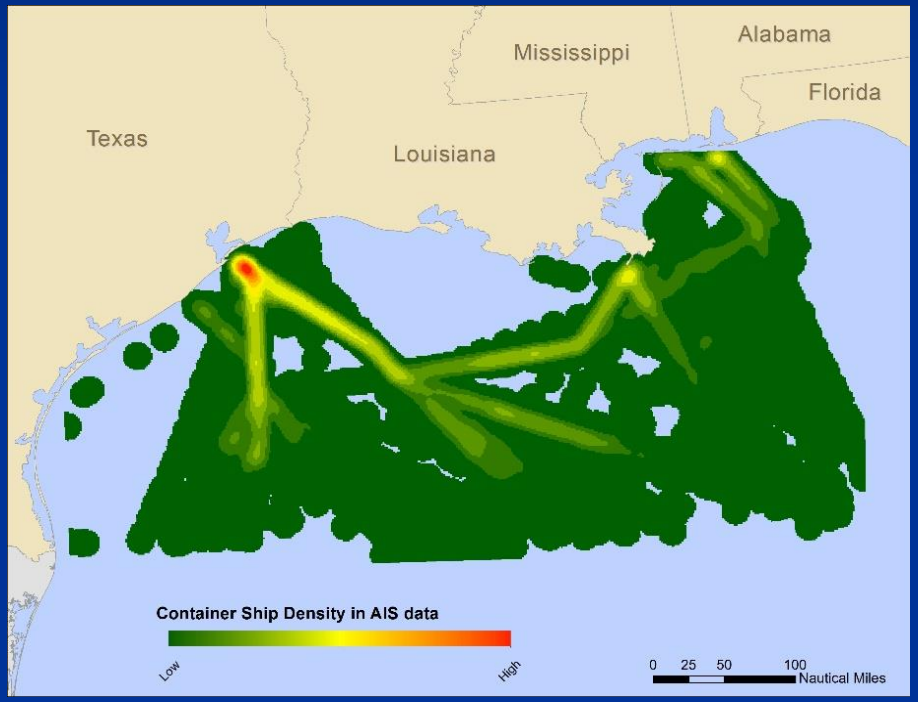
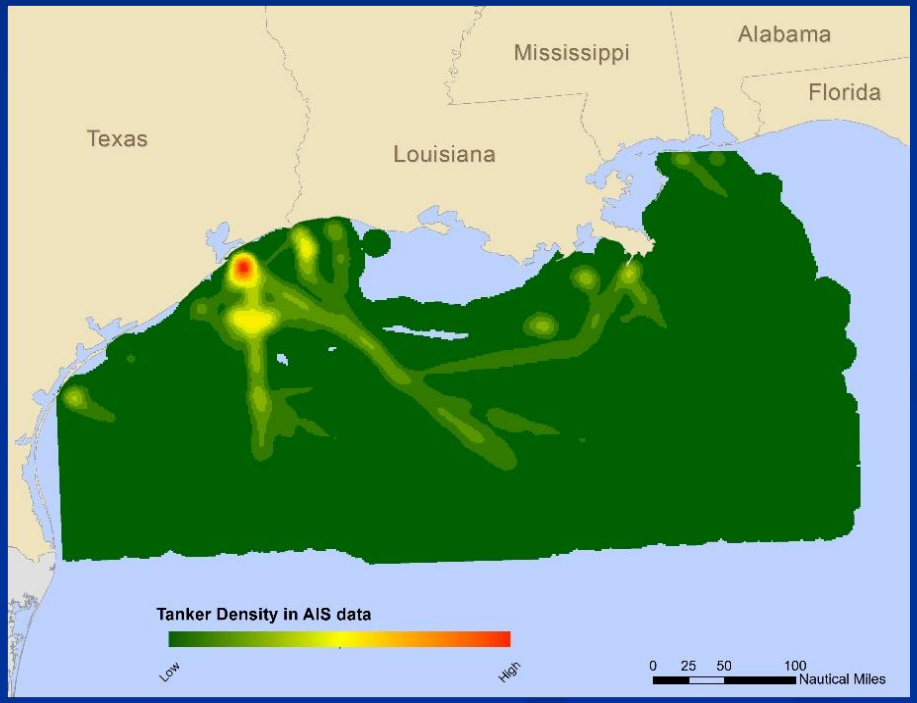
Container Ship & Tanker Density





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Comparison to 2011 Inventory: Non-platform Sources (Oil and Gas Related)

Calendar Year	CO Emissions (tpy)	NO_X Emissions (tpy)	PM_{10}-PRI Emissions (tpy)	SO_2 Emissions (tpy)	VOC Emissions (tpy)
2014	15,459	77,754	2,329	6,648	3,367
2011	41,880	232,765	8,631	22,977	7,937
Percent Difference	-63%	-67%	-73%	-71%	-58%

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Comparison to 2011 Inventory: Non-platform Sources (Non-oil and Gas Related)

Calendar Year	CO Emissions (tpy)	NO_X Emissions (tpy)	PM_{10}-PRI Emissions (tpy)	SO_2 Emissions (tpy)	VOC Emissions (tpy)
2014	25,387	227,858	7,127	50,358	41,137
2011	13,008	131,094	4,973	36,283	37,063
Percent Difference	95%	74%	43%	39%	11%

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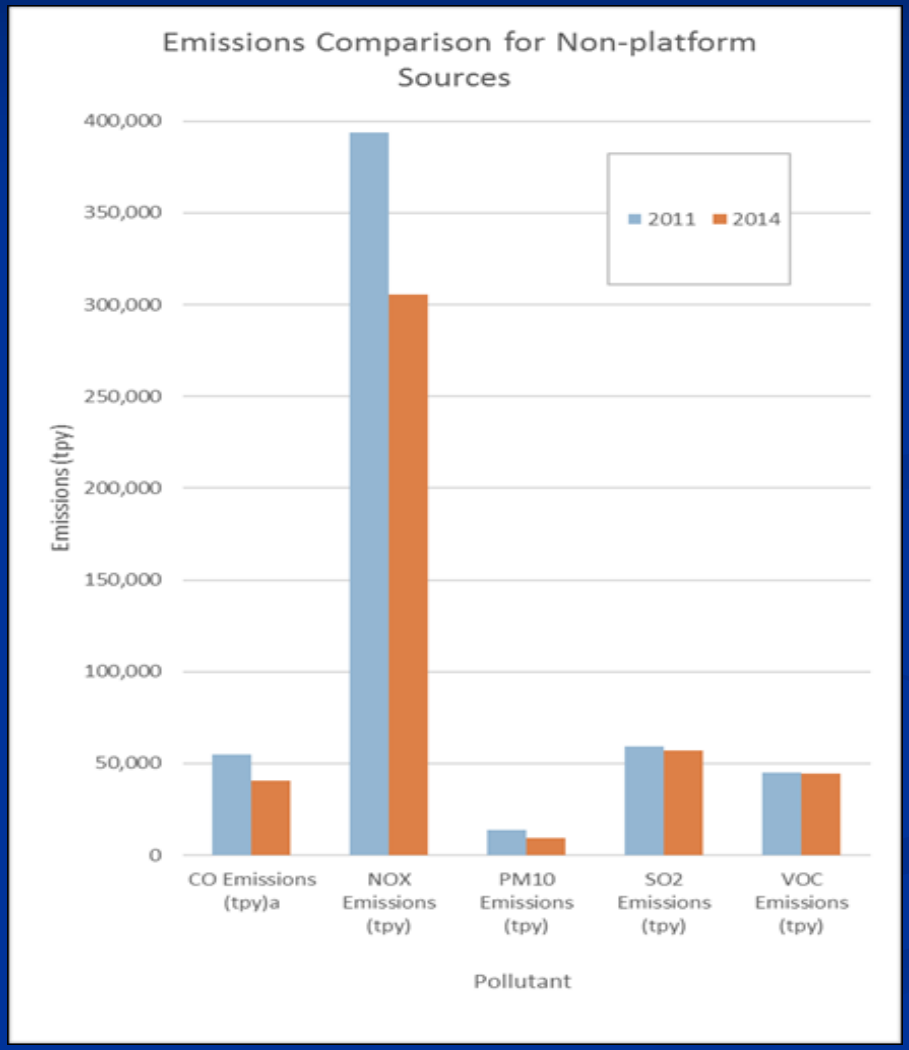
Comparison to 2011 Inventory: Non-platform Sources



