

TCEQ Emissions Inventory (EI) & EPA Toxics Release Inventory (TRI)

Report by Pasadena CAC Plants *2019 Data and Trends* *Full Presentation*

ANA PARTIN

INEOS PHENOL

OCTOBER 27, 2020

Emissions, Air Quality, & Health

- ❖ Emissions come from many sources, including industry.
- ❖ Minimizing emissions improves air quality, which is good for health and the environment.
- ❖ Tonight's report: air emissions from PCAC plants
- ❖ Other meetings focus on health data and health research.

Why Review Emissions Reports?

If you measure it, you manage it

- Learn what PCAC plants release
 - Including pollutants contributing to ozone formation
- Help public learn about chemicals in the community
- Tool for helping PCAC hold plants accountable
 - By looking at industry trends and specific plants
 - By sharing questions, concerns and suggestions
- Plants may learn from their own reports and others

TCEQ Air Emissions Inventory (EI) Trends in PCAC Plants

Change in PCAC Plants TCEQ Air Emissions Inventory

2018-2019

- Routine Permitted Emissions - 8%
- Maintenance Emissions - 48%
- Upset Emissions - 53%
- Nitrogen Oxides (NOx) - 8%
- Volatile Organic Compounds (VOCs) - 16%
- Highly Reactive VOCs (HRVOCs) - 14%
- Carbon Monoxide (CO) + 13%
- Total Suspended Particulates (TSP) - 6%
- Particulate Matter (PM 2.5) - 8%
- Sulfur Oxides (SOx) - 19%

Pounds of TCEQ EI per Million Pounds of Product for PCAC Plants 1995, 2005, 2010, 2015-2019

