

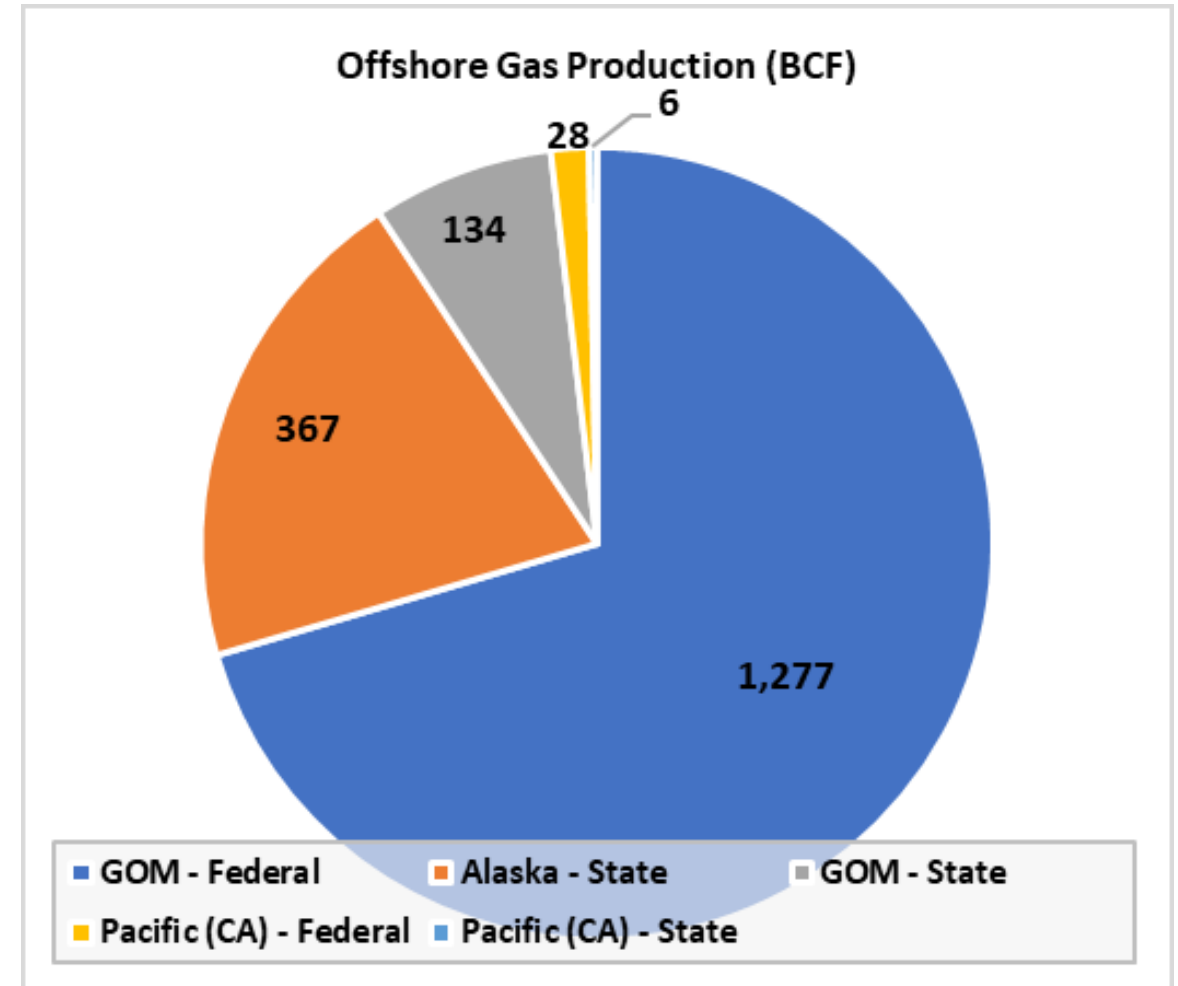
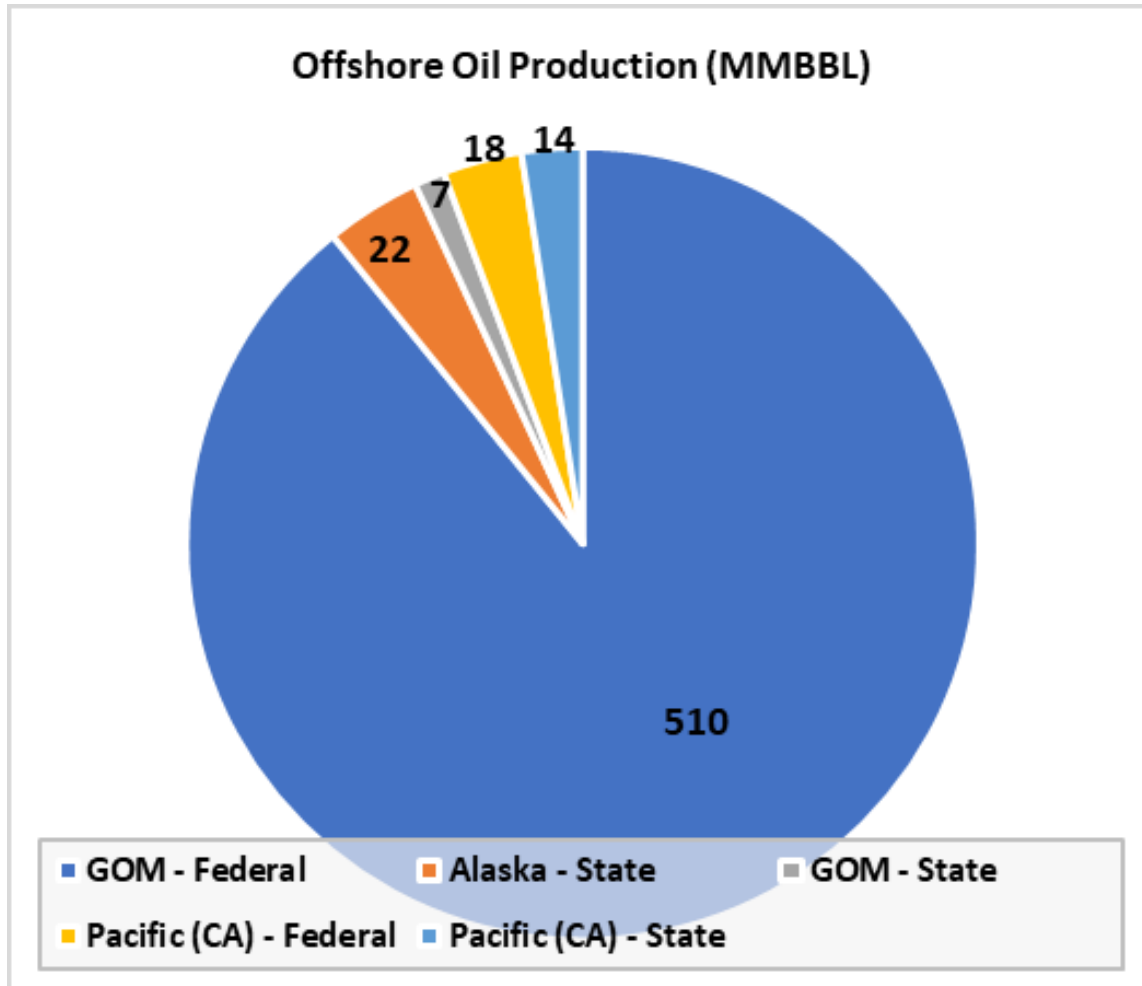
# NATURAL GAS & PETROLEUM SYSTEMS: UPDATES UNDER CONSIDERATION FOR OFFSHORE PRODUCTION EMISSIONS IN 2020 GHGI

Stakeholder Webinar  
September 12, 2019

# OVERVIEW

- Offshore Production Background
- Current GHGI Methodology
- Updates Under Consideration
  1. Gulf of Mexico Federal Waters
  2. Gulf of Mexico State Waters
  3. Pacific and Alaska Regions (Federal/State Waters)
- National Emissions Summary
- Stakeholder Feedback

# OVERVIEW OF OFFSHORE OIL & GAS PRODUCTION (YEAR 2014)



# OFFSHORE PRODUCTION BACKGROUND

- Offshore production facilities
  - Can include production structures and supporting structures
  - Production complex = 1 or more structures
  - Variation in water depth (deep versus shallow water)
  - Variation in complexity (number and type of unit operations— “major” vs. “minor” complexes)
- Offshore facilities operate in waters that are under federal government (DOI/BOEM) jurisdiction (“federal waters”) or state government jurisdiction (“state waters”)
  - Federal waters = Outer Continental Shelf (OCS). Includes producing regions in Gulf of Mexico (GOM) and Pacific Ocean
  - State waters producing regions include GOM (multiple states), Pacific (California), and Alaska.