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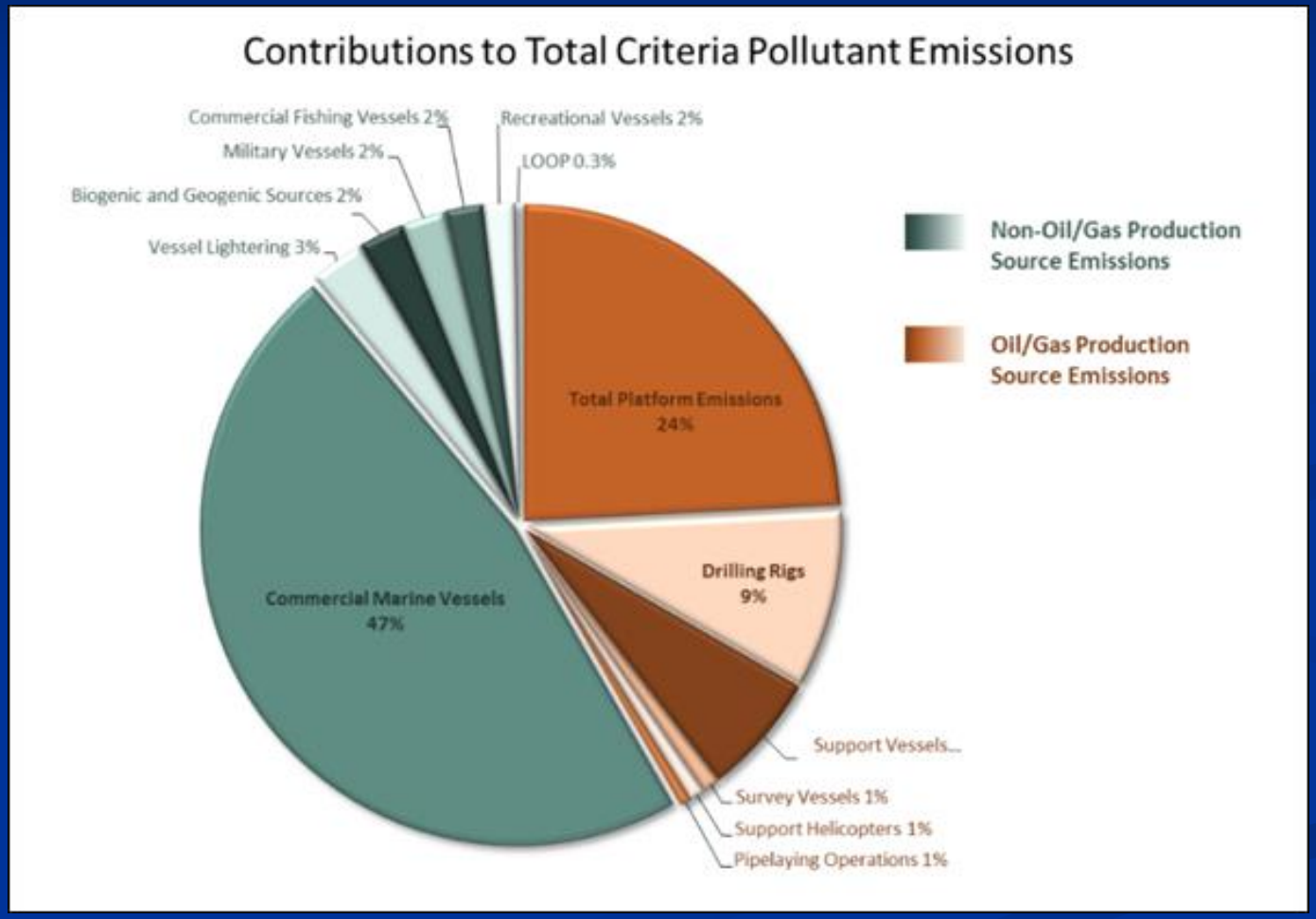
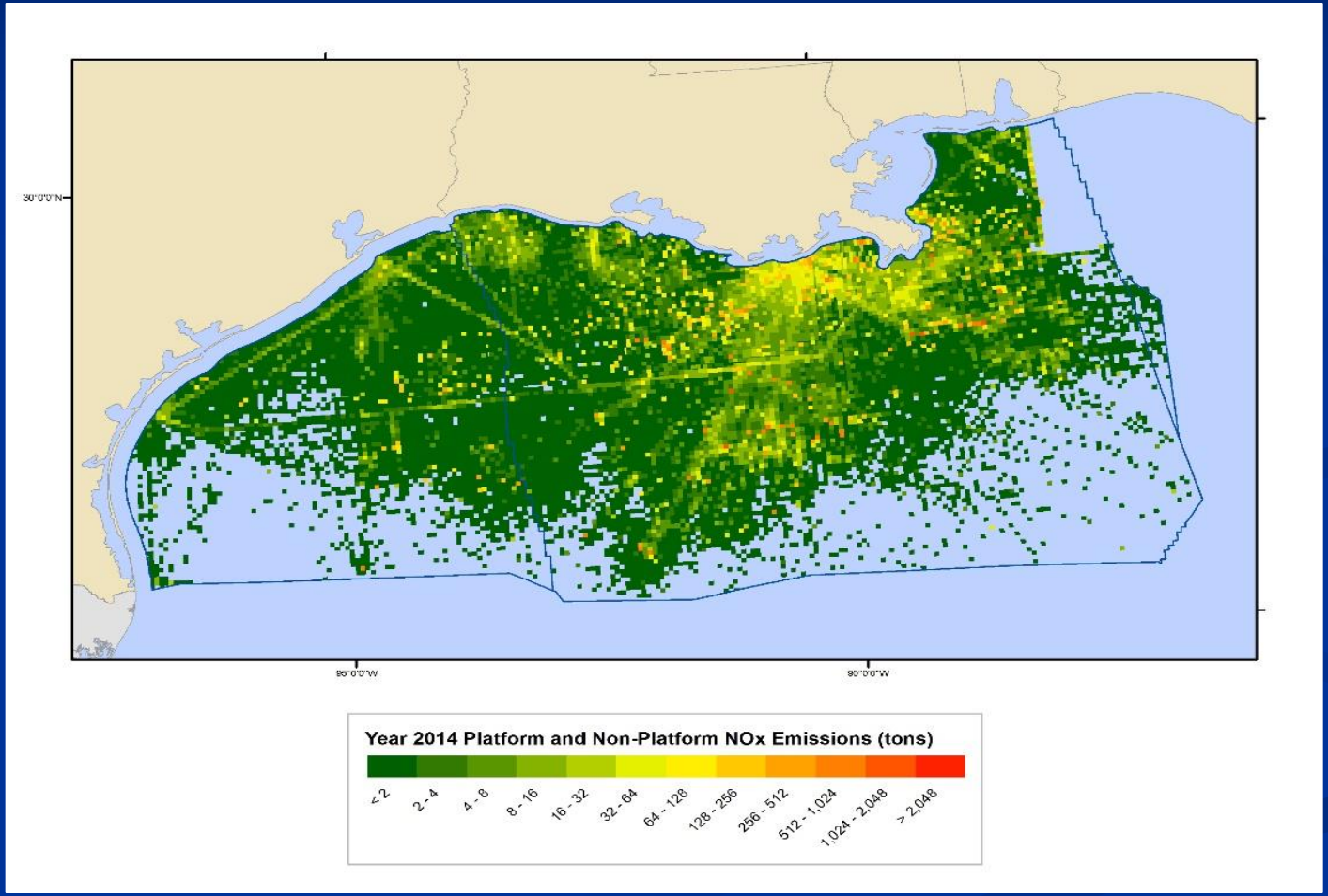
Contribution from all Sources to Total Criteria Pollutant Emissions



NO_x Emissions: All O&G Sources



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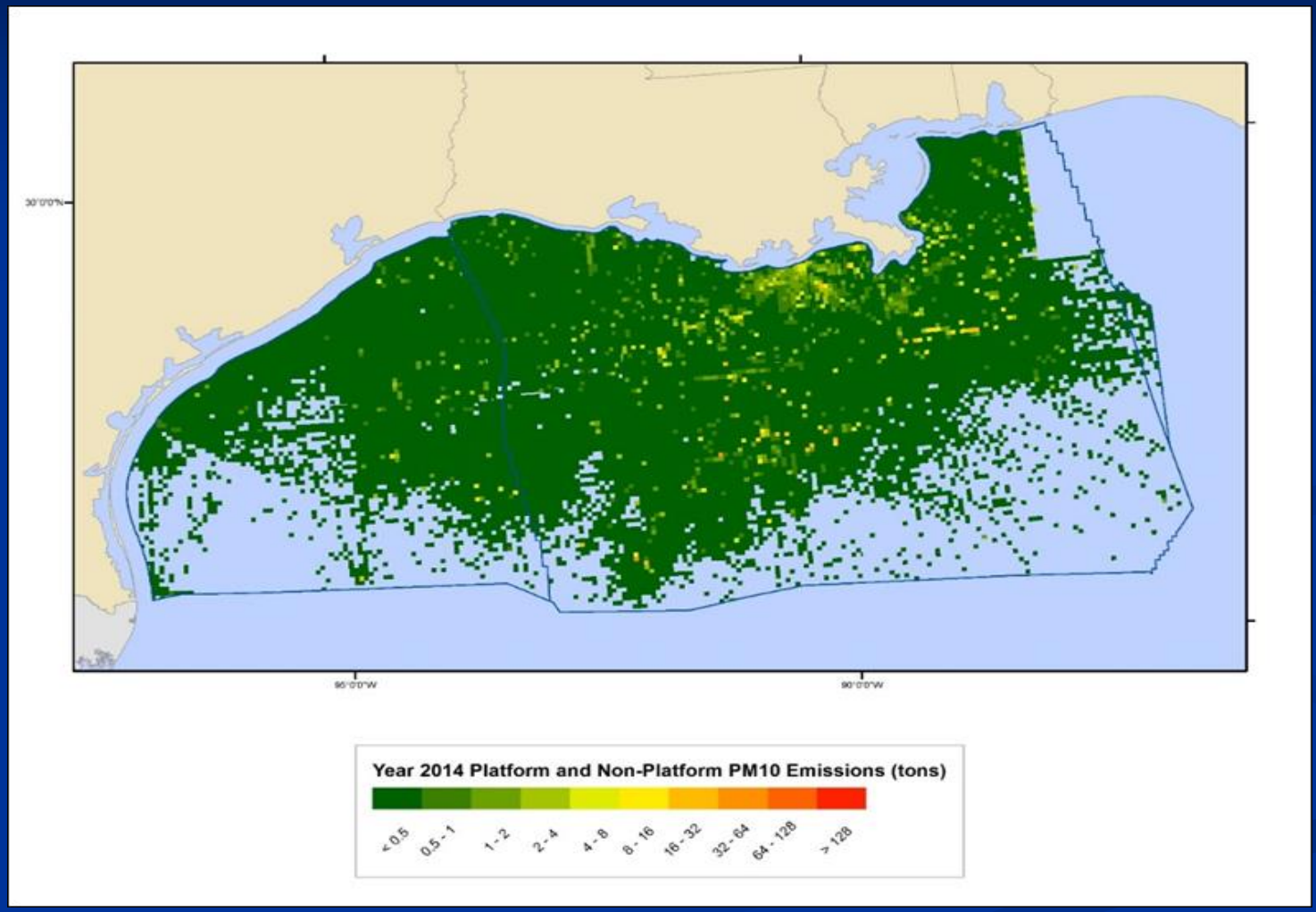
PM_{10} Emissions: All O&G Sources