Pounds

1200

1000

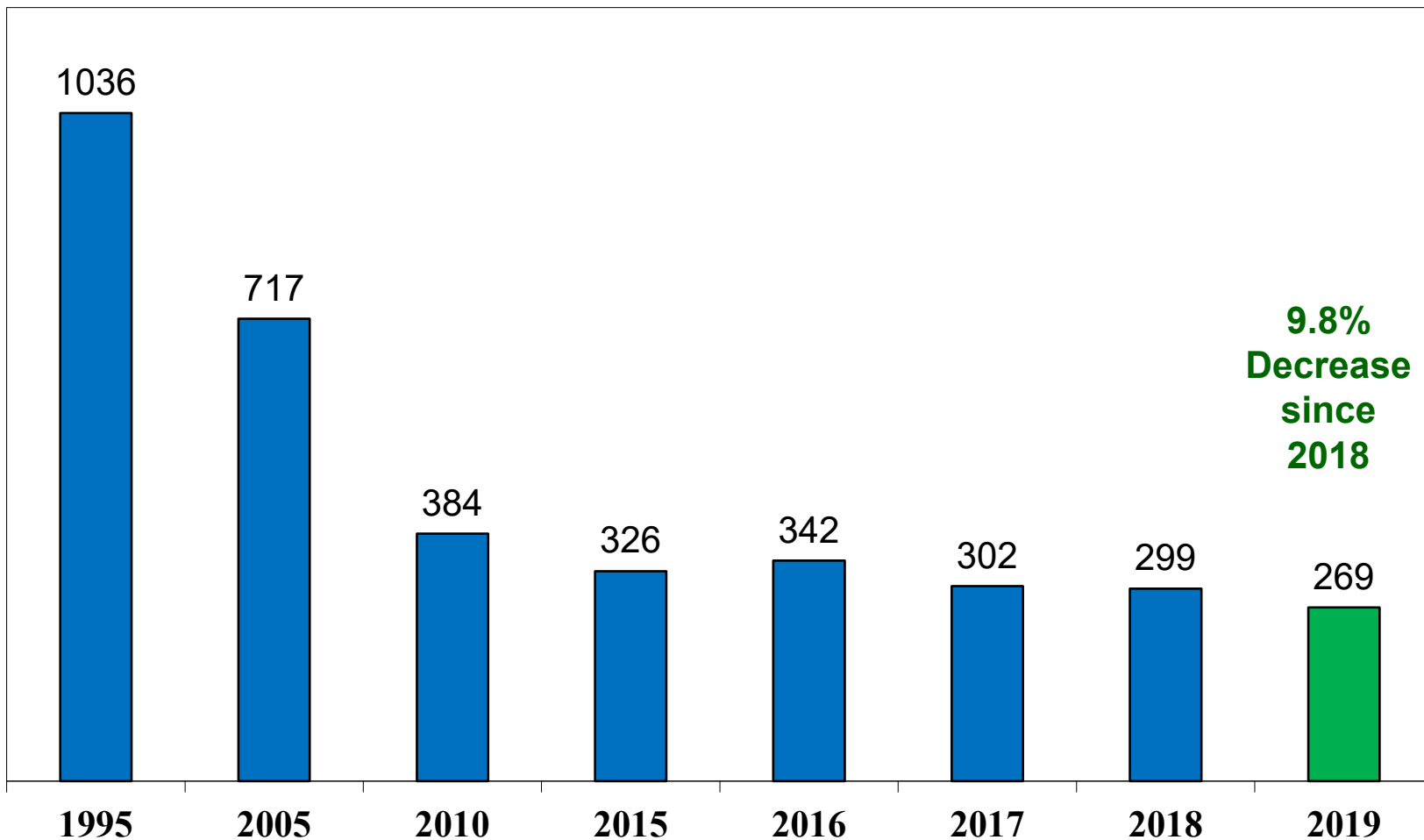
800

600

400

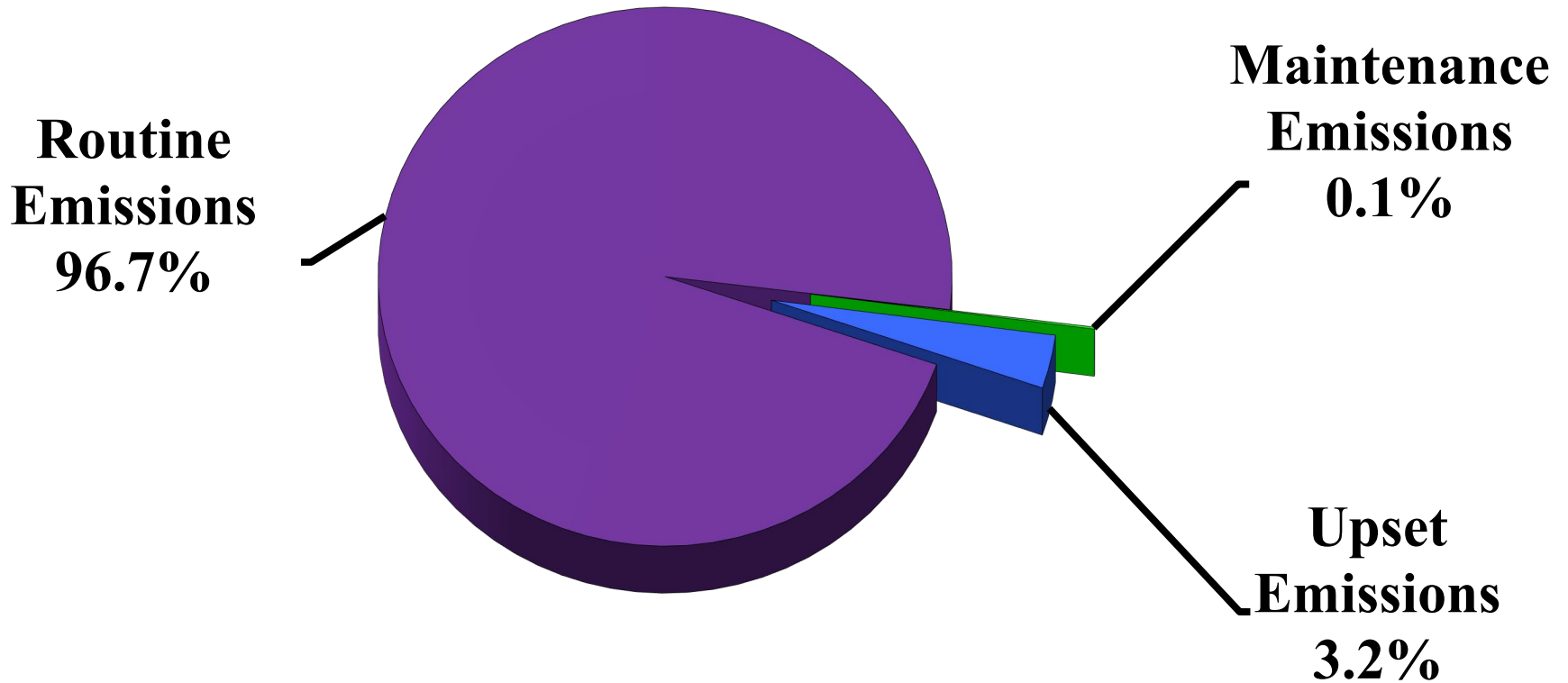
200

0



1995→2019 : 74% Reduction in EI Emissions per Million Pounds of Product

2019 TCEQ EI Emissions *by Cause* for PCAC Plants



Criteria Air Pollutants in EI

4 of the criteria air pollutants- subject to National Ambient Air Quality Standards (NAAQS)

- Nitrogen Oxides (NO_x)- ozone precursor
- Sulfur Oxides (SO_x)
- Carbon Monoxide (CO)
- Total Suspended Particulates (TSP)/PM 2.5

Volatile Organic Compounds (VOCs)- ozone precursors subject to other rules

- Highly Reactive VOCs (HRVOCs), a subset of VOCs, contribute more to ozone formation

Nitrogen Oxides (NOx) TCEQ Air Emissions Inventory for PCAC Plants 1995, 2005, 2010, 2015-2019

Pounds

20,000,000

15,000,000

10,000,000

5,000,000

0

1995→2019 : 82% Reduction in NOx Emissions

17,054,589

**8%
Decrease
since
2018**

2,880,225

2,835,685

3,312,243

3,042,629

1995

2005

2010

2015

2016

2017

2018

2019

Biggest change from 2018 was decrease at Chevron Pasadena Refinery:
Temporary Decrease in Operating Hours

Nitrogen Oxides (NOx)

2019 Changes

Increases

LyondellBasell Refinery (+38,075 lbs.) (2% Change)

Sekisui (+33,719 lbs.)

- *Sustainable/Temporary*: Acquired boiler from Air Products in 2018. Month-long turnaround in 2019, used more temporary engines. (402% Change)

Oxy Vinyls (+8,628 lbs.)

- Continuous monitoring of boiler stack (15% Change)

Nitrogen Oxides (NOx)

2019 Changes

Decreases

Chevron Pasadena Refinery (-323,901 lbs.)

- *Temporary:* Annual operating hours decreased in 2019 (25% Change)

Air Products (-17,438 lbs.)

- Combination of less production and sale of boiler. (12% Change)

Kinder Morgan Export Terminal (-11,563 lbs.)