# CURRENT GHGI METHODOLOGY

- Only accounts for offshore emissions in GOM federal waters

## Vented and Leak Emissions

- EFs: Developed from BOEM's 2011 Gulfwide Emission Inventory
  - EFs are on a structure basis
  - 4 EF categories: Deepwater gas, Deepwater oil, Shallow water gas, and Shallow water oil
- Activity: Structure counts over time series are from a Minerals Management Service (MMS) census, which was last updated in 2010

Pollutant/Facility Category	Structure EF (mt/yr)
<b>CH<sub>4</sub></b>	
Deep Gas	–
Deep Oil	656
Shallow Gas	62
Shallow Oil	116
<b>CO<sub>2</sub></b>	
Deep Gas	–
Deep Oil	7.7
Shallow Gas	1.2
Shallow Oil	1.9

# CURRENT GHGI METHODOLOGY (CONT.)

## Flaring Emissions

- All offshore flaring CO<sub>2</sub> emissions are represented in natural gas systems
- EF: kg/mmBtu, with yr-specific heat content
- Activity: Flared gas volumes over the time series were provided by MMS staff, based on data collected in Oil and Gas Operations Reports (OGOR). Data were last available for 2008

# 1. UPDATES UNDER CONSIDERATION FOR OFFSHORE FACILITIES IN GOM FEDERAL WATERS

# GOM FEDERAL WATERS: DATA SOURCES

- BOEM Gulfwide Emission Inventory (GEI)
  - Year-specific emission factors
- BOEM Platform Database
  - Counts of total “active” complexes for each time series year
  - Split between “major” and “minor” complexes for each time series year
- BOEM OGOR-A Production
  - Complex-specific production type (“oil” vs “gas”) assignment
- BOEM OGOR-B Flaring Volumes
  - Gas volume flared from each type of complex (“oil” vs “gas”) in each time series year



# GOM FEDERAL WATERS: BOEM GEI

- Estimates criteria pollutant and GHG emissions
- All offshore facilities in GOM federal waters west of 87.5° longitude are required to report, however, there are non-reporters each year
- GEI studies are conducted triennially
  - Currently available for years 2000, 2005, 2008, 2011, and 2014
  - 2017 GEI publication expected soon, and will be taken into consideration for GHGI updates
- 2005 GEI: hurricanes led to fewer reporters with atypically low activity and emissions
- 2000 GEI was the first year of reporting and there were subsequent updates in GEI methods and operator understanding - Not used in our updates under consideration

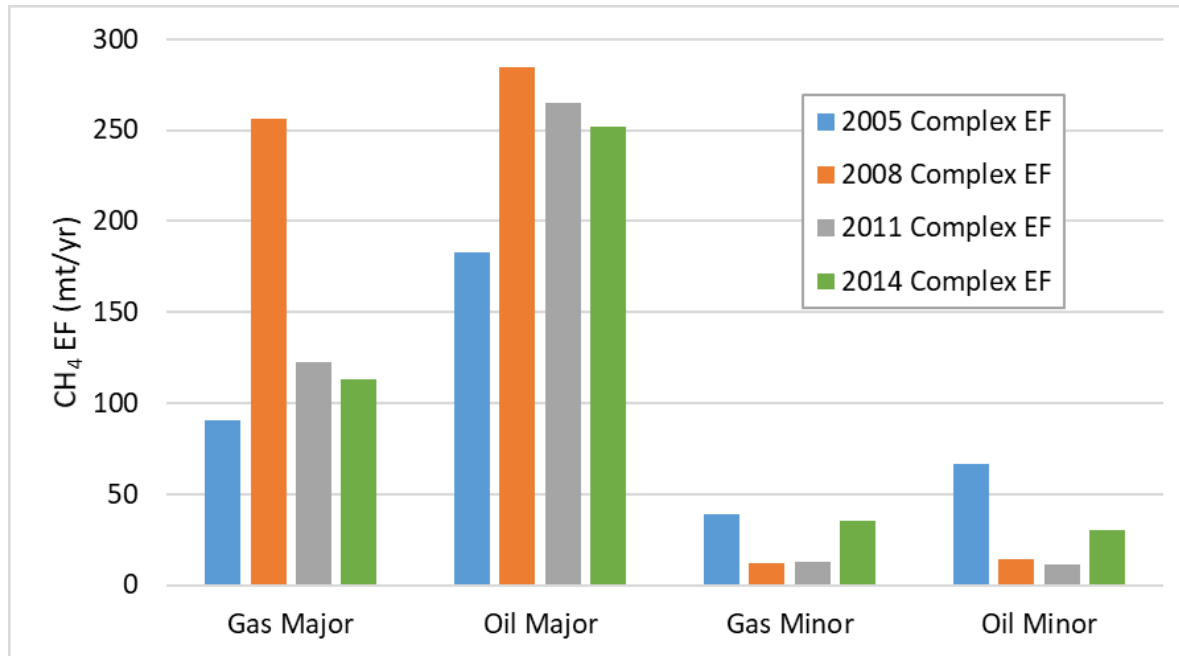
# GOM FEDERAL WATERS: BOEM GEI DATA

Data Element	2005	2008	2011	2014
# Active Complexes	1,407	2,614	2,205	1,397
Flared Volume (Bcf)	5.1	7.0	10.1	5.1
<b>Vent and Leak Emissions</b>				
CH <sub>4</sub> (KT)	194	383	245	204
CO <sub>2</sub> (KT)	2	4	4	3
<b>Flare Emissions</b>				
CH <sub>4</sub> (KT)	0.3	0.4	0.3	0.3
CO <sub>2</sub> (KT)	10	380	548	279

# GOM FEDERAL WATERS: APPROACH FOR BOEM GEI-BASED EFS

- EFS calculated on complex basis (instead of structure basis) – emphasizes the activity data unit most related to the presence of production operations
- Separate EFS calculated for major and minor complexes to represent differences in complexity expected to correlate with emissions
  - Major/minor categorization relies on BOEM Platform Database - A major structure is defined as containing at least six completions or containing more than two pieces of production equipment; otherwise the structure is defined as minor
  - Major complex has at least 1 major structure
  - This approach would replace the current subcategorization scheme based on water depth, which more indirectly correlates with emissions
- Separate EFS calculated for oil and gas complexes
  - Oil/gas complex assignments rely on BOEM OGOR-A production data
  - Updated method allows EPA to use all GEI data

# GOM FEDERAL WATERS: BOEM GEI-BASED VENT AND LEAK EF CONSIDERATIONS



GHGI Time Series Year(s)	Applicable BOEM GEI EF Year	
	Major Complexes	Minor Complexes
1990-2004	2008 GEI	2014 GEI
2005	2005 GEI	
2006-2009	2008 GEI	
2010-2012	2011 GEI	
2013-2017	2014 GEI	

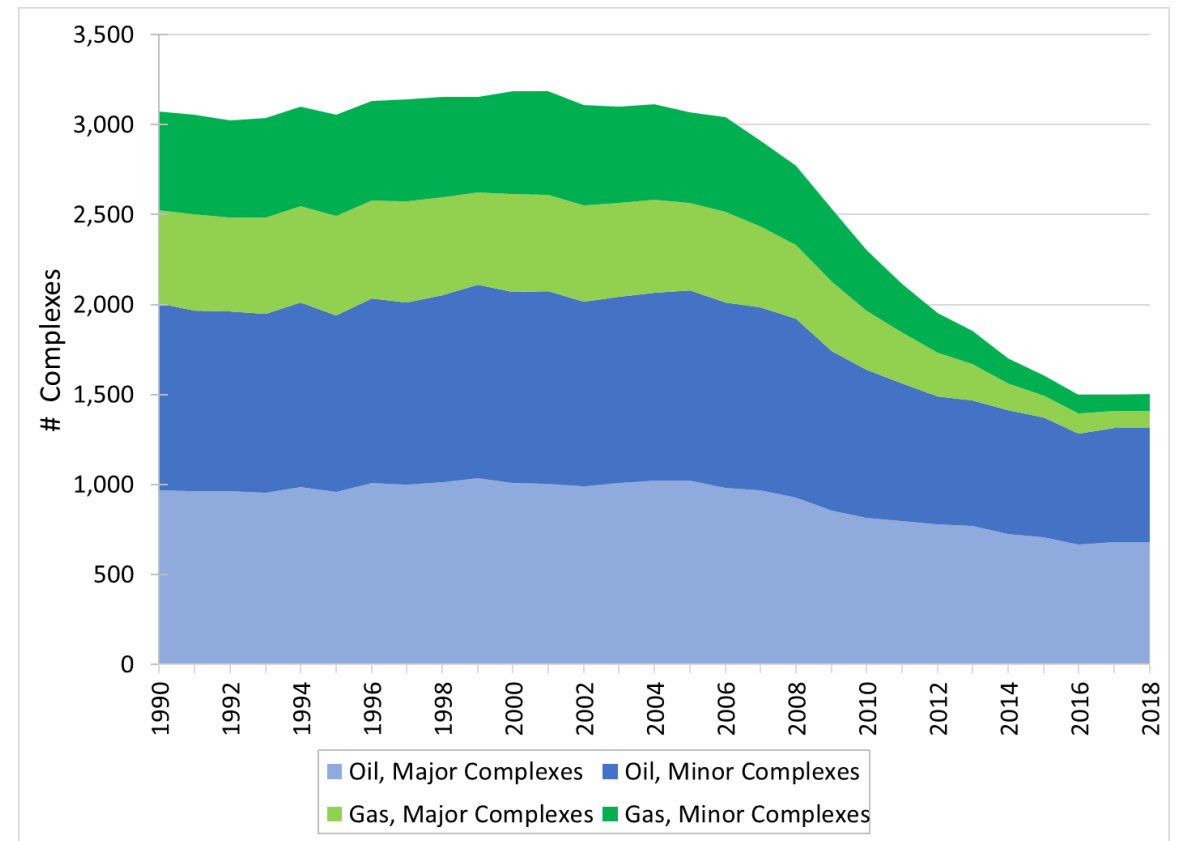
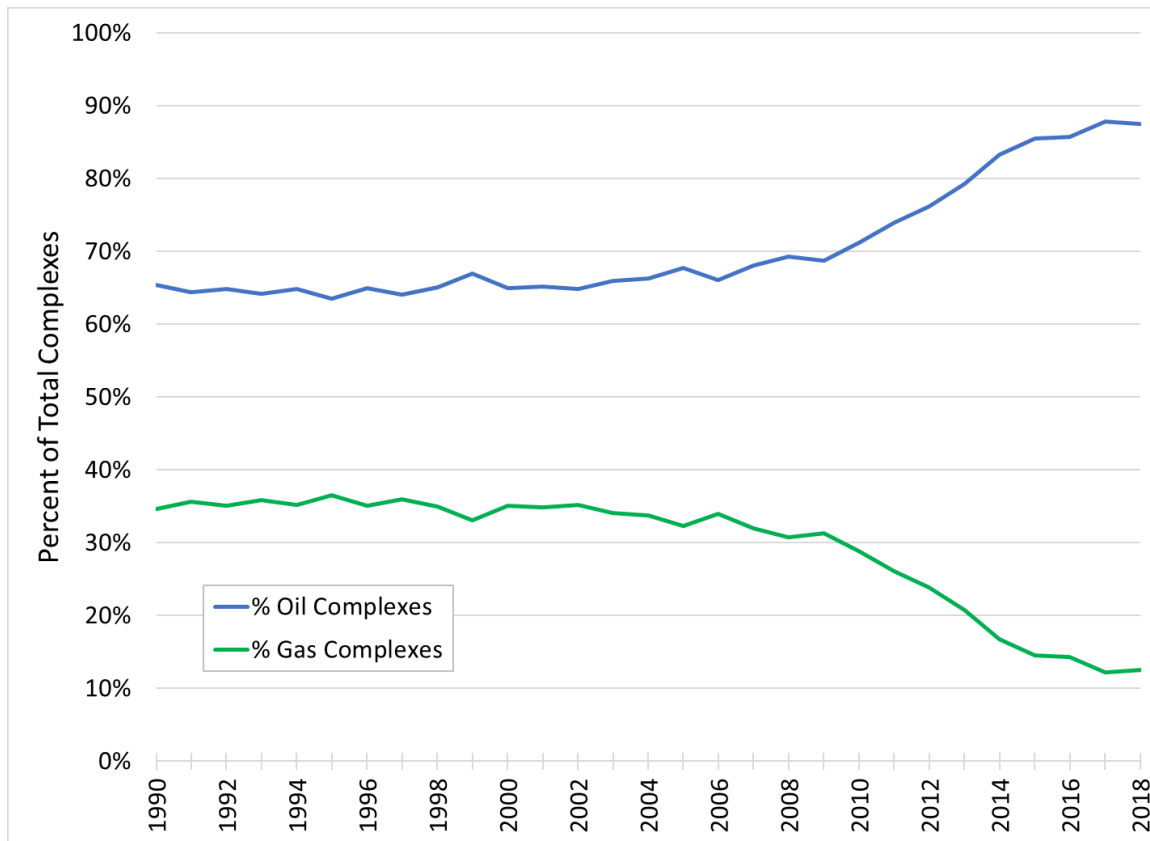
# GOM FEDERAL WATERS: BOEM PLATFORM DATABASE