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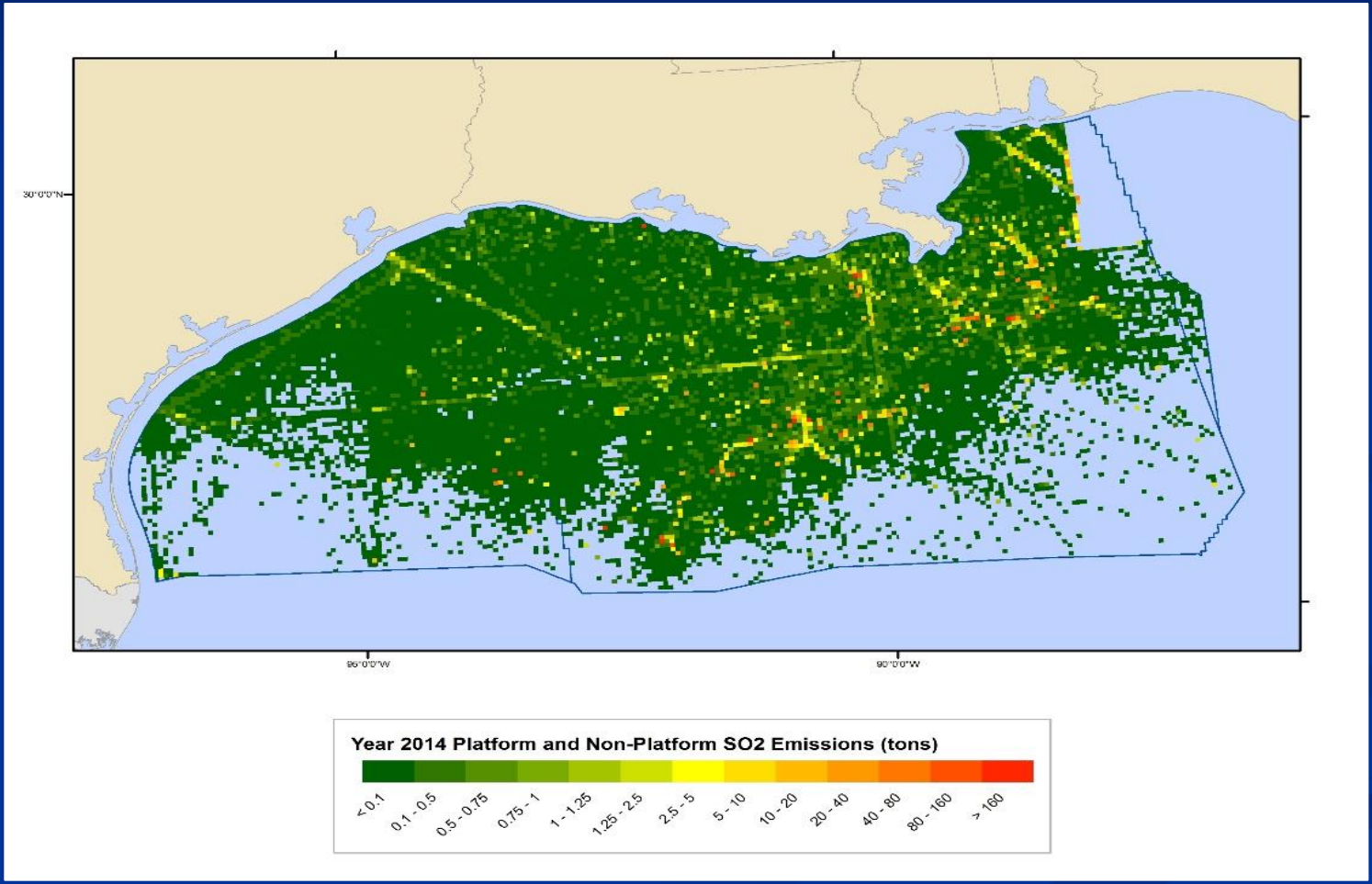
SO_2 Emissions: All O&G Sources



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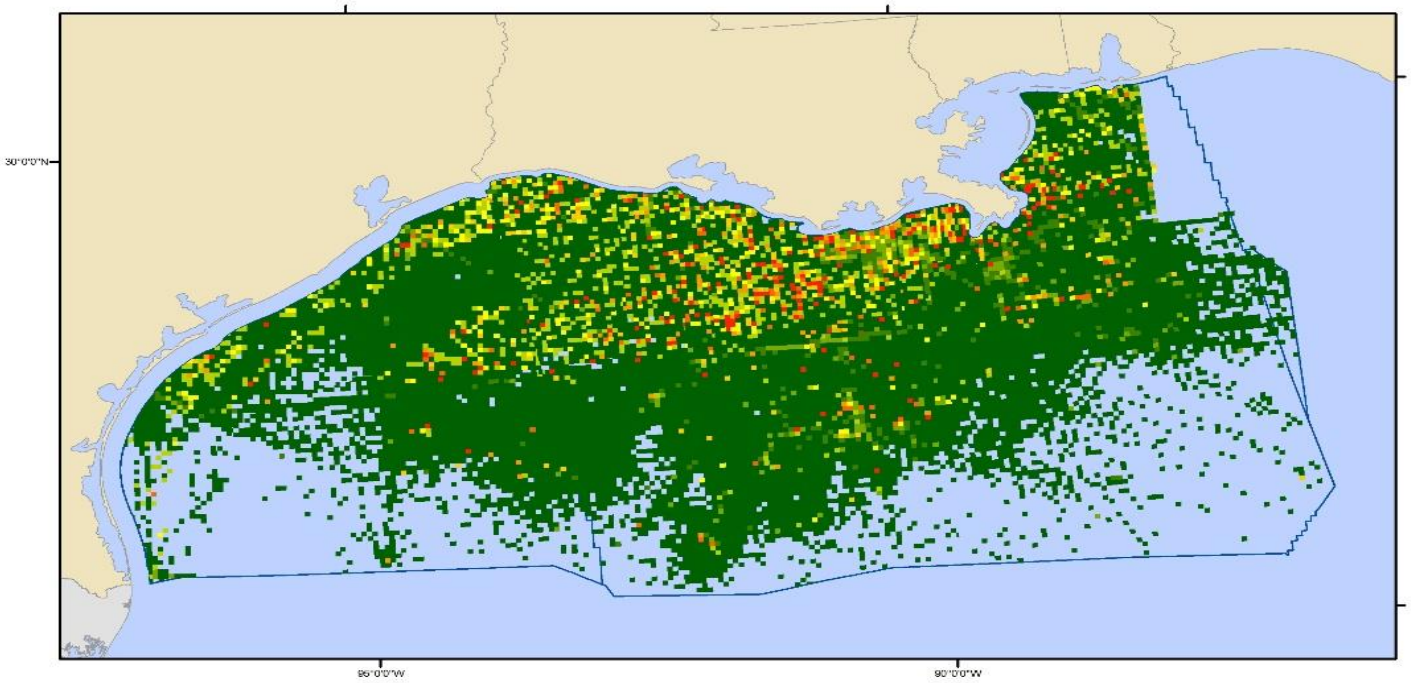
VOC Emissions: All O&G Sources



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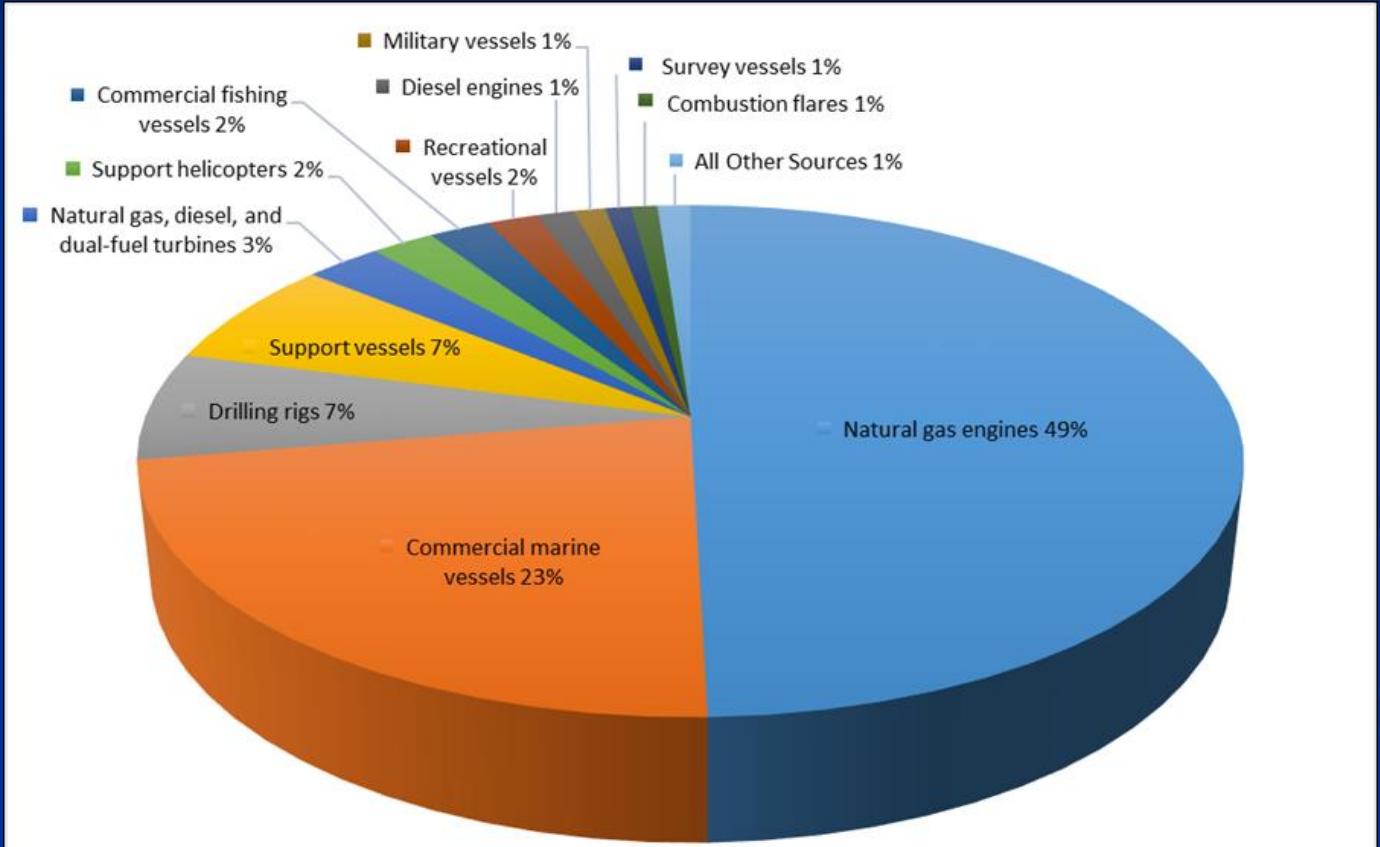
CO Emissions by Source



All Other Sources includes: drilling equipment, pipelaying operations, LOOP, boilers, heaters, and burners.