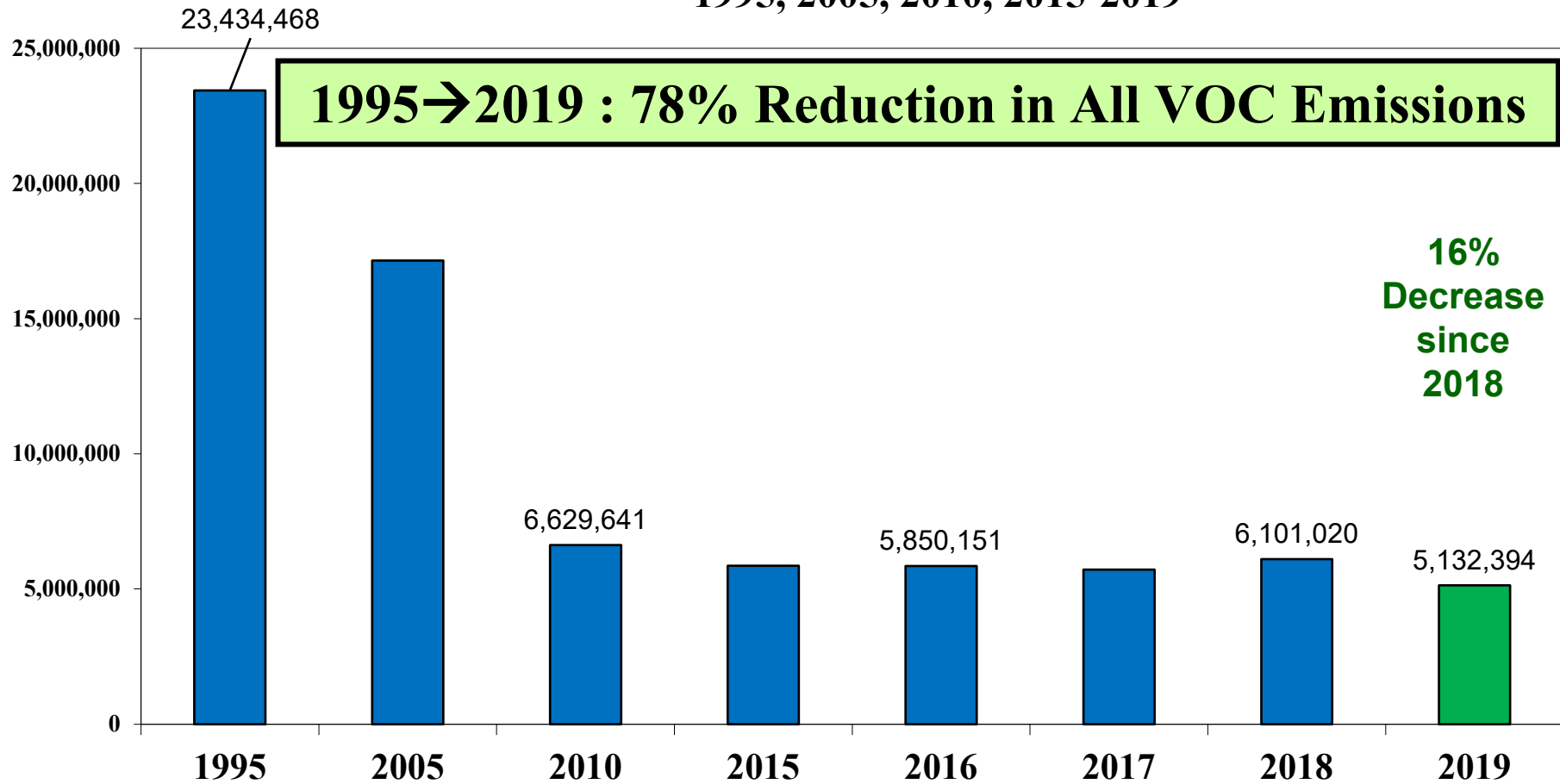
- *Sustainable:* Vapor combustion units were stack tested in late 2018. New emission factors from the test were applied in RY2019 report. (70% Change)

BASF (-11,193 lbs.)

- *Sustainable:* Improved equipment reliability. (30% Change)

All Volatile Organic Compounds (VOCs) TCEQ Air Emissions Inventory for PCAC Plants 1995, 2005, 2010, 2015-2019

Pounds



Biggest change from 2018 was decrease at Chevron Pasadena Refinery:
Temporary Decrease in Operating Hours

All Volatile Organic Compounds (VOCs) 2019 Changes

Increases

Kinder Morgan Liquids Terminal (+115,523 lbs.)
(9% Change)

ITC (+18,772 lbs.)

- Expanded tank farm and terminal throughout with combustion control (41% Change)

INEOS Phenol (+11,600 lbs.)

- *Sustainable:* Supplemental fuel gas to flare to maintain BTU value (12% Change)

All Volatile Organic Compounds (VOCs) 2019 Changes

Decreases

Chevron Pasadena Refinery (-806,293 lbs.)

- *Temporary:* Annual operating hours decreased in 2019 (48% Change)

Chevron Phillips (-157,632 lbs.)

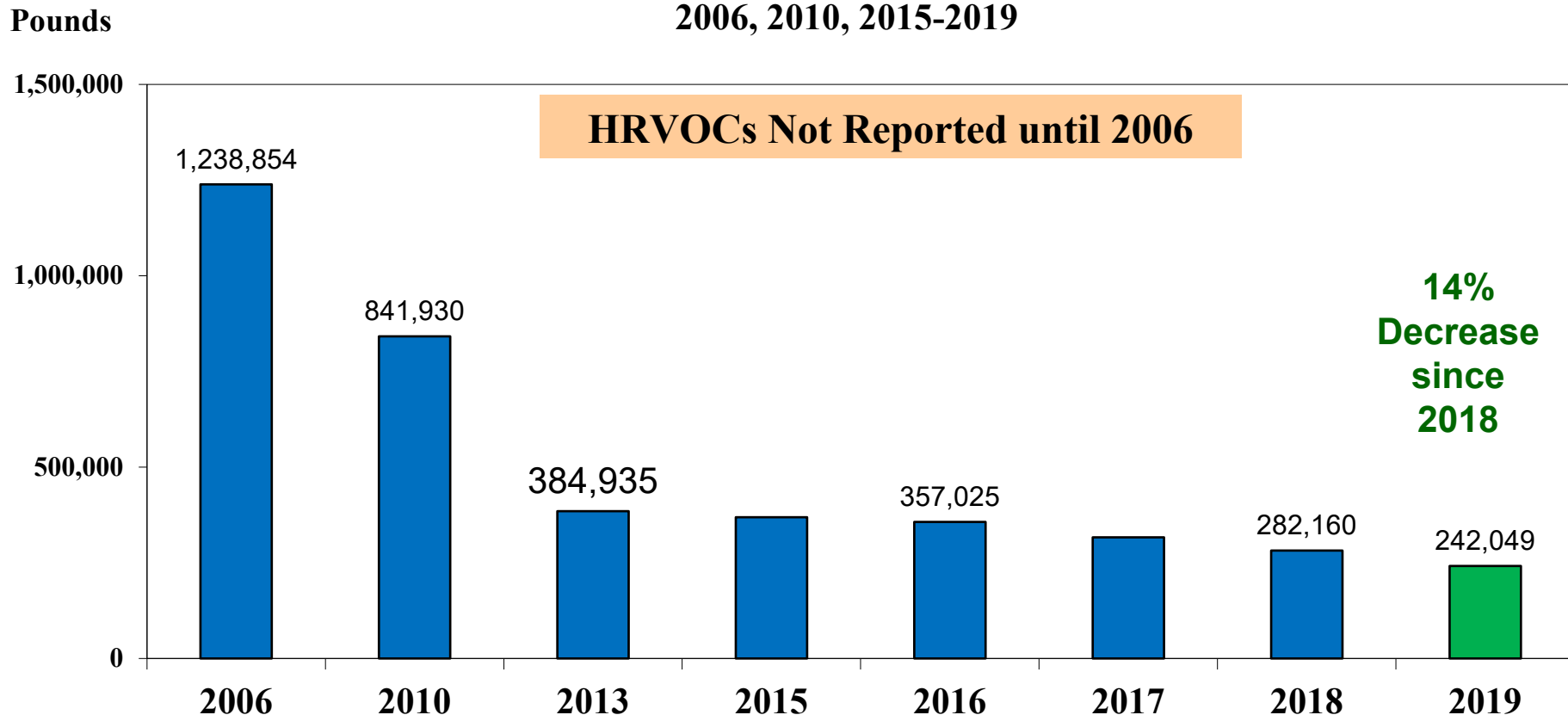
- *Sustainable:* Installation of carbon bed collection system for various point sources. (19% Change)