- Provides information on all offshore facilities in GOM federal waters, including: complex and structure IDs, lease IDs, Area/Block IDs, install dates, removal dates, the structure water depth, and a major/minor structure designation
- Used to develop “active” offshore complex counts, subcategorized by “major” versus “minor”, in each GHGI time series year
- Inactive complexes are excluded
  - There can be a period of inactivity (no emissions) while an offshore complex exists, but is awaiting or undergoing removal
  - EPA assumed 3-year decommissioning period

# GOM FEDERAL WATERS: BOEM OGOR-A PRODUCTION

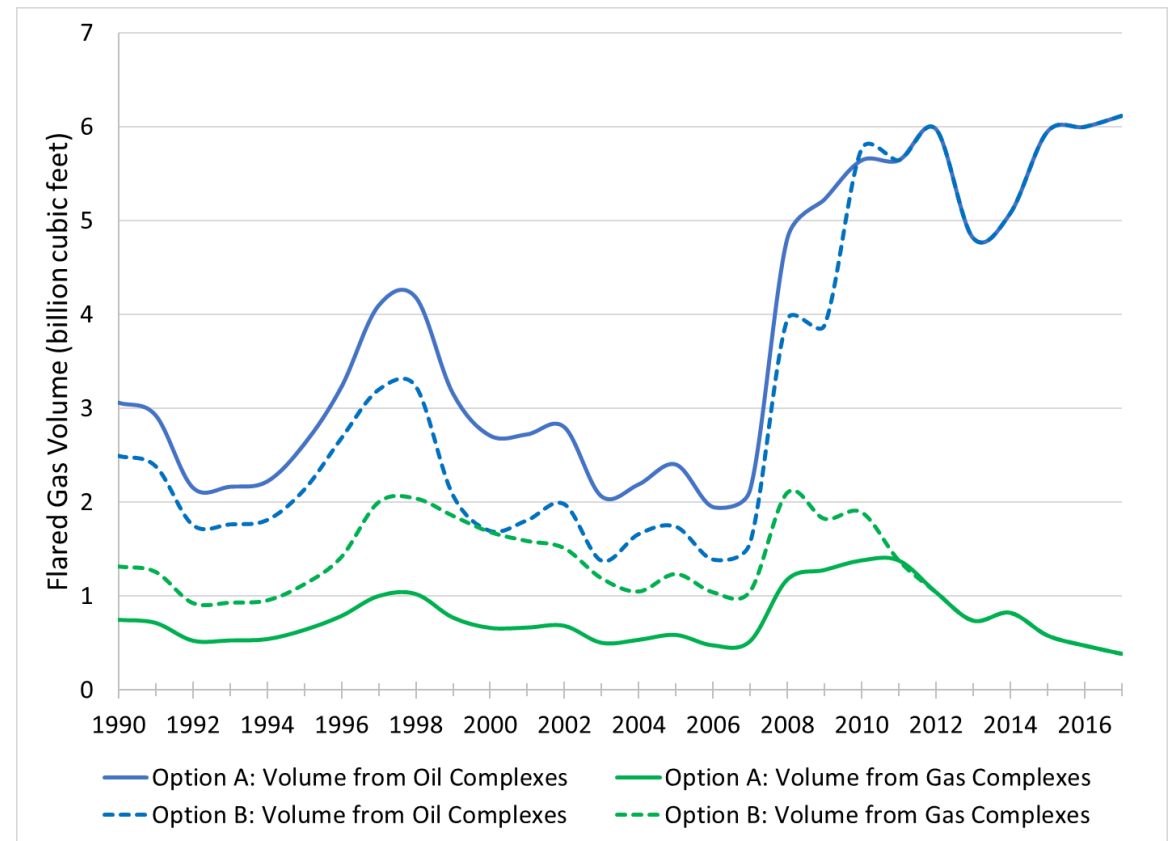
- Annual oil and gas production for each oil and gas lease
  - Area/Block IDs associated with each lease ID are available from 1996-present
- Used to:
  1. Classify each GEI complex as an oil or gas complex (previously discussed)
  2. Estimate the fraction of oil and gas complexes in each GHGI time series year
  3. Calculate production-based EFs for GOM federal waters, for use in estimating GOM state waters emissions (discussed later)