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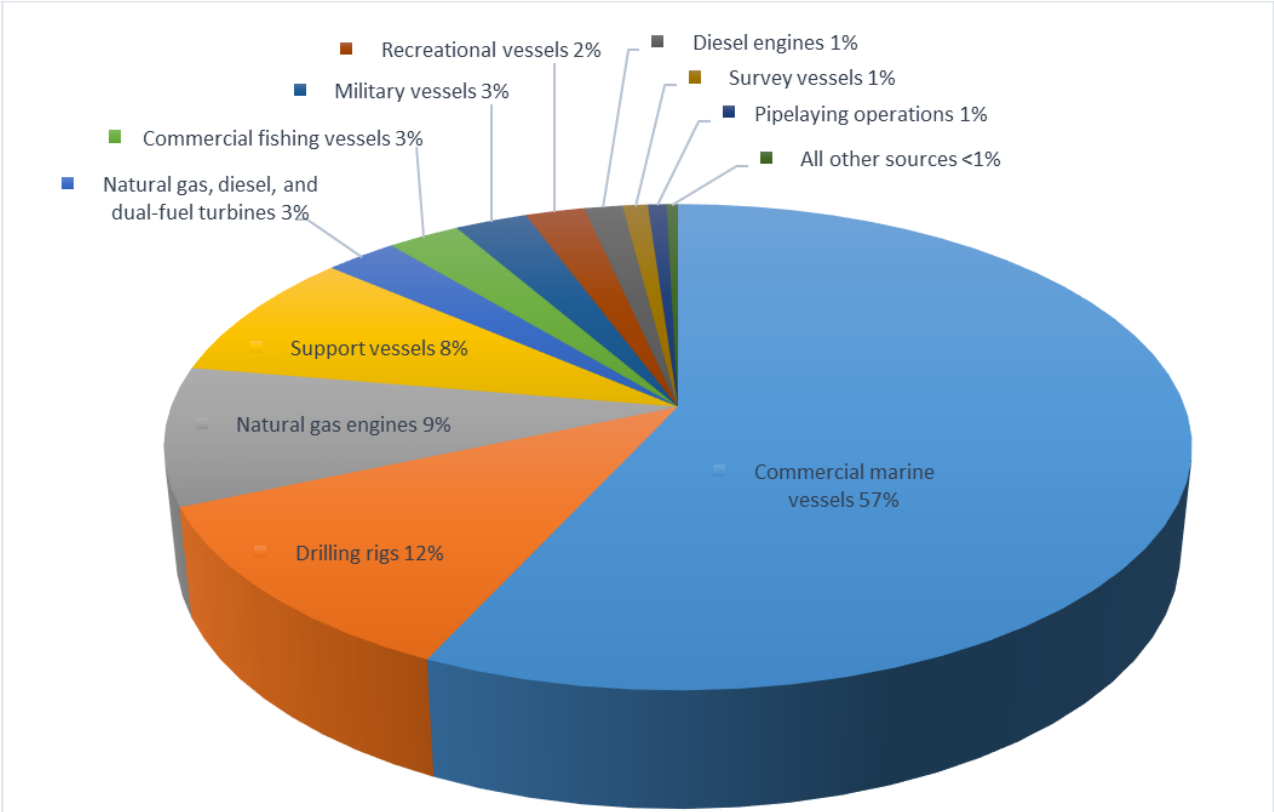
NO_x Emissions by Source



All other sources includes: LOOP, support helicopters, boilers, heaters, and burners, combustion flares.

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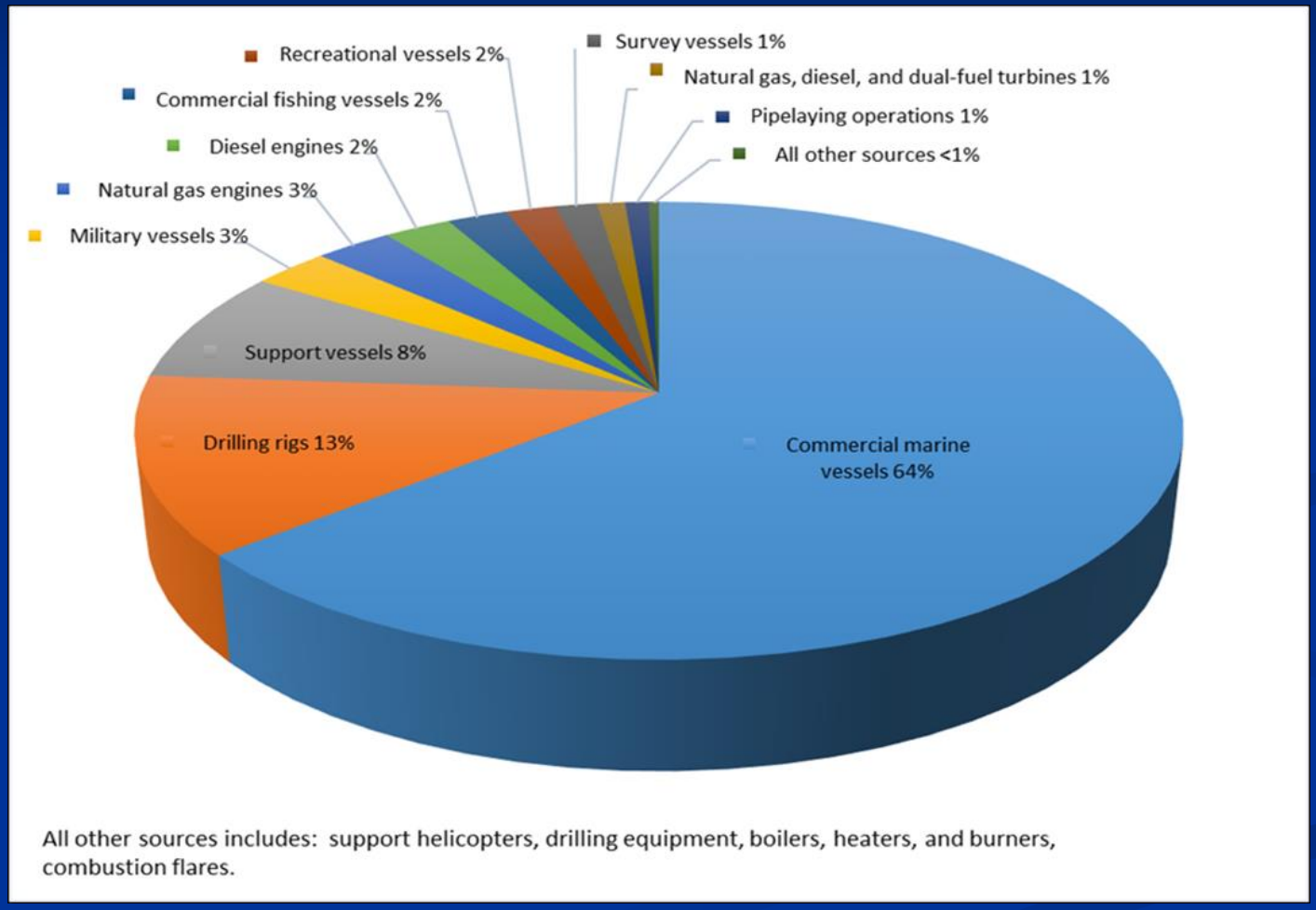
PM_{10} Emissions by Source



All other sources includes: support helicopters, drilling equipment, boilers, heaters, and burners, combustion flares.