LyondellBasell Refinery (-138,779 lbs.) (9% Change)

Albemarle (-20,000 lbs.) (8% Change)

Highly Reactive Volatile Organic Compounds (HRVOCs) (subset of VOCs) TCEQ Air Emissions Inventory for PCAC Plants

2006, 2010, 2015-2019



2006→2019 : 80% Reduction in HRVOC Emissions

Biggest change from 2018 was decrease at Chevron Pasadena Refinery:
Temporary Decrease in Operating Hours

Highly Reactive Volatile Organic Compounds (HRVOCs) (subset of VOCs) 2019 Changes

Increases

Chevron Phillips (+4,847 lbs.) (5% Change)

Enterprise Products (+1,873 lbs.)

- Increase due to additional permitted flaring activities for the site.
(11% Change)

Oxy Vinyls (+1,548 lbs.)

- Increase in fugitive emissions from refrigeration skid (46% Change)

Highly Reactive Volatile Organic Compounds (HRVOCs) (subset of VOCs) 2019 Changes

Decreases

Chevron Pasadena Refinery (-33,196 lbs.)

➤ *Temporary:* Annual operating hours decreased in 2019 (44% Change)

INEOS Phenol (-5,140 lbs.)

➤ *Sustainable:* 2018 included an emission event that did not occur in 2019 (65% Change)

Albemarle (-5,000 lbs.)

➤ *Temporary:* Variability of demand (14% Change)

LyondellBasell Refinery (-2,559 lbs.) (5% Change)

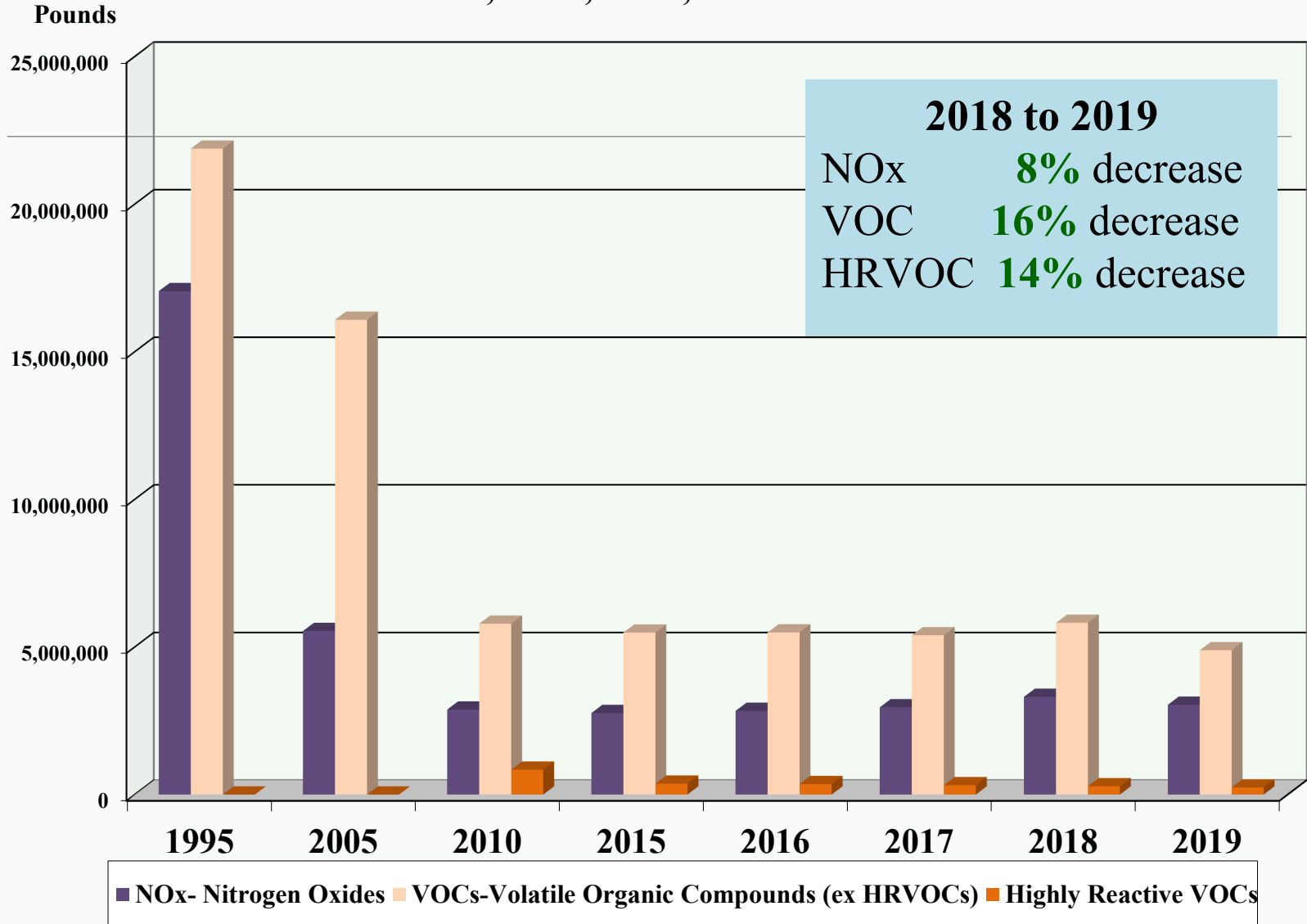
BASF (-2,484 lbs.)