# GOM FEDERAL WATERS: ACTIVE COMPLEX COUNTS FOR UPDATE UNDER CONSIDERATION



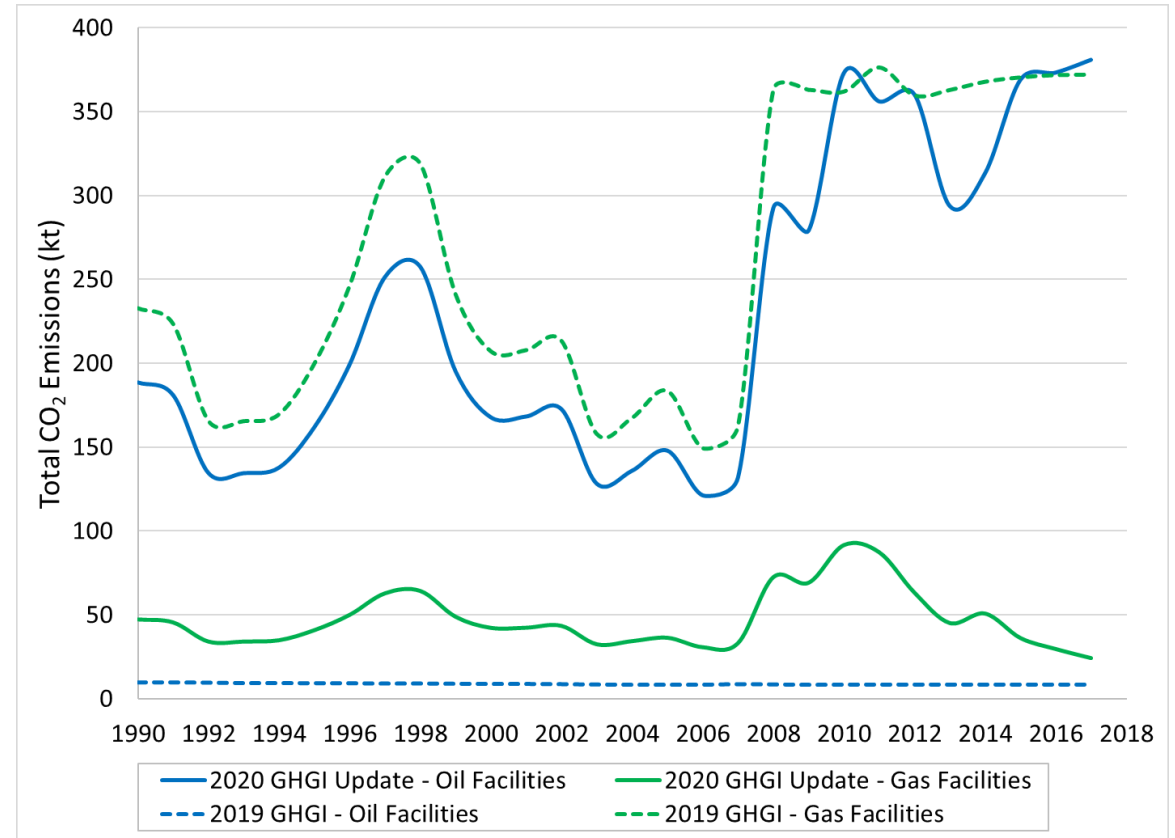
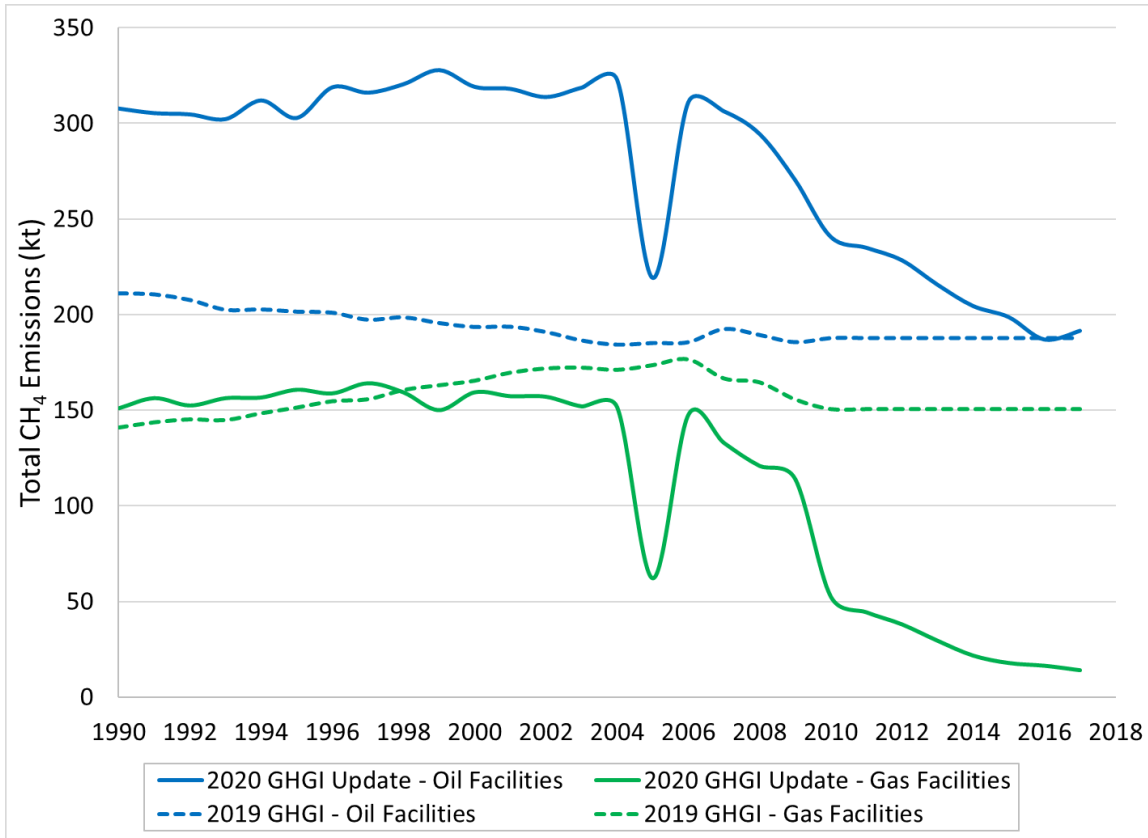
# GOM FEDERAL WATERS: BOEM OGOR-B FLARED GAS VOLUMES

- OGOR-B data currently used does not apportion flared gas volumes to oil vs gas complexes (in current GHGI, all assigned to gas complexes)
- Publicly available OGOR-B provides separate oil vs gas flared gas volumes for 2011 forward
- EPA is considering two options for 1990-2010:
  - Option A (shown as solid lines) assigns more flaring to oil complexes
  - Option B (shown as dashed lines) assigns more flaring to gas complexes





# GOM FEDERAL WATERS: EMISSIONS

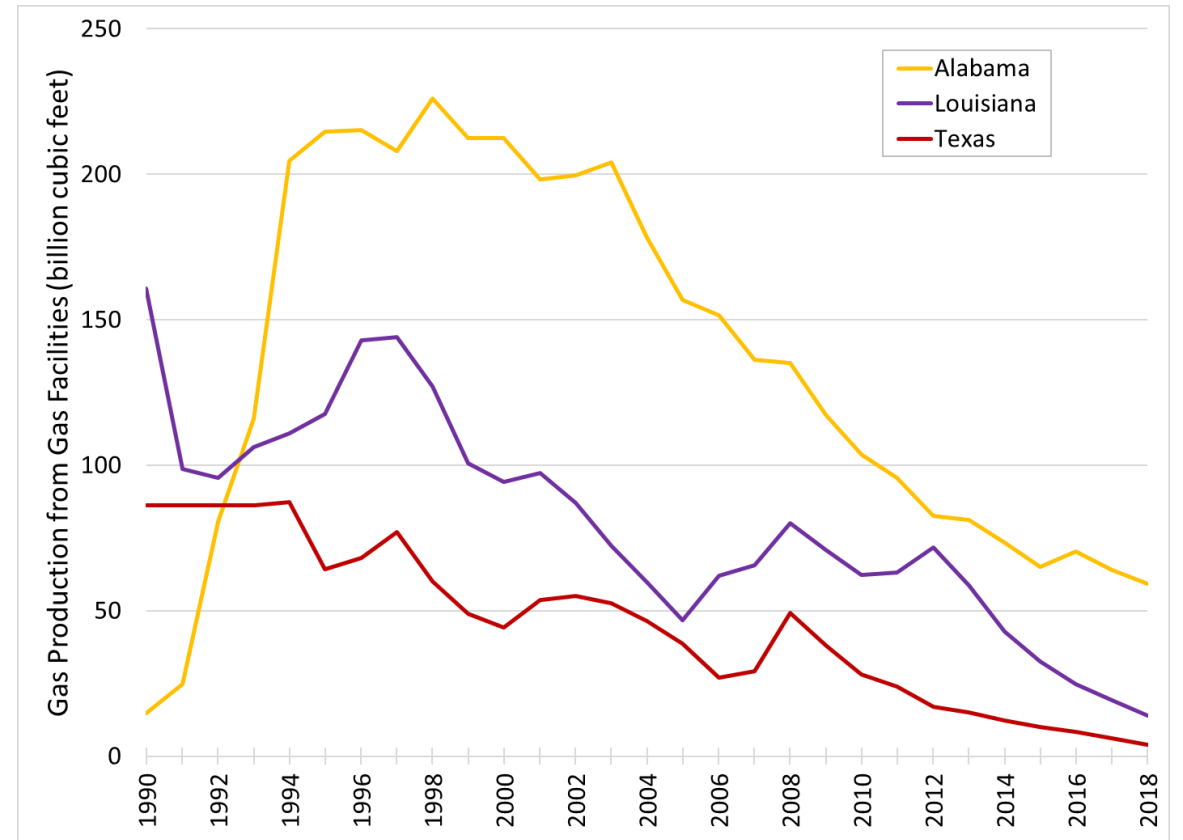
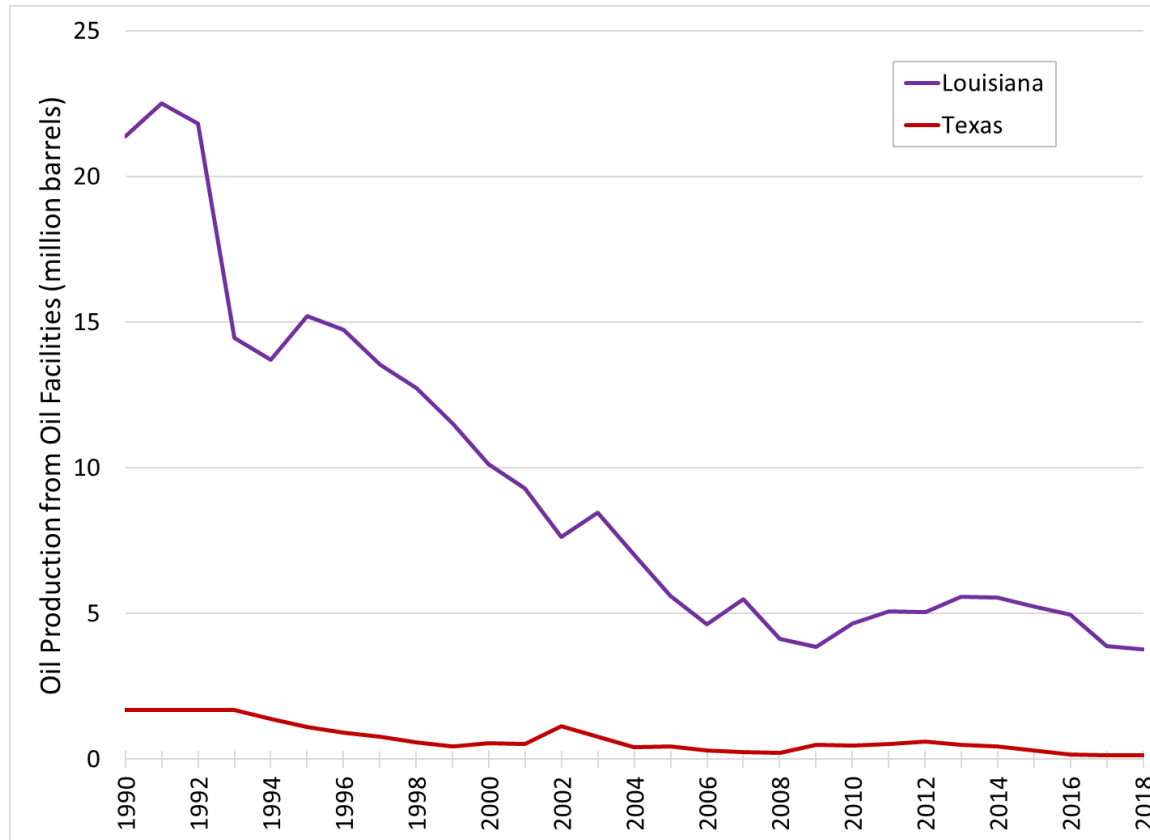