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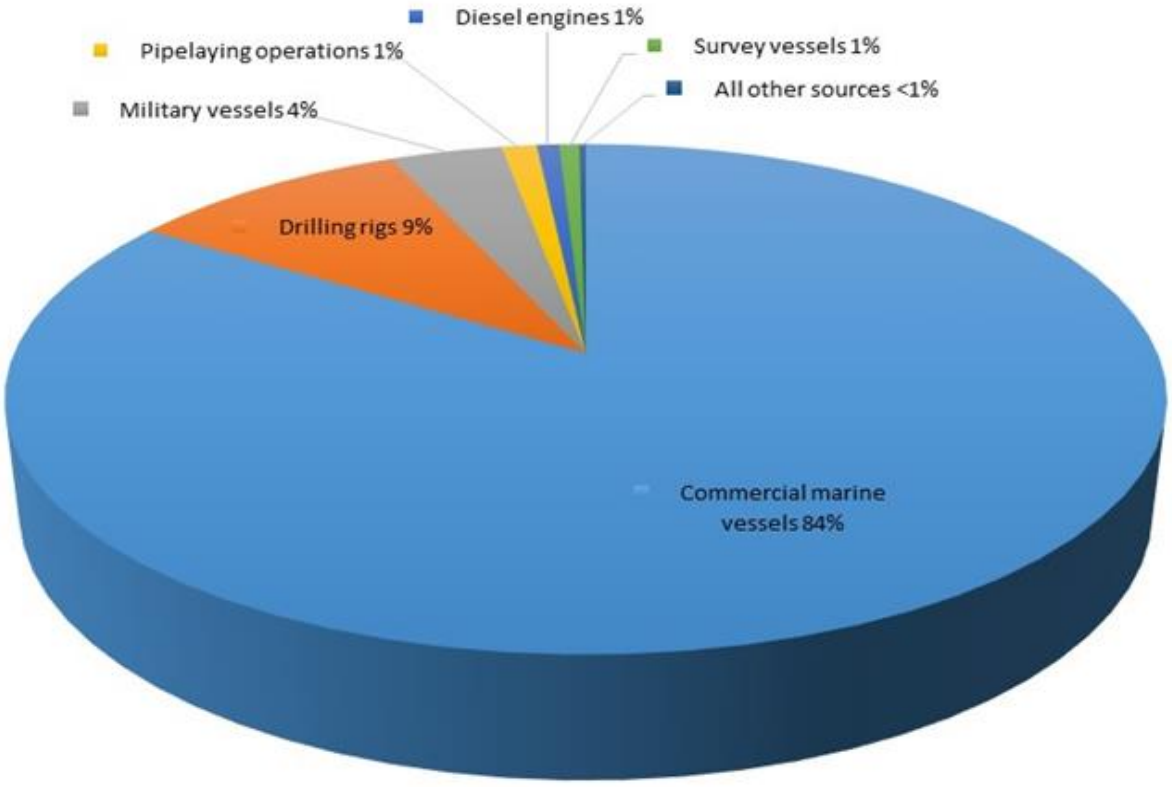
SO_2 Emissions by Source



All other sources includes: support vessels, natural gas, diesel, and dual-fuel turbines, drilling equipment, amine units, LOOP, natural gas engines, commercial fishing vessels, recreational vessels, combustion flares, boilers, heaters, and burners.

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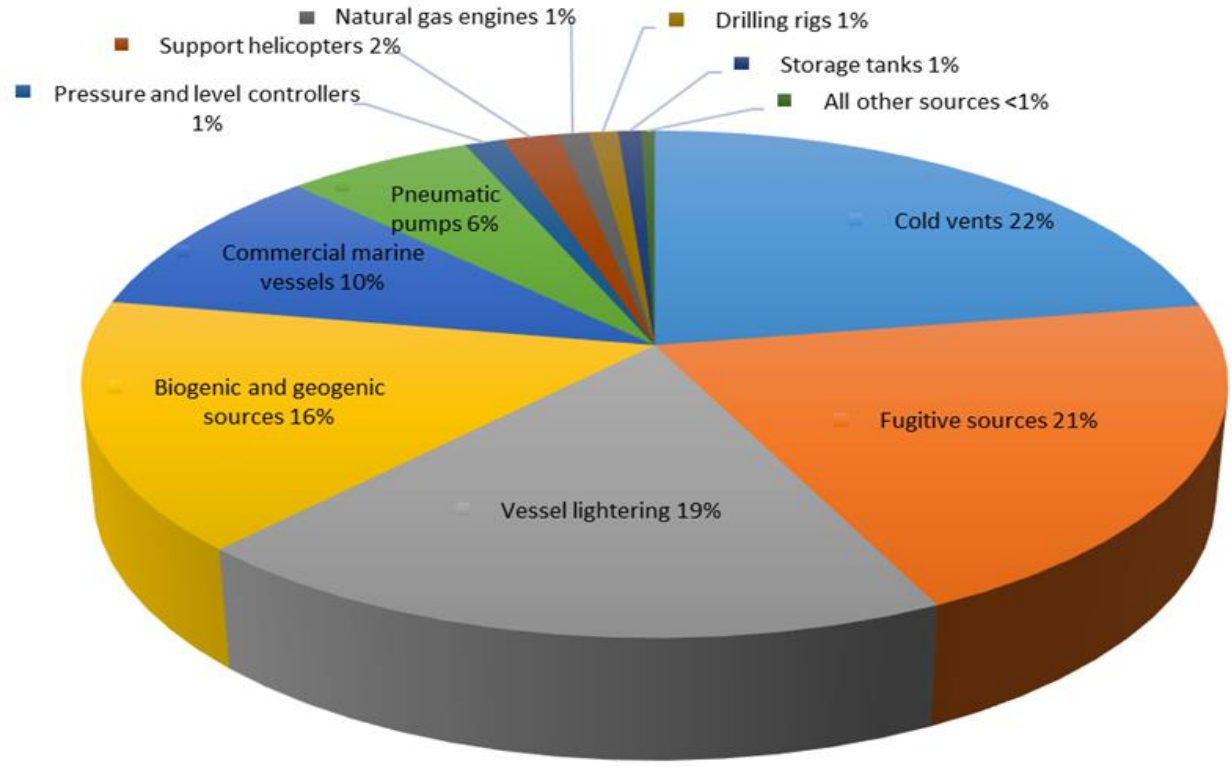
VOC Emissions by Source



All other sources includes: military vessels, survey vessels, losses from flashing, LOOP, glycol dehydrators, diesel engines, loading operations, commercial fishing vessels, pipelaying operations, recreational vessels, mud degassing, natural gas, diesel, and dual-fuel turbines, drilling equipment, combustion flares, boilers, heaters, and burners, minor sources, amine units.

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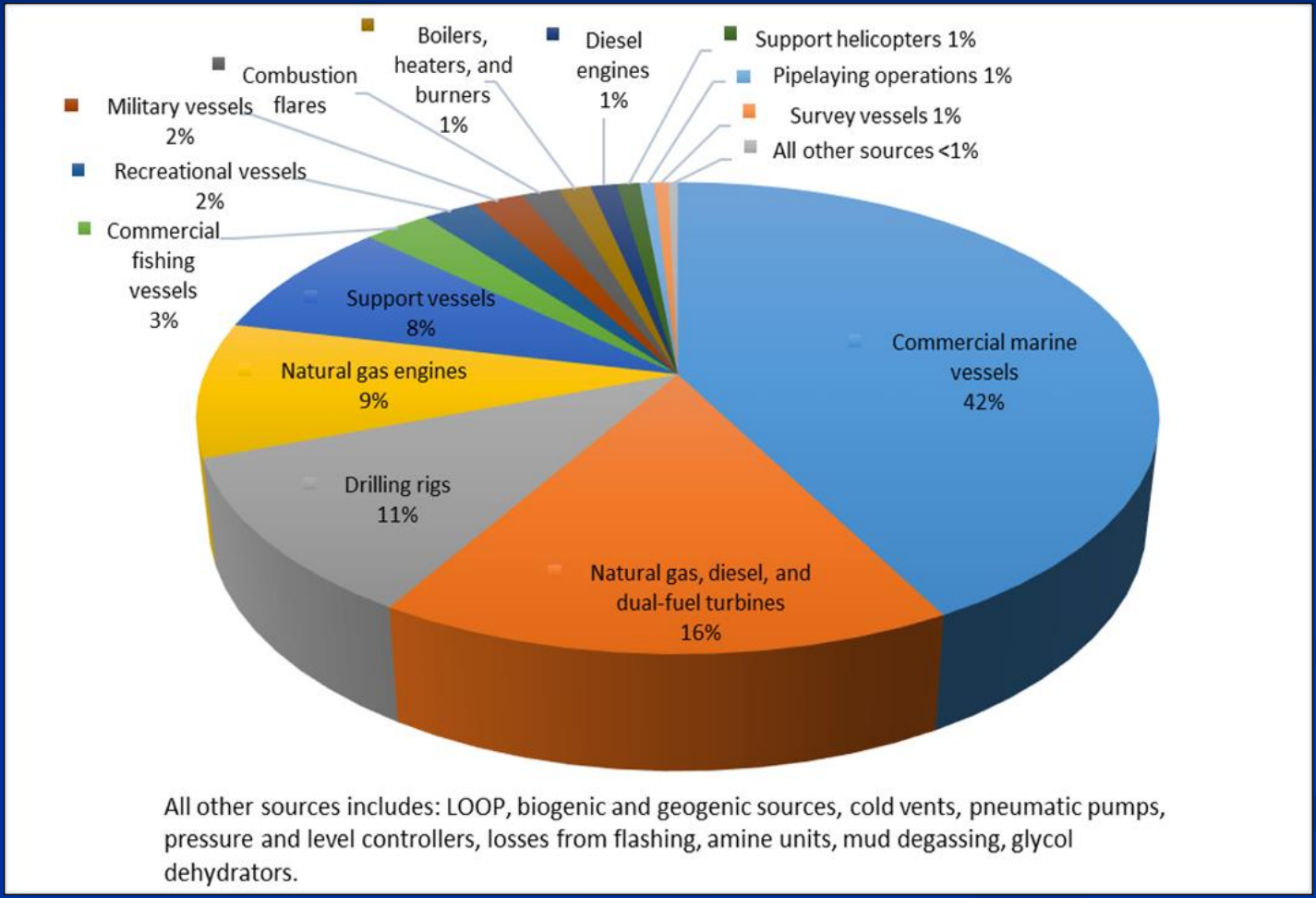
CO_2 Emissions by Source