➤ *Sustainable:* Improved equipment reliability. (37% Change)

Summary of Contributors to Ozone Formation

NO_x, VOCs (excluding HRVOCs) & HRVOCs for PCAC Plants

1995, 2005, 2010, 2015-2019

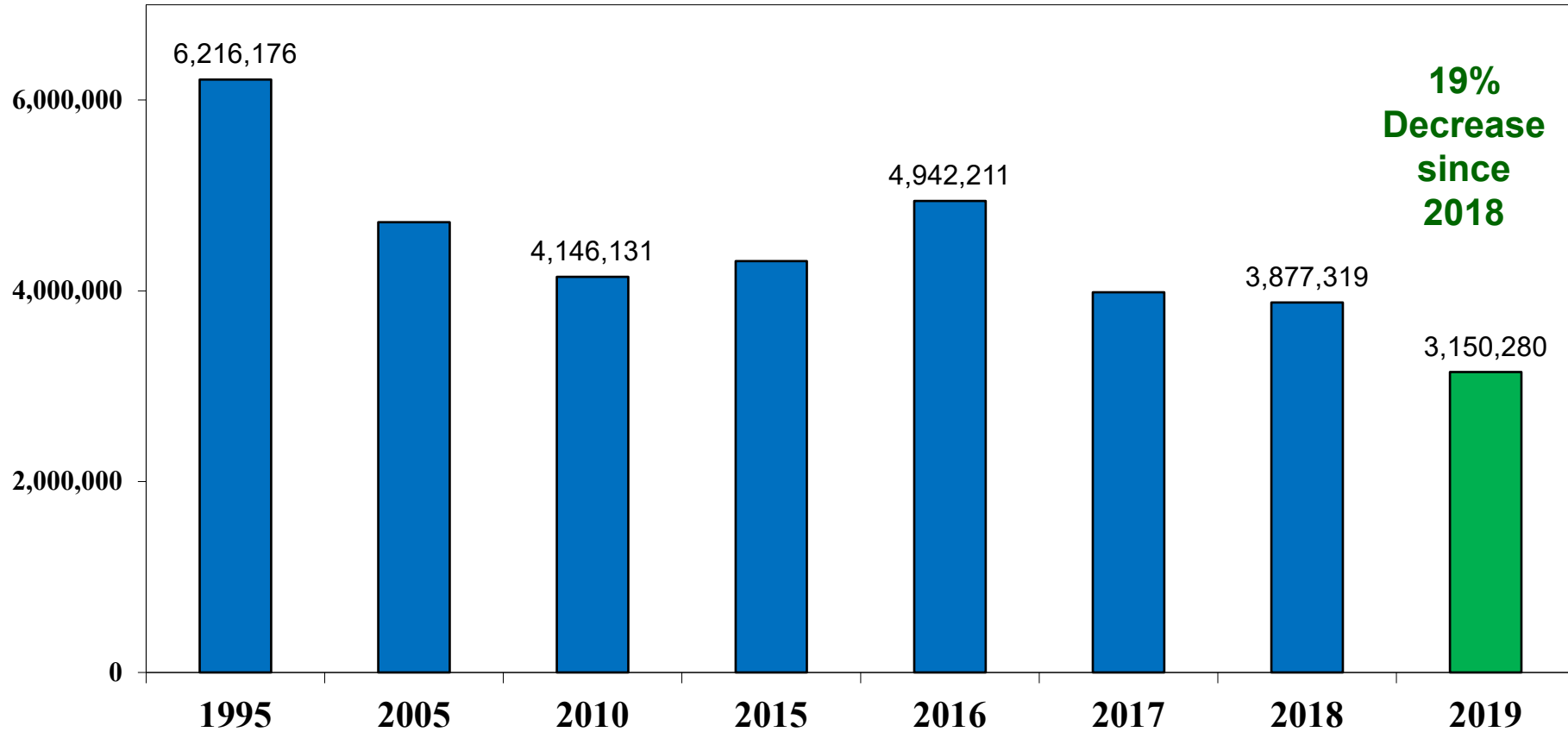


Sulfur Oxides (SOx)

TCEQ Air Emissions Inventory for PCAC Plants

1995, 2005, 2010, 2015-2019

Pounds



**19%
Decrease
since
2018**

1995→2019: 49% Reduction in SOx Emissions

Biggest change from 2018 was decrease at Chevron Pasadena Refinery:
Temporary Decrease in Operating Hours

Sulfur Oxides (SOx)

2019 Changes

Increases

LyondellBasell Refinery (92,803 lbs.) (5% Change)

Sekisui (+1,263 lbs.)

- *Sustainable/Temporary*: Acquired boiler from Air Products in 2018. Month-long turnaround in 2019, used more temporary engines. (307% Change)

Decreases

Chevron Pasadena Refinery (-713,520 lbs.)