## 2. UPDATES UNDER CONSIDERATION FOR OFFSHORE FACILITIES IN GOM STATE WATERS

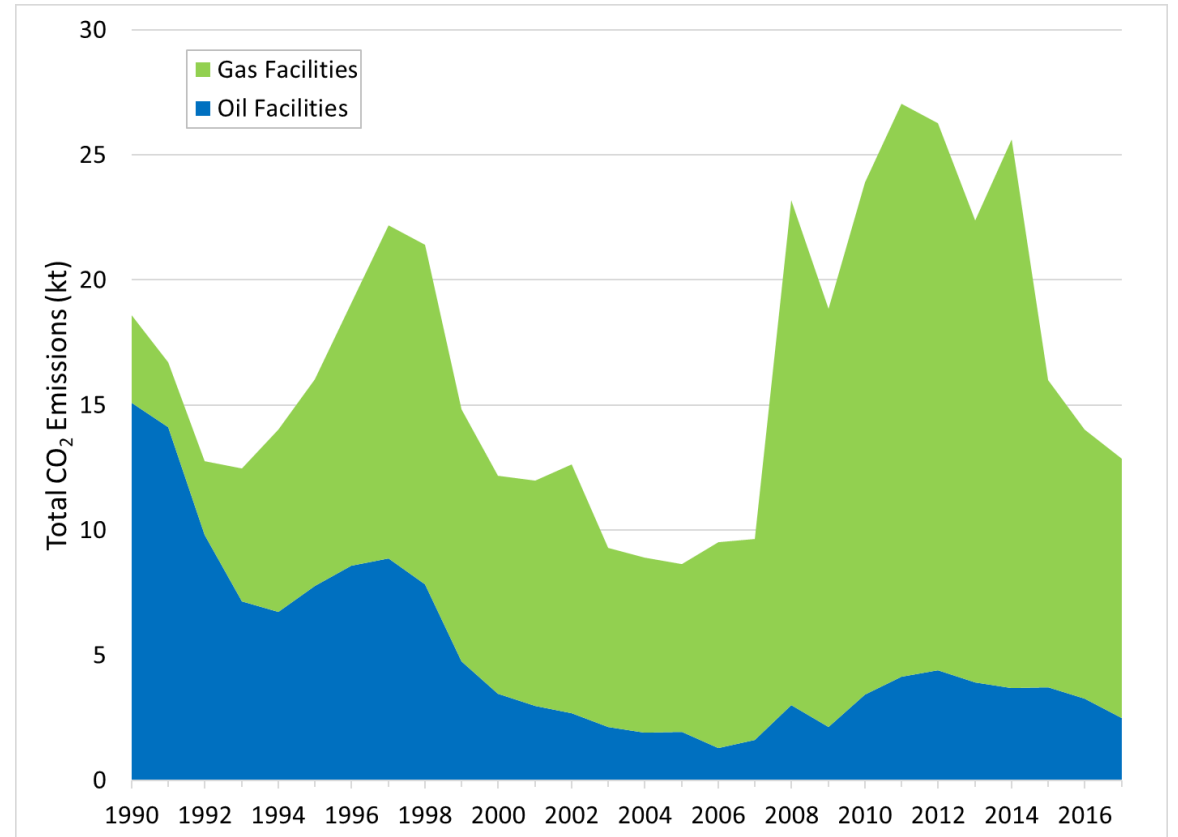
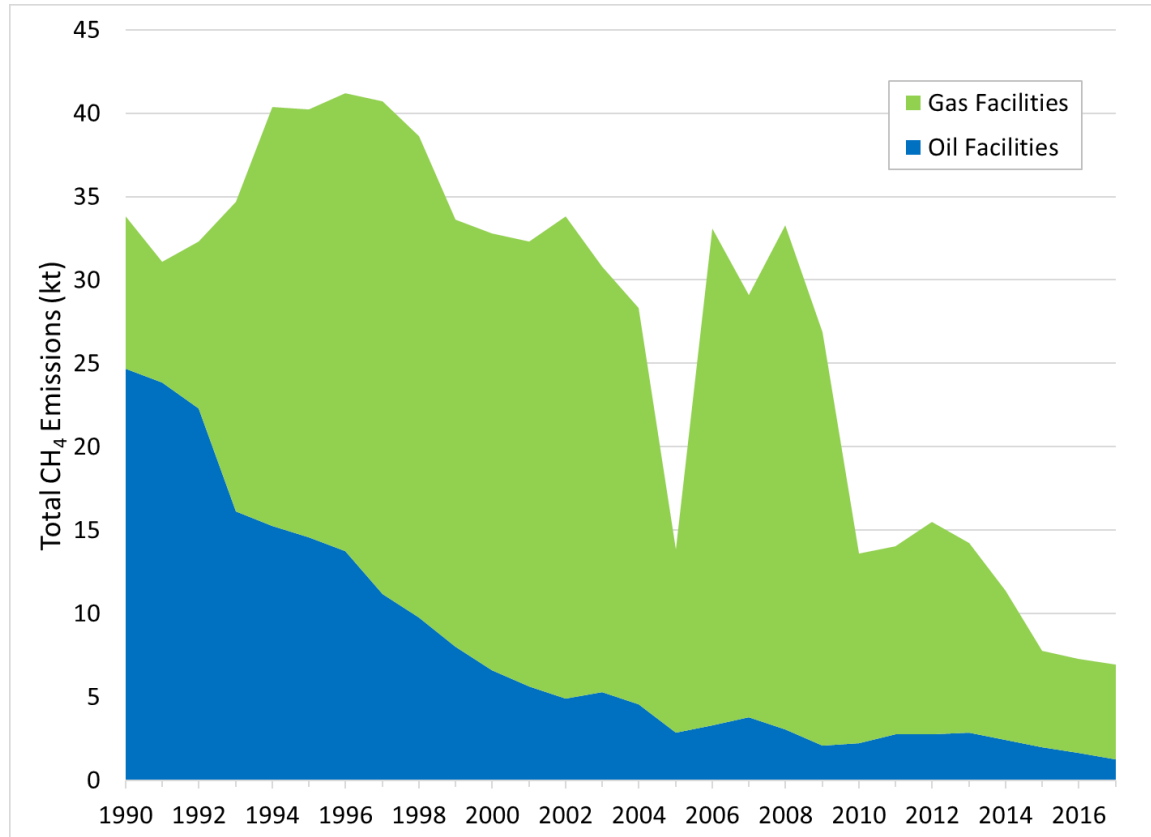
# GOM STATE WATERS: BACKGROUND & APPROACH

- Offshore production in GOM state waters occurs in coastal areas off Alabama, Louisiana, and Texas
- EPA has not identified emissions data (e.g., regional inventories or GHGRP reporting) for these regions
- EFs: Calculate production-based EFs from GOM federal waters emissions and production
  - Emissions per unit oil production for oil complexes; emissions per unit gas production for gas complexes
- Activity: Production data in each GHGI time series year (available from states)