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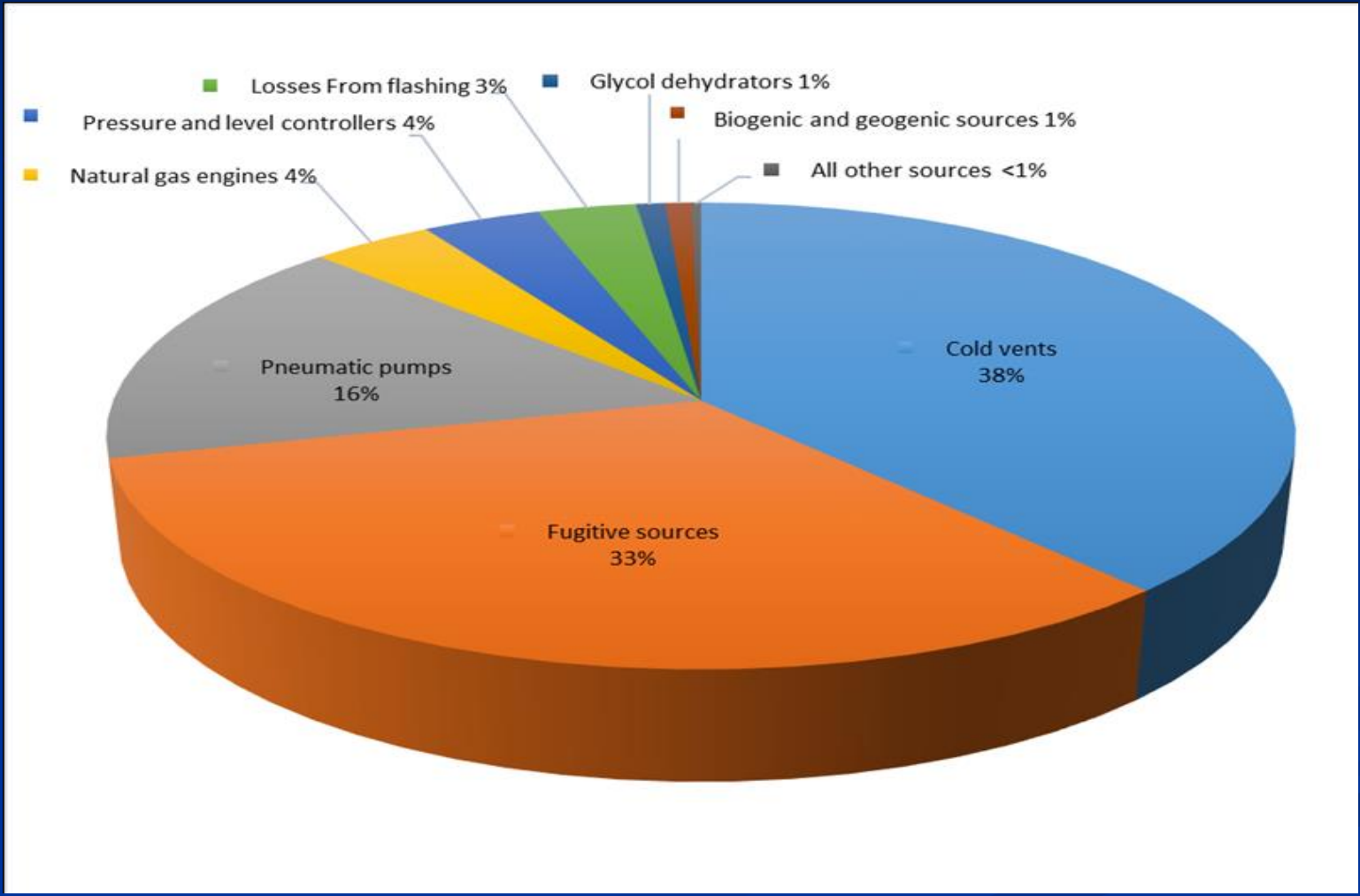
CH_4 Emissions by Source



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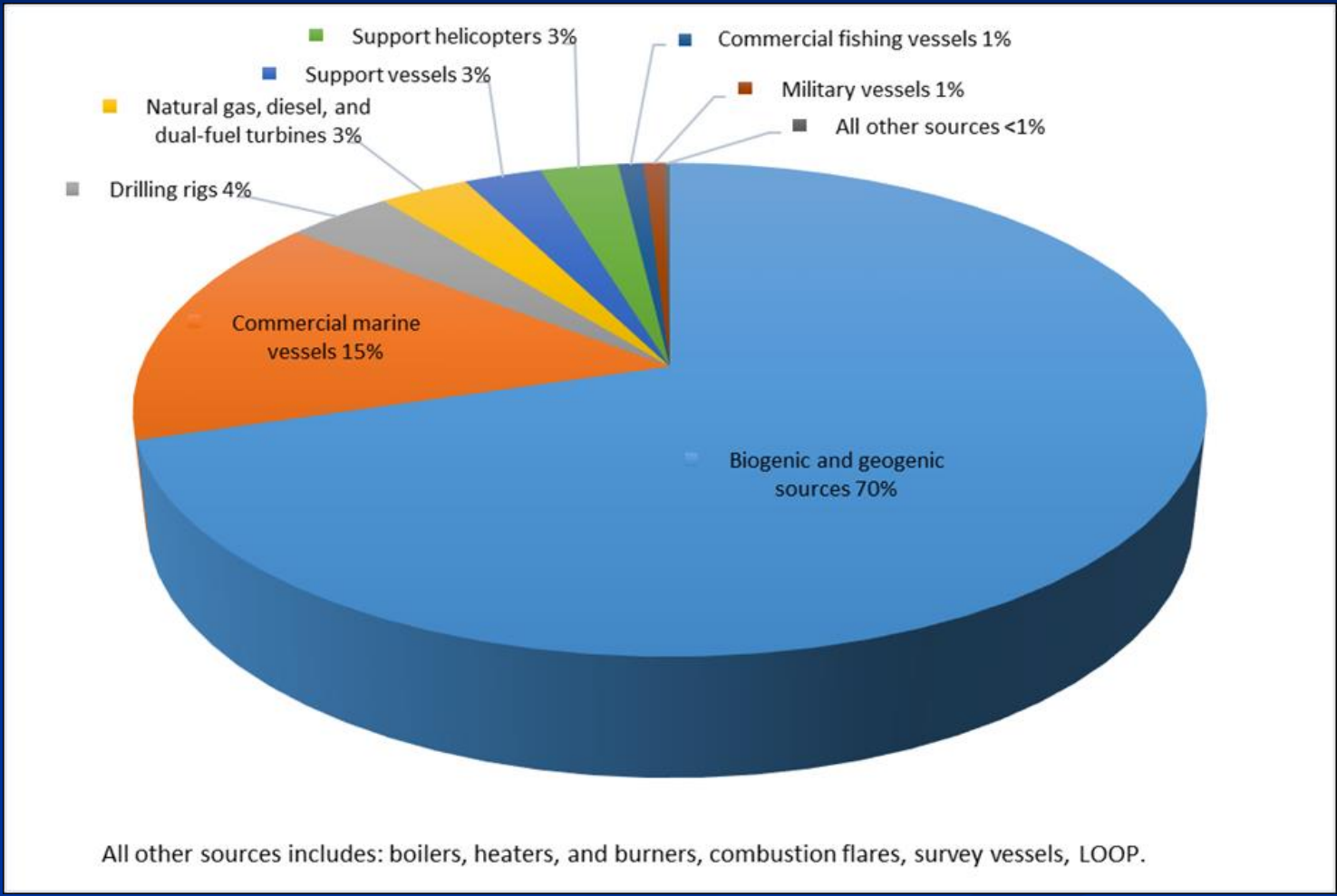
N_2O Emissions by Source



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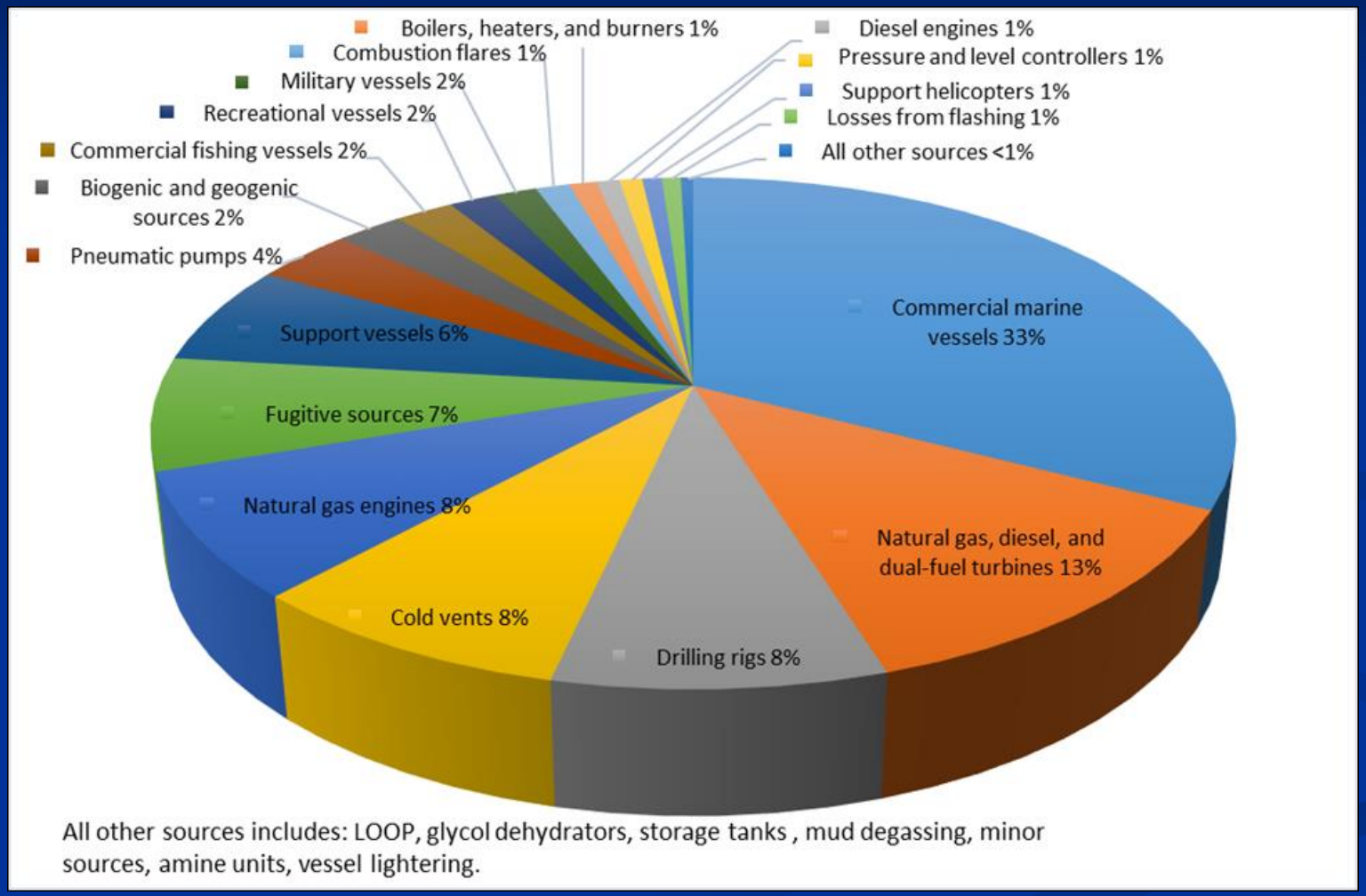
CO_2e Emissions by Source



All other sources includes: LOOP, glycol dehydrators, storage tanks , mud degassing, minor sources, amine units, vessel lightering.