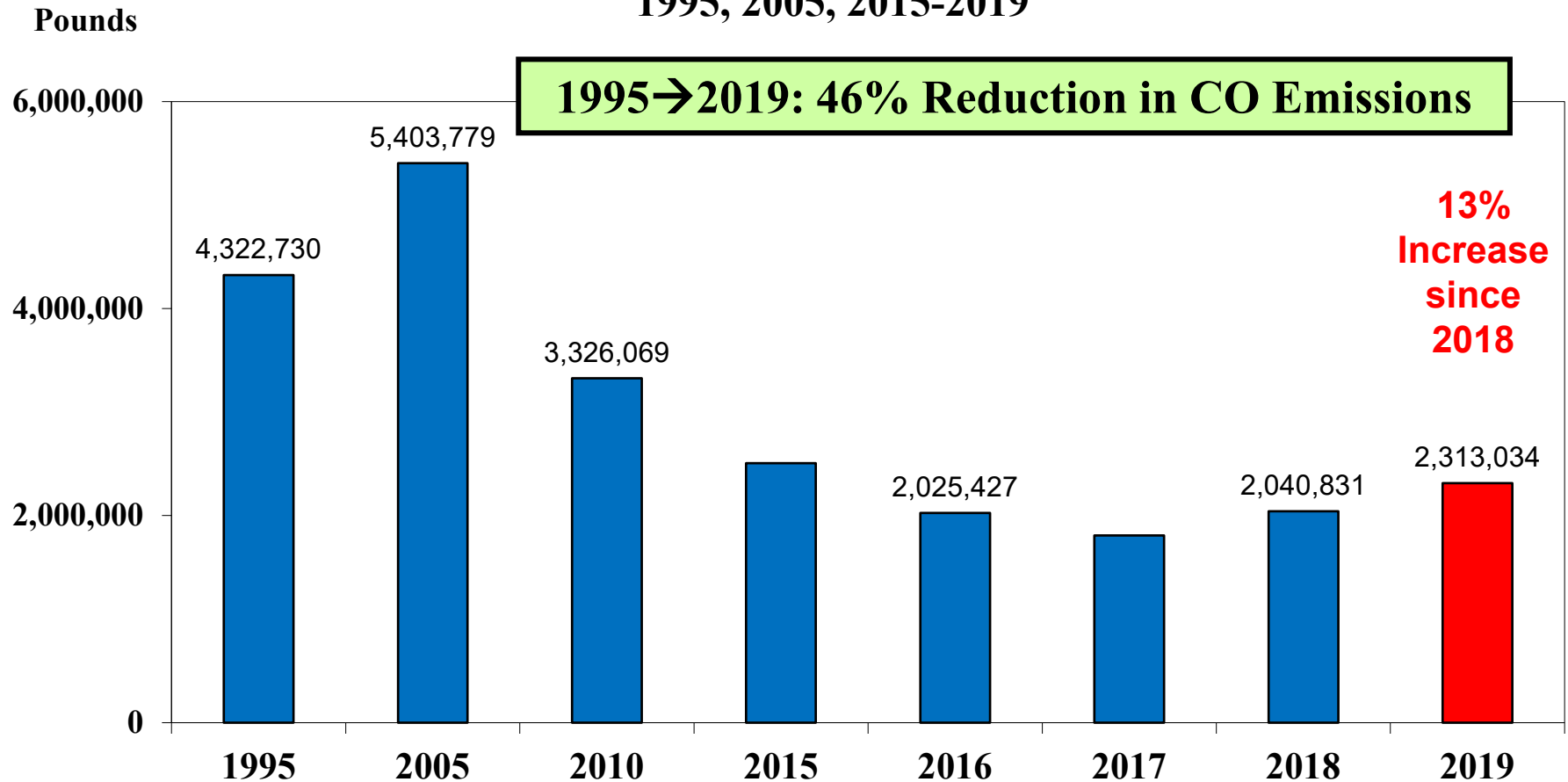
- *Temporary*: Annual operating hours decreased in 2019 (43% Change)

PCI Nitrogen (-107,414 lbs.)

- Efficiency and control updates (28% Change)

Carbon Monoxide (CO) TCEQ Air Emissions Inventory for PCAC Plants

1995, 2005, 2015-2019



Biggest change from 2018 was increase at LyondellBasell Refinery:
Higher natural gas use at flares to meet EPA Refinery Sector Rule

Carbon Monoxide (CO) 2019 Changes

Increases

LyondellBasell Refinery (+231,495 lbs.)

- Higher natural gas use at flares to meet EPA Refinery Sector Rule (RSR) requirement for proper combustion. (55% Change)

Chevron Pasadena Refinery (+40,758 lbs.)

- Temporary: While annual operating hours decreased in 2019, approximate 10% increase in CO from maintenance, startup, and shutdown (MSS) activities occurred. (11% Change)

Carbon Monoxide (CO) 2019 Changes

Increases

Chevron Phillips (+46,652 lbs.) (6% Change)

Sekisui (+17,311 lbs.)

- *Sustainable/Temporary*: Acquired boiler from Air Products on 10/1/18, but also had month-long turnaround in 2019 and used more temporary engines. (228% Change)

ITC (+13,817 lbs.)

- Expanded tank farm and terminal throughput with combustion control (25% Change)

Carbon Monoxide (CO) 2019 Changes

Decreases

BASF (-71,034 lbs.)

- *Sustainable*: Improved equipment reliability (41% Change)

Albemarle (-13,000 lbs.)