# GOM STATE WATERS: PRODUCTION



# GOM STATE WATERS: EMISSIONS



# 3. UPDATES UNDER CONSIDERATION FOR OFFSHORE FACILITIES IN THE PACIFIC AND ALASKA REGIONS

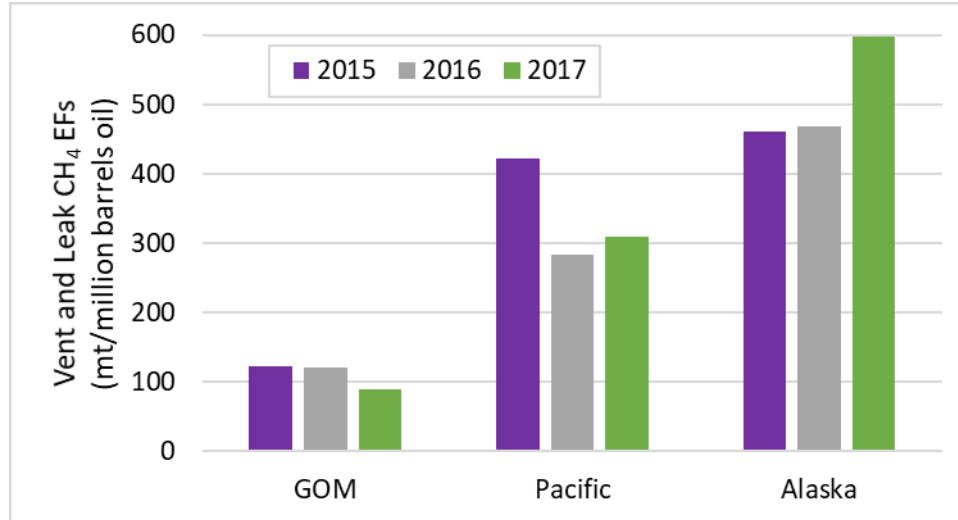
# PACIFIC & ALASKA: BACKGROUND & APPROACH

- Offshore production in Pacific occurs in federal and state waters
  - EPA assumes all facilities are “oil” production type
- Offshore production occurs only in state waters off the coast of Alaska
- EFs: Calculate production-based EFs from GHGRP data
  - Emissions per unit oil production for oil complexes; emissions per unit gas production for gas complexes
- Activity: Production data
  - Pacific – available from EIA, BOEM, and California state
  - Alaska – available from state

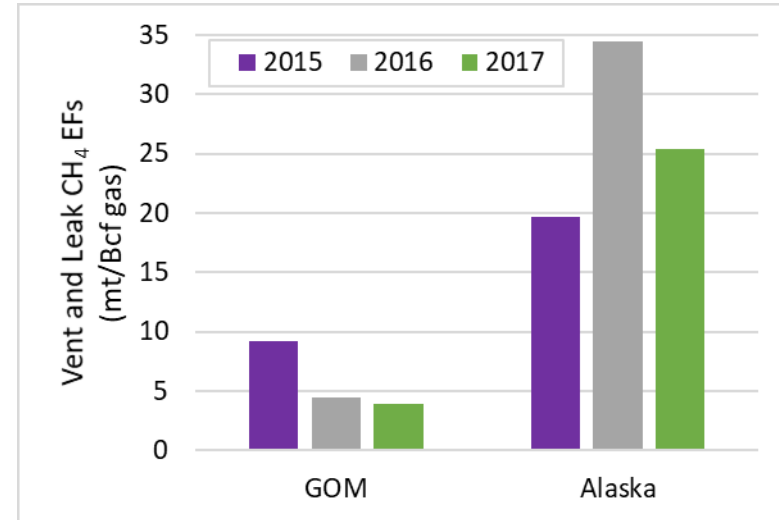
# PACIFIC & ALASKA: CALCULATED GHGRP EFs

Vent and Leak CH<sub>4</sub> EFs

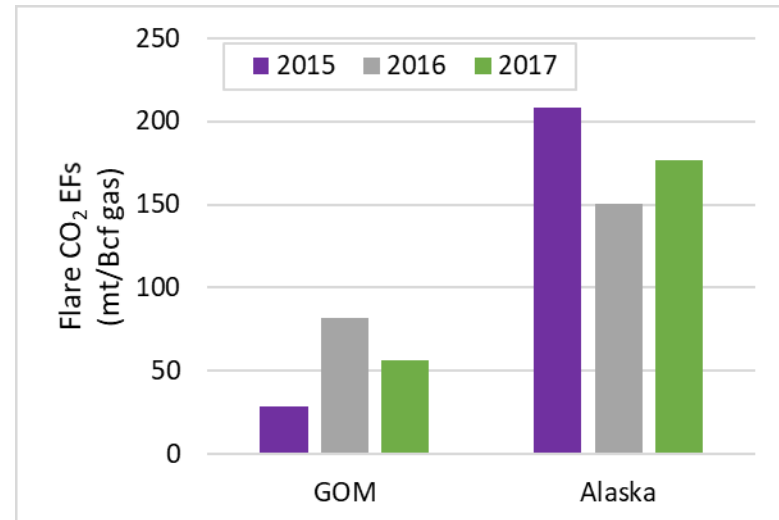
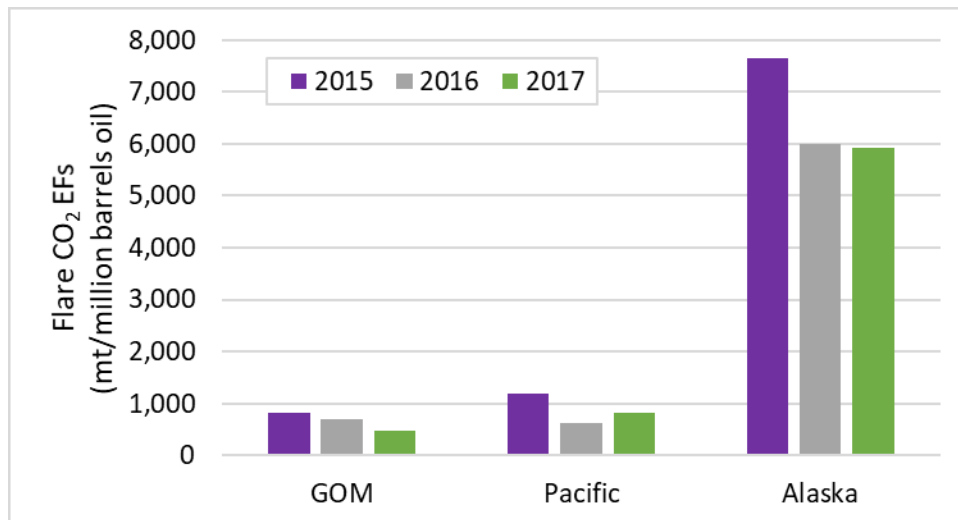
Oil Facilities