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Comparison to 2011 Inventory: Oil and Gas Production Sources

Calendar Year	CO Emissions (tpy)	NO_X Emissions (tpy)	PM_{10}-PRI Emissions (tpy)	SO_2 Emissions (tpy)	VOC Emissions (tpy)
2014	65,511	126,445	2,997	7,151	51,577
2011	112,219	316,893	9,390	26,174	62,661
Percent Difference	-42%	-60%	-68%	-73%	-18%

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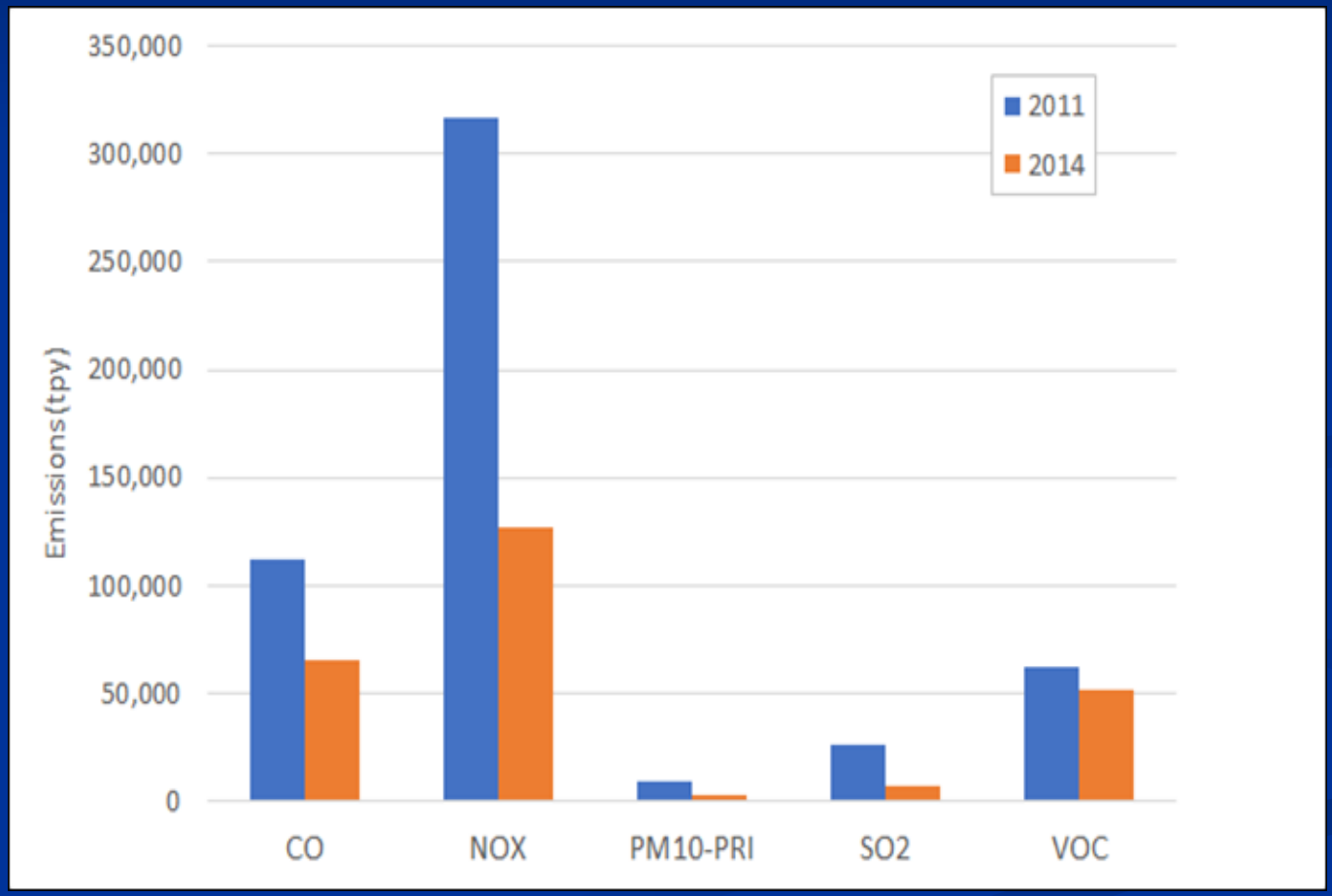
Comparison to 2011 Inventory: Oil and Gas Production Sources



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Comparison to 2011 Inventory: Oil and Gas Production Sources

Calendar Year	CO_2 Emissions (tpy)	CH_4 Emissions (tpy)	N_2O Emissions (tpy)	CO_2e Emissions (tpy)[a]
2014	10,135,309	225,704	300	15,867,318
2011	28,907,412	271,469	707	35,904,823
Percent Difference	-65%	-17%	-58%	-56%

[a] CO_2e=25 for CH_4 and 298 for N_2O

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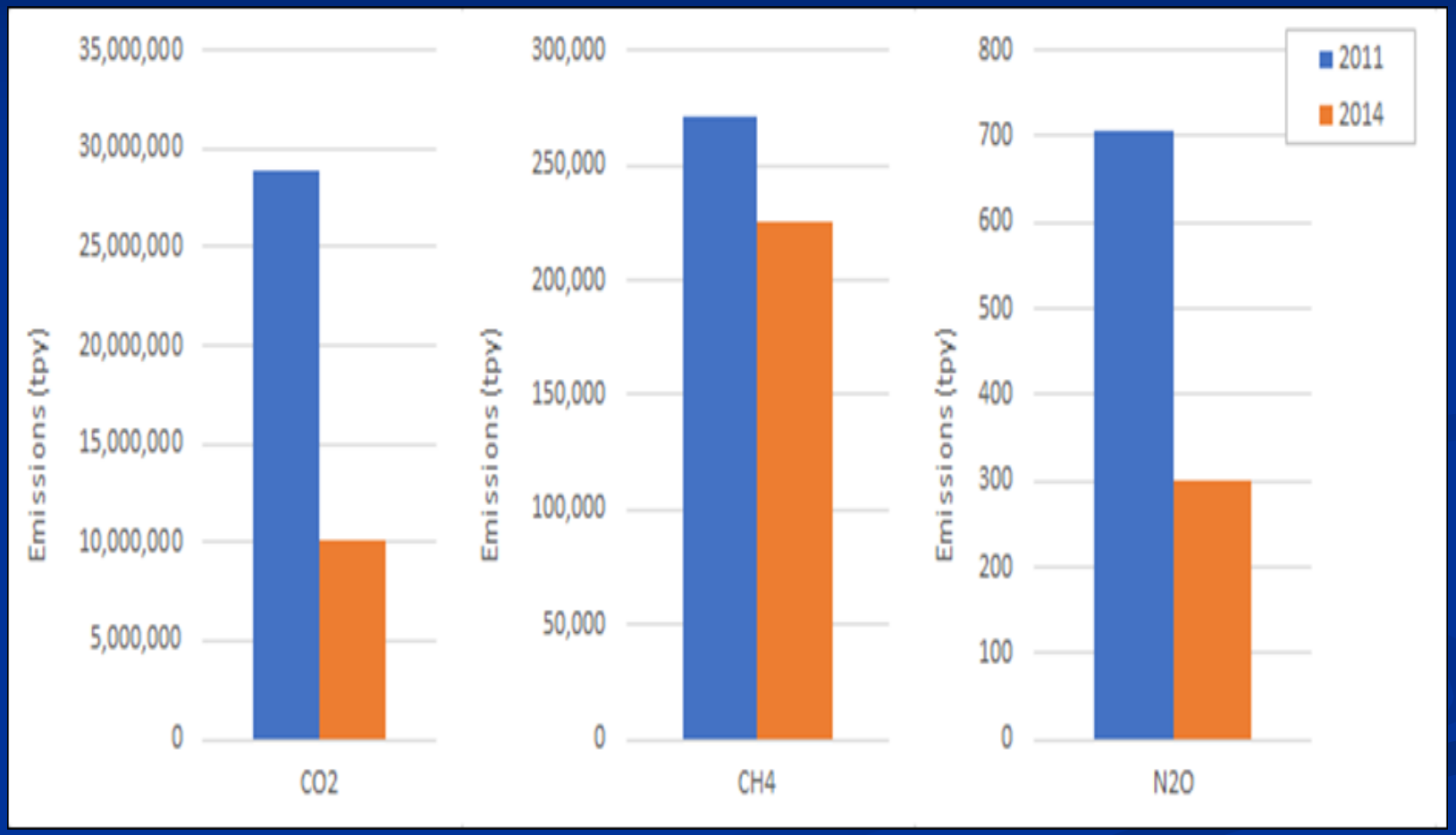
Comparison to 2011 Inventory: Oil and Gas Production Sources