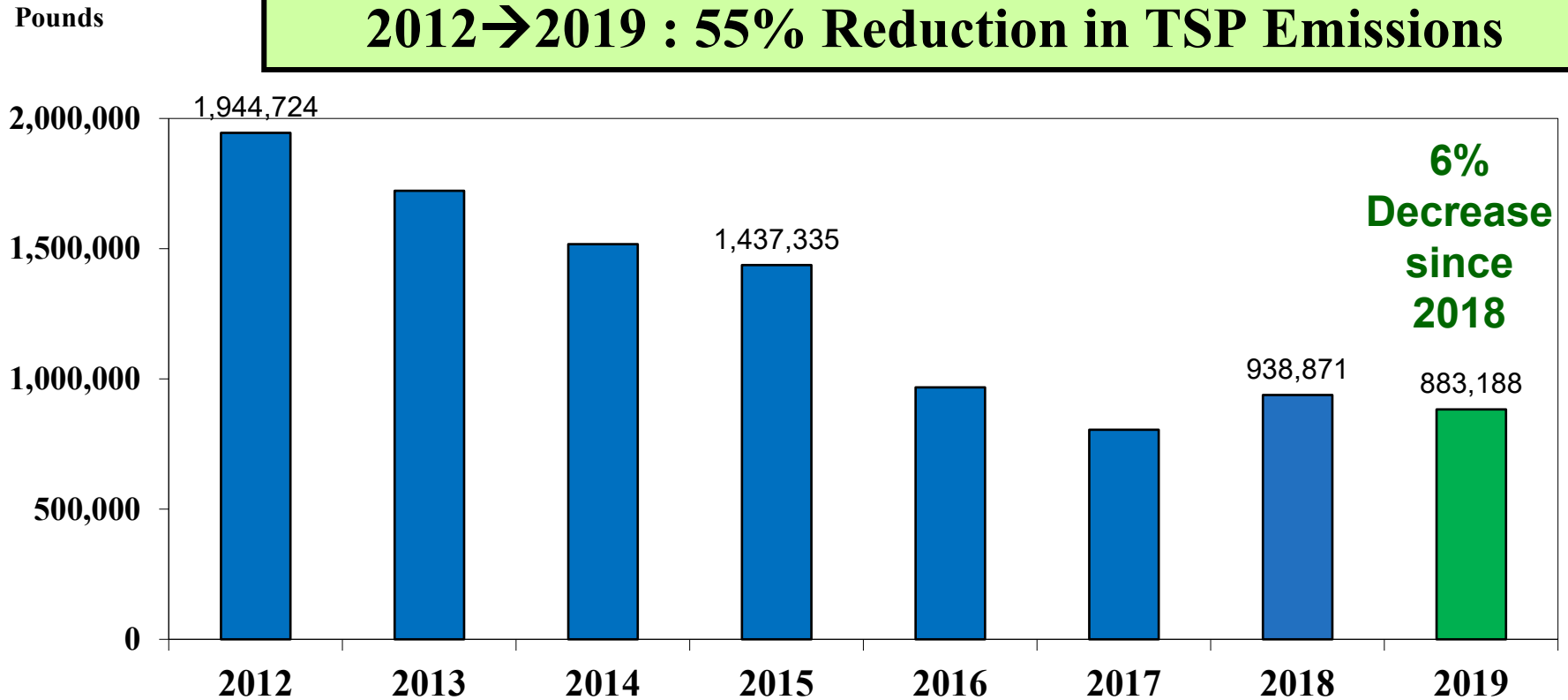
- *Temporary*: Variability of demand (14% Change)

Air Products (-12,002 lbs.)

- Combination of less production and sale of boiler (43% Change)

Total Suspended Particulates (TSP) TCEQ Air Emissions Inventory for PCAC Plants 2012-2019

2012→2019 : 55% Reduction in TSP Emissions



Biggest change from 2018 was decrease at Chevron Pasadena Refinery:
Temporary Decrease in Operating Hours

Total Suspended Particulates (TSP) 2019 Changes

Increases

PCI Nitrogen (+21,138 lbs.)

- Increase in onstream time and production (21% Change)

Chevron Phillips (+11,253 lbs.)

- *Calculation method change/temporary:* TSP calculations underestimated emissions on the three cooling towers for CY 2018. 2019 emissions are consistent with historical values. (42% Change)

Decreases

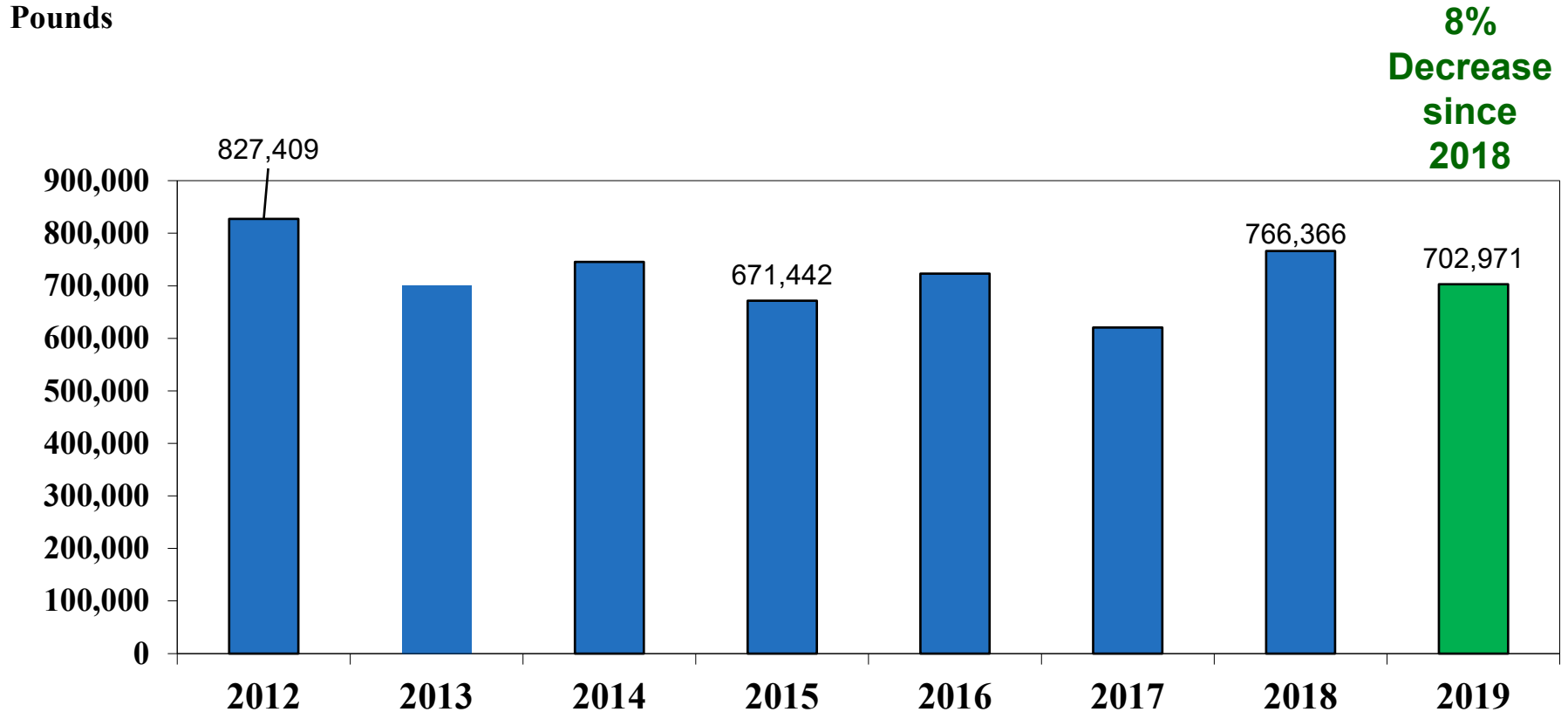
Chevron Pasadena Refinery (-62,239 lbs.)