Gas Facilities



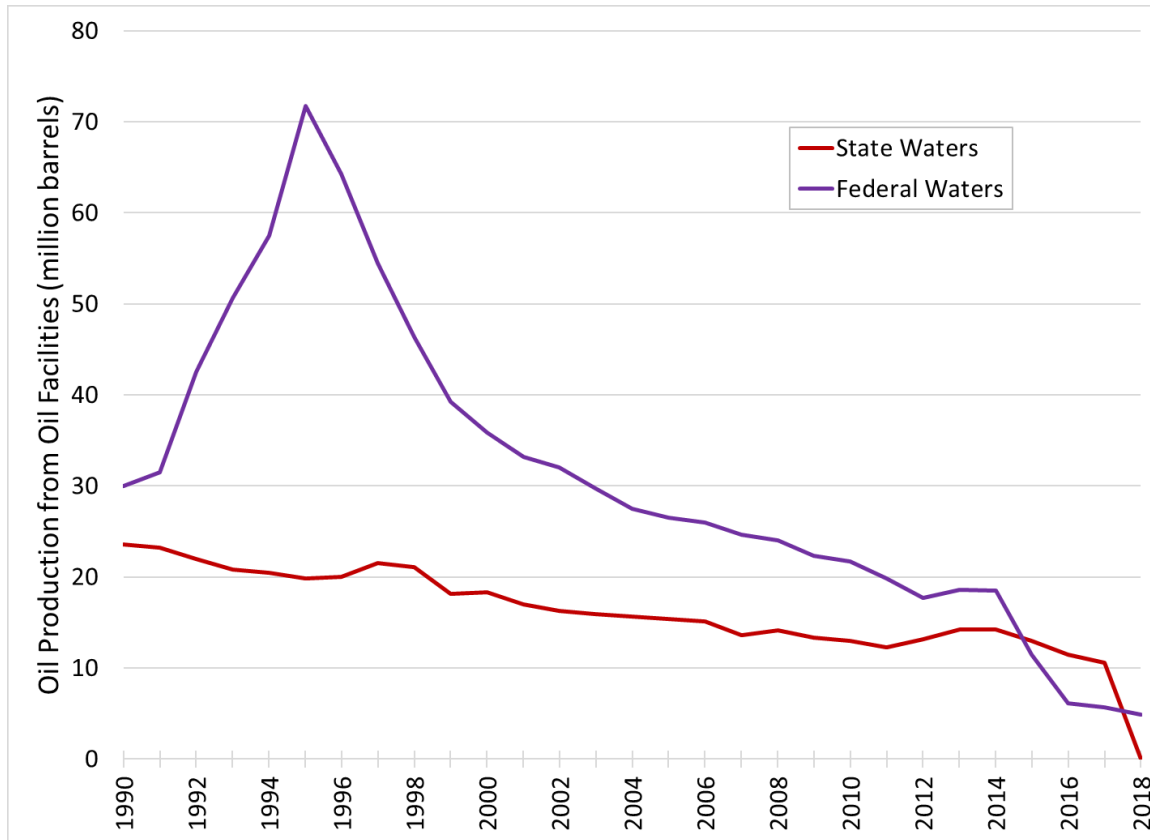
Flare CO<sub>2</sub> EFs



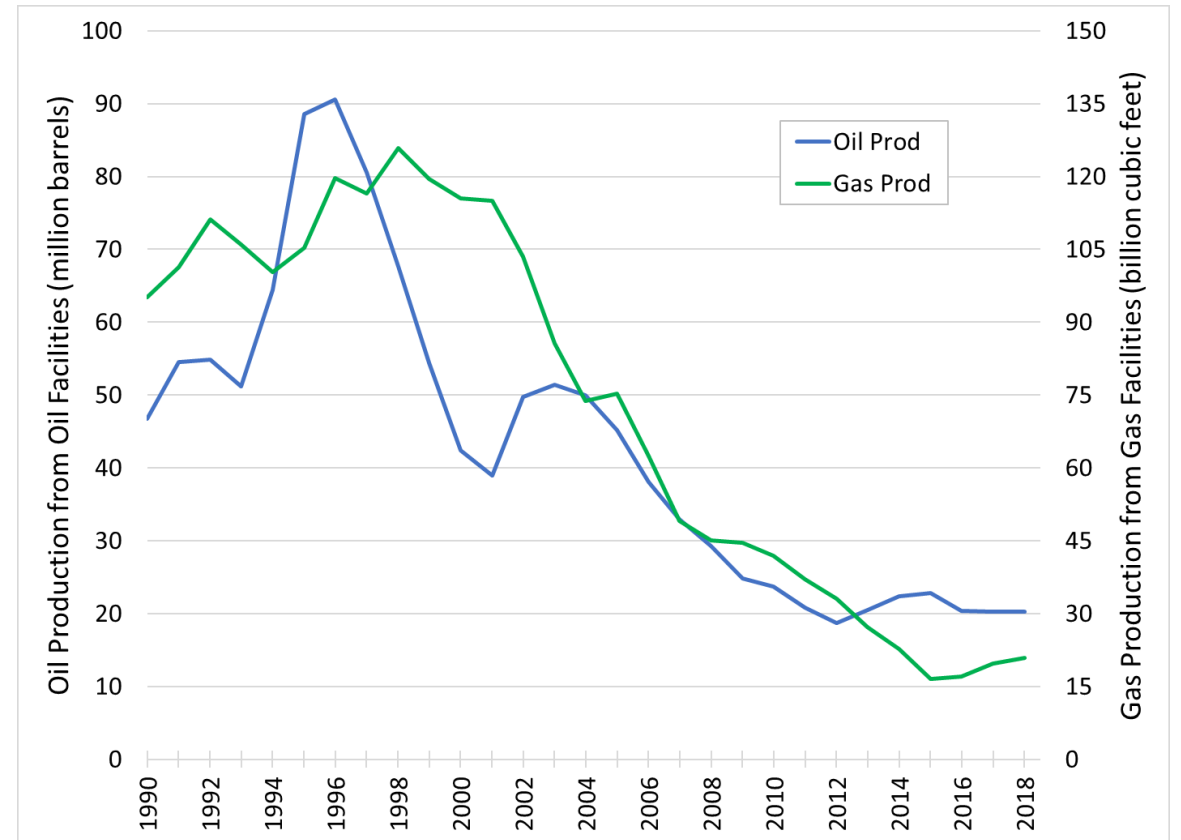


# PACIFIC AND ALASKA: PRODUCTION

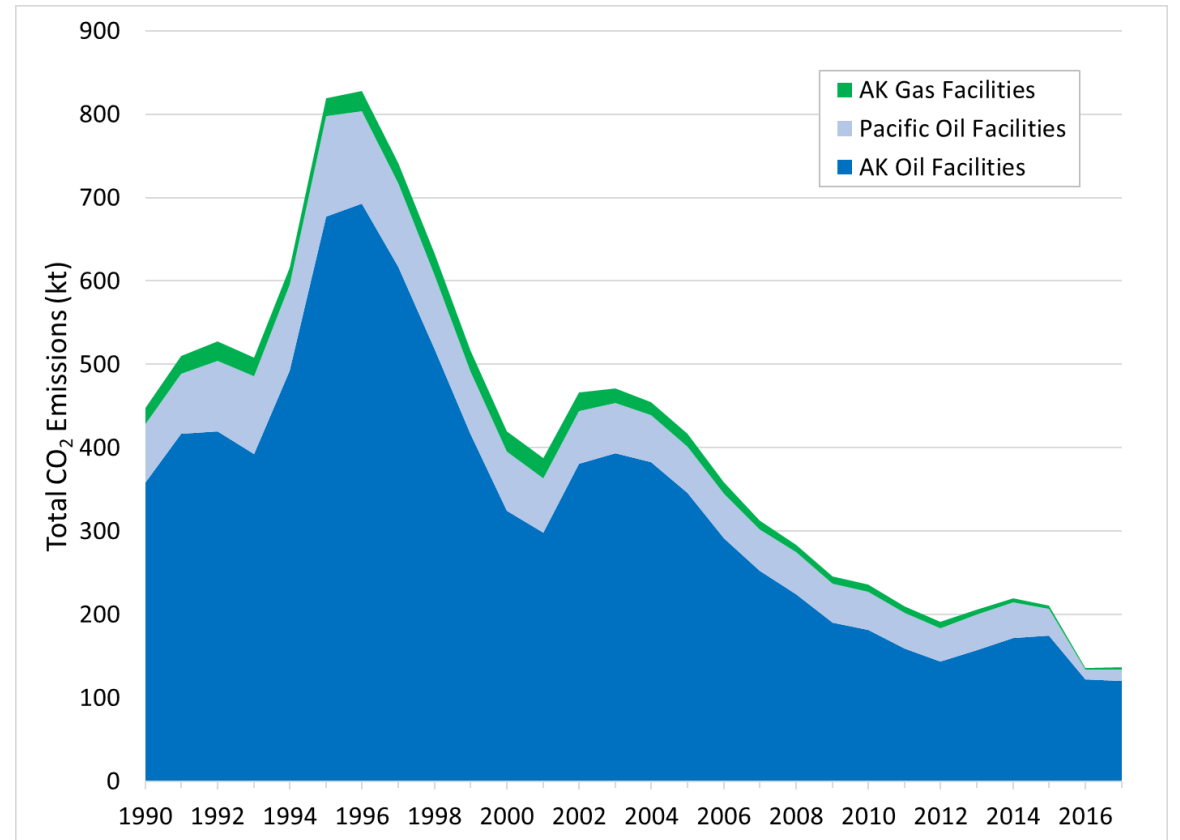
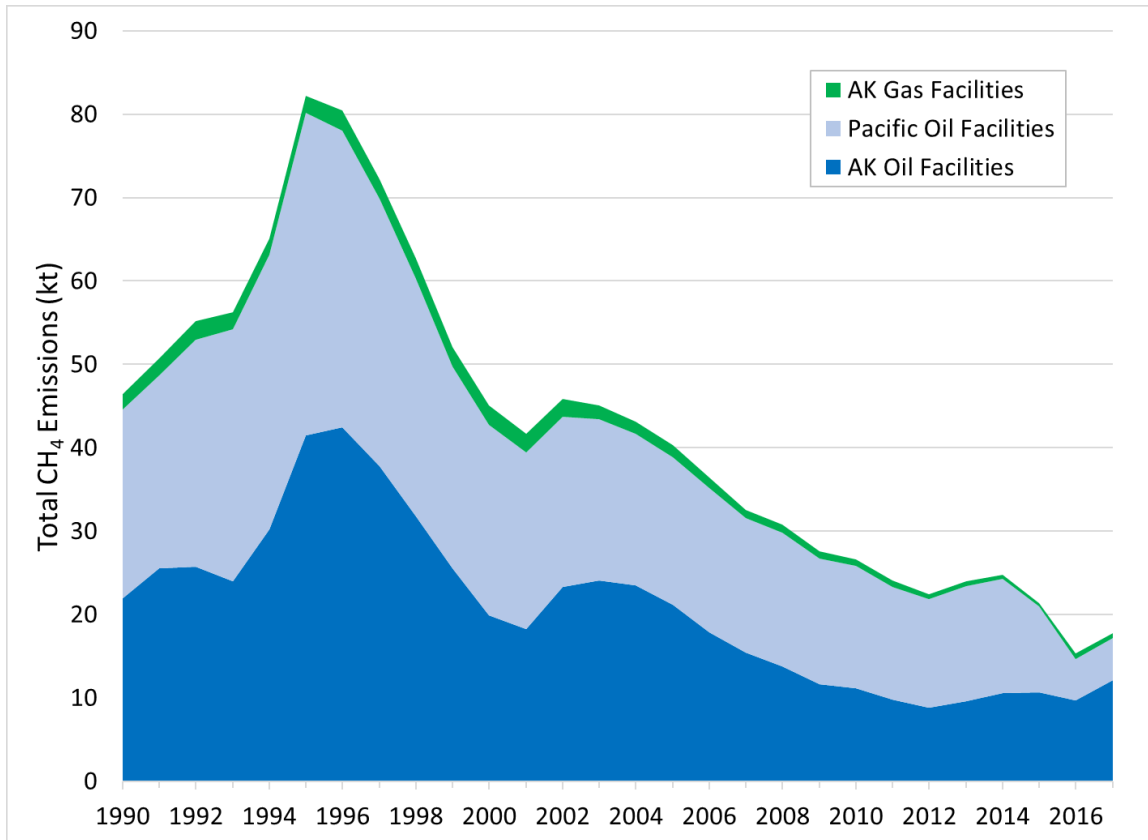
## Pacific