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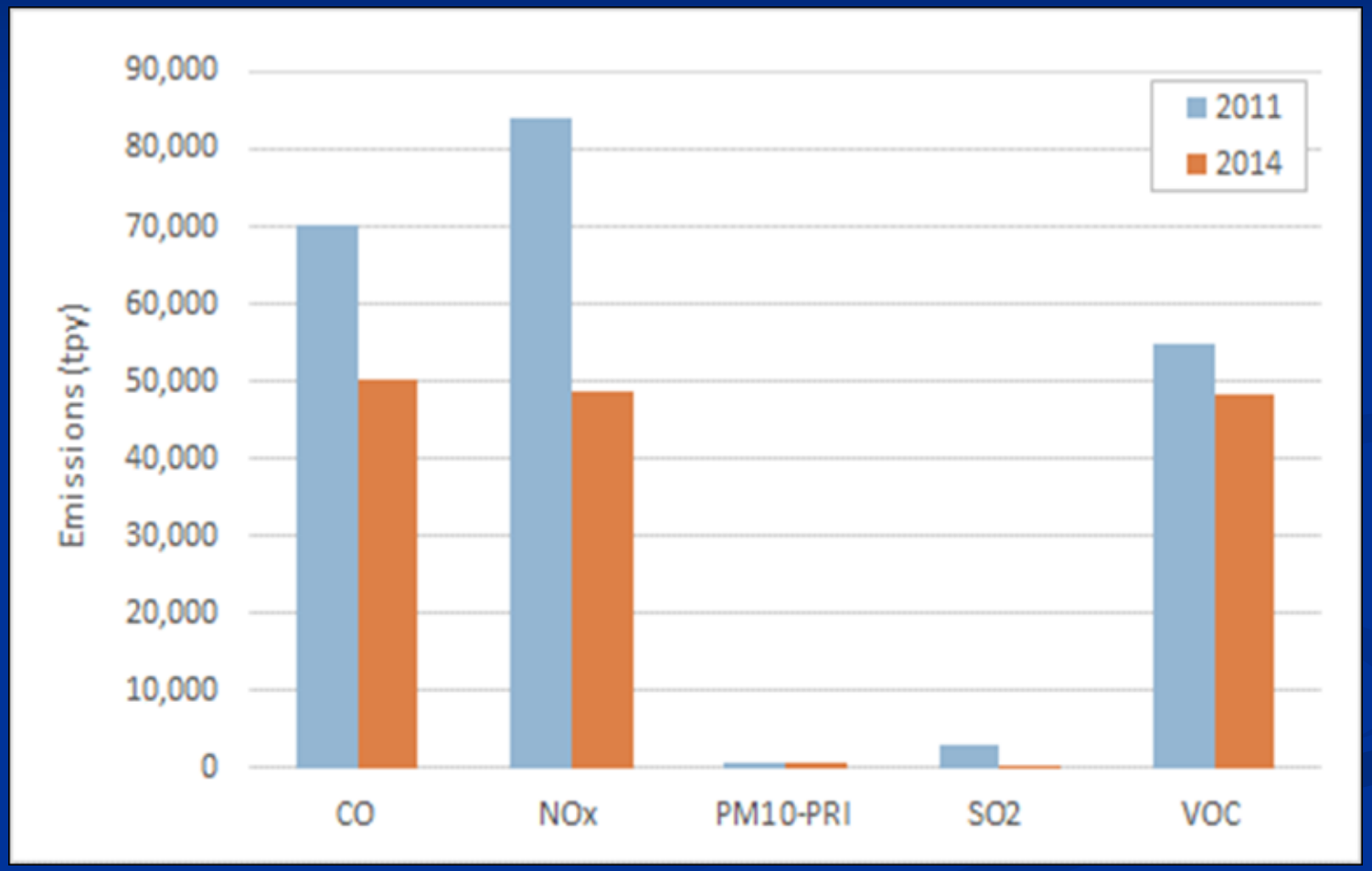
Comparison of Criteria Pollutant Emissions: Platform Sources



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Conclusions: Platform Sources

- CO: Decrease of 29% primarily due to natural gas engines
- NO_x: Decrease of 42% primarily due to natural gas engines and natural gas, diesel, and dual-fuel turbines
- PM_{10}: Decrease of 20% primarily due to diesel engines
- SO_2: Decrease of over 84% primarily due to turbines
  - Decrease primarily due to decreased fuel use and reduced diesel fuel sulfur content
- VOC: Decrease of 12% primarily due to vents
  - With an increase from fugitives and pneumatic pumps
- CO_2e: Decrease of 38% primarily due to decrease in CO_2 from vents and natural gas, diesel, and dual-fuel turbines
  - With an increase in CH_4 emissions from fugitives and pneumatic pumps

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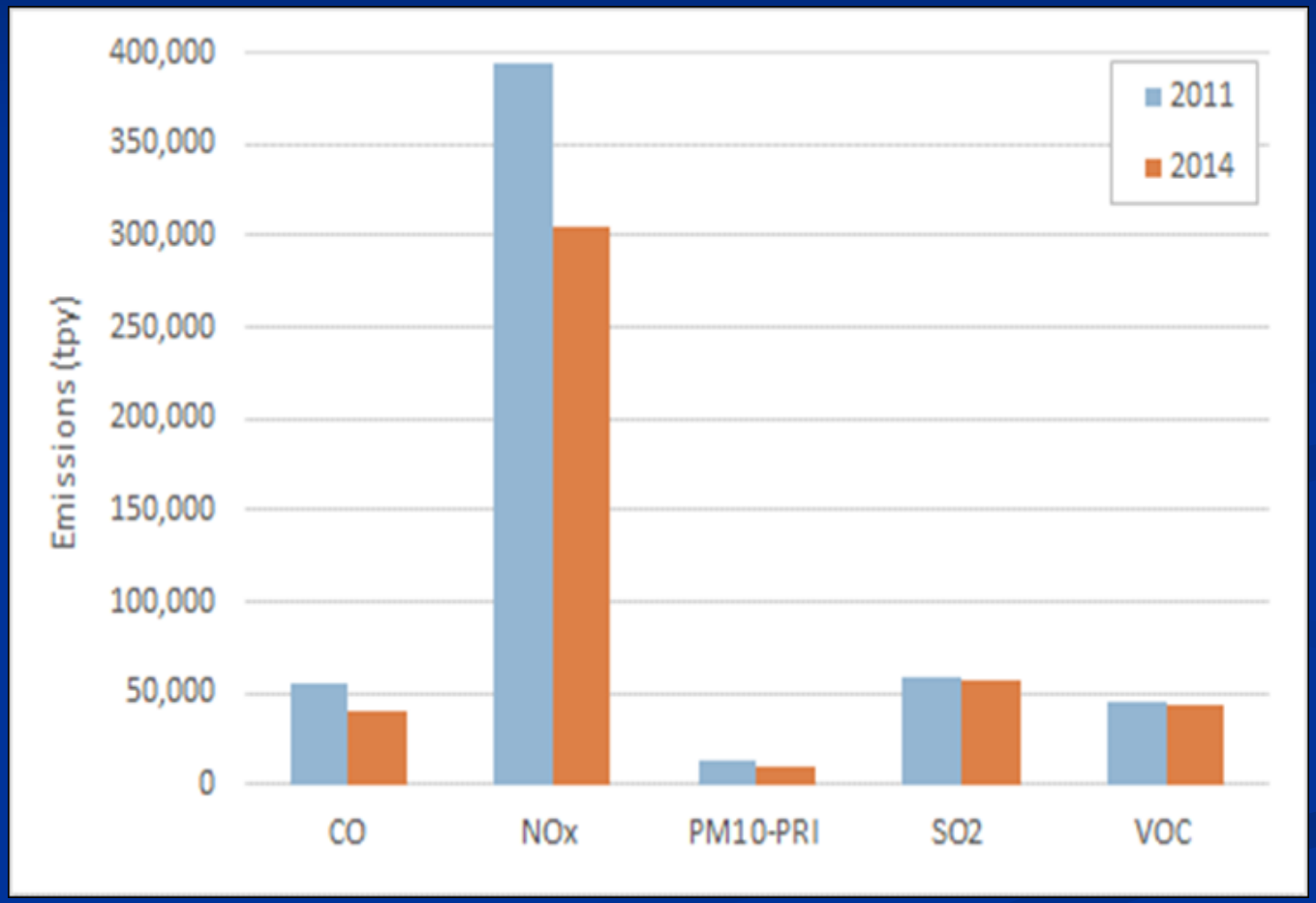
Comparison of Criteria Pollutant Emissions: All Non-platform Sources



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Conclusions: Non-platform Sources

- Emissions decreased overall for all pollutants due to the use of more accurate vessel counts, engine power data, and propulsion load estimates derived from AIS data
  - CO: 26% decrease
  - NO_x: 22% decrease
  - PM_{10}: 30% decrease
  - SO_2: 4% decrease
    - With increase for pipelaying and survey vessels due to inclusion of Category 3 vessels
  - VOC: 1% decrease
    - With increase for survey vessels due to inclusion of Category 3 vessels
  - CO_2e: 38% decrease primarily due to use of AIS data

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Emissions Trends Analysis

- Platform and non-platform sources and emissions were compared for the 2000, 2005, 2008, 2011, and 2014 inventory years
- Overall, emissions are largely affected by three factors:
  - Activity/production levels by water depth and planning area
  - Changes in inventory methodologies
  - Improvements in emission factors

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HAP Scoping Task

- Developed emission estimates for 10 production platforms based on highest PM_{10} and VOC emissions
- 14 HAPs included
  - 5 metals
  - 9 organics
- GOADS activity data for 11 types of equipment

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ANY QUESTIONS?

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