## Alaska



# PACIFIC AND ALASKA: EMISSIONS



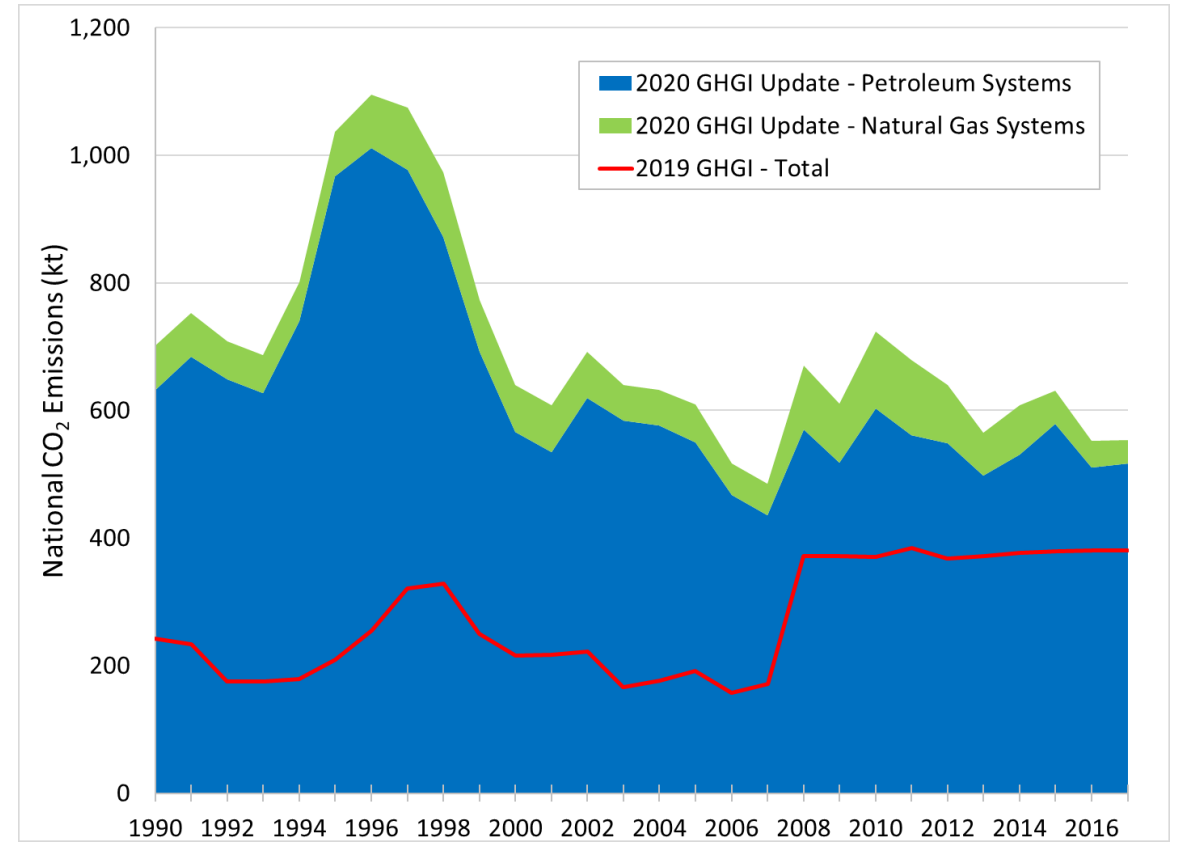
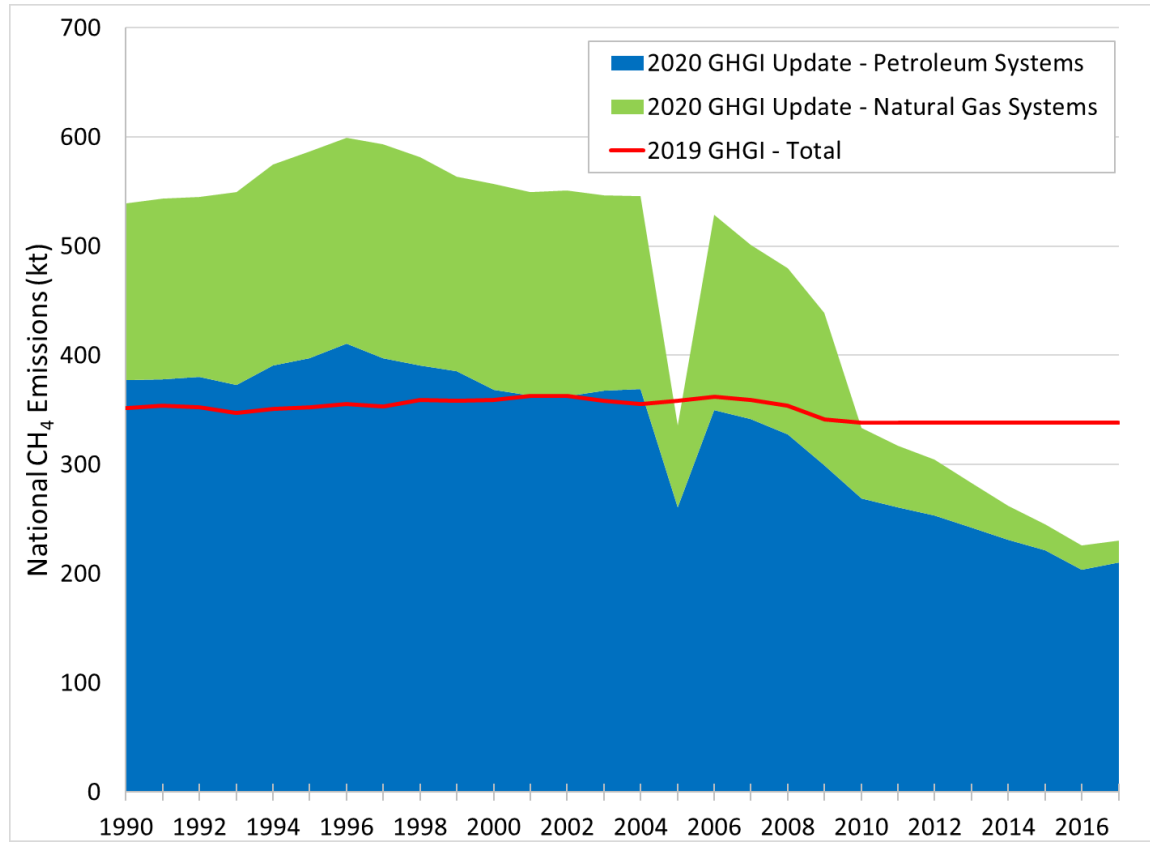
# OFFSHORE PRODUCTION NATIONAL EMISSIONS SUMMARY

# OFFSHORE PRODUCTION EMISSIONS – YEAR 2017

## COMPARISON

Category	Region	National CH <sub>4</sub> Emissions (kt)		National CO <sub>2</sub> Emissions (kt)	
		2020 GHGI Update	2019 GHGI	2020 GHGI Update	2019 GHGI
Petroleum Systems	GOM Federal Waters	191	188	377	0
	GOM State Waters	1	NE	2	NE
	Alaska	12	NE	120	NE
	Pacific	5	NE	13	NE
Natural Gas Systems	GOM Federal Waters	14	151	24	369
	GOM State Waters	6	NE	10	NE
	Alaska	0.5	NE	3	NE
	Pacific	n/a	n/a	n/a	n/a

# OFFSHORE PRODUCTION TIME SERIES EMISSIONS



# REQUESTS FOR STAKEHOLDER FEEDBACK

1. GOM Federal Waters: Feedback on datasets and approach
  - a. Complex-level EFs: Oil/gas complexes, Major/minor complexes
  - b. Approach for applying BOEM GEI EFs over the time series
  - c. Approach to estimate complex counts over the time series
2. GOM Federal Waters Flaring: Feedback on two approaches; applying GEI-based EFs versus OGOR-B flaring volumes
  - a. Feedback on two options for use of OGOR-B flaring volumes
3. GOM State Waters: Feedback on relying on GOM federal waters production-based EFs

# REQUESTS FOR STAKEHOLDER FEEDBACK (CONT.)

4. Pacific and Alaska Regions: Feedback on relying on GHGRP production-based EFs
5. Feedback on the 1990-2018 CH<sub>4</sub> emissions trend, including information on changes in offshore production practices over time that may have contributed to the trend
6. Feedback on how to track and estimate emissions from anomalous leak events
7. Information on other available or upcoming data related to offshore oil and gas emissions

# PROVIDING STAKEHOLDER FEEDBACK

- EPA memo posted online for additional details and specific stakeholder feedback requests
- <https://www.epa.gov/ghgemissions/stakeholder-process-natural-gas-and-petroleum-systems-1990-2018-inventory>
- Stakeholder feedback requested by: September 30, 2019
- Submit feedback via email: [GHGInventory@epa.gov](mailto:GHGInventory@epa.gov)



# NOVEMBER 7, 2019 EPA GHG DATA STAKEHOLDER WORKSHOP

- Workshop to be held in Pittsburgh, following the Natural Gas STAR & Methane Challenge Workshop; webinar option available
- EPA will present on GHGRP data, and on existing GHG Inventory methods and updates under consideration based on previous stakeholder comments and data from the GHGRP and external studies
- Stakeholders are invited to present on new data and information relevant to estimating GHG emissions from natural gas systems and petroleum systems
- Stakeholders wishing to present at the workshop should contact [ghginventory@epa.gov](mailto:ghginventory@epa.gov) by September 20, 2019 with information on the topic area that they would like to discuss