- *Temporary:* Annual operating hours decreased in 2019 (27% Change)

Albemarle (-21,000 lbs.)

- *Temporary:* Lower blasting activity (34% Change)

Total Suspended Particulates Reported as PM 2.5 TCEQ Air Emissions Inventory for PCAC Plants 2012-2019



2012→2019: 15% Reduction in PM 2.5 Emissions

Biggest change from 2018 was decrease at Chevron Pasadena Refinery:
Temporary Decrease in Operating Hours

PM 2.5 Portion of TSP

2019 Changes

Increase

PCI Nitrogen (+12,816 lbs.)

- Increase in onstream time and production (44% Change)

Decreases

Chevron Pasadena Refinery (-58,642 lbs.)

- *Temporary:* Annual operating hours decreased in 2019 (28% Change)

Albemarle (-12,000 lbs.)

- *Temporary:* Lower blasting activity (35% Change)

Questions?

EPA Toxics Release Inventory (TRI) Trends for PCAC Plants

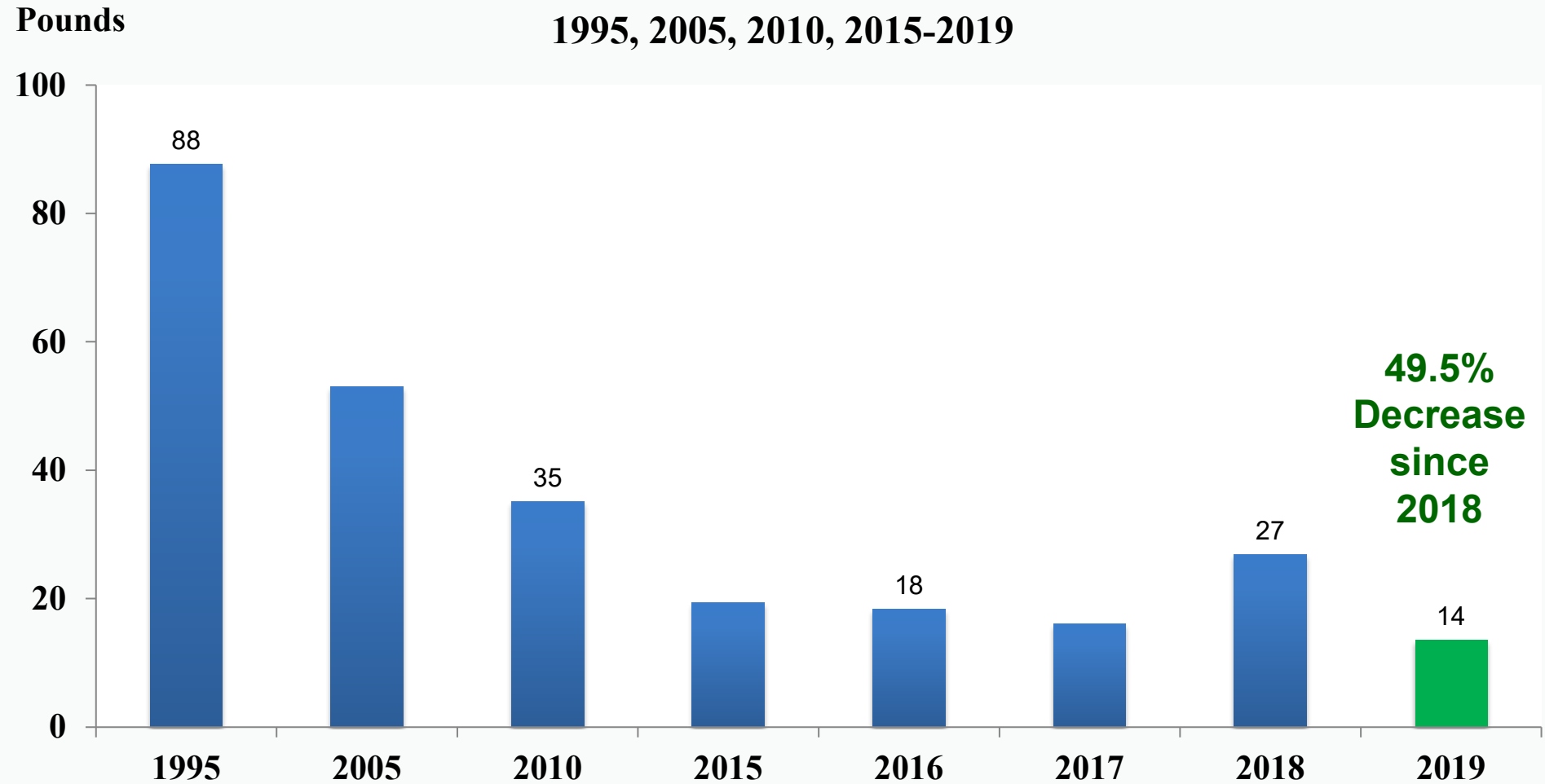
Change in PCAC Plants EPA Toxic Release Inventory

2018-2019

- Releases to air- total - 50%
- From fugitive sources - 14%
- From point source - 59%

Pounds EPA TRI per Million Pounds of Product for PCAC Plants

1995, 2005, 2010, 2015-2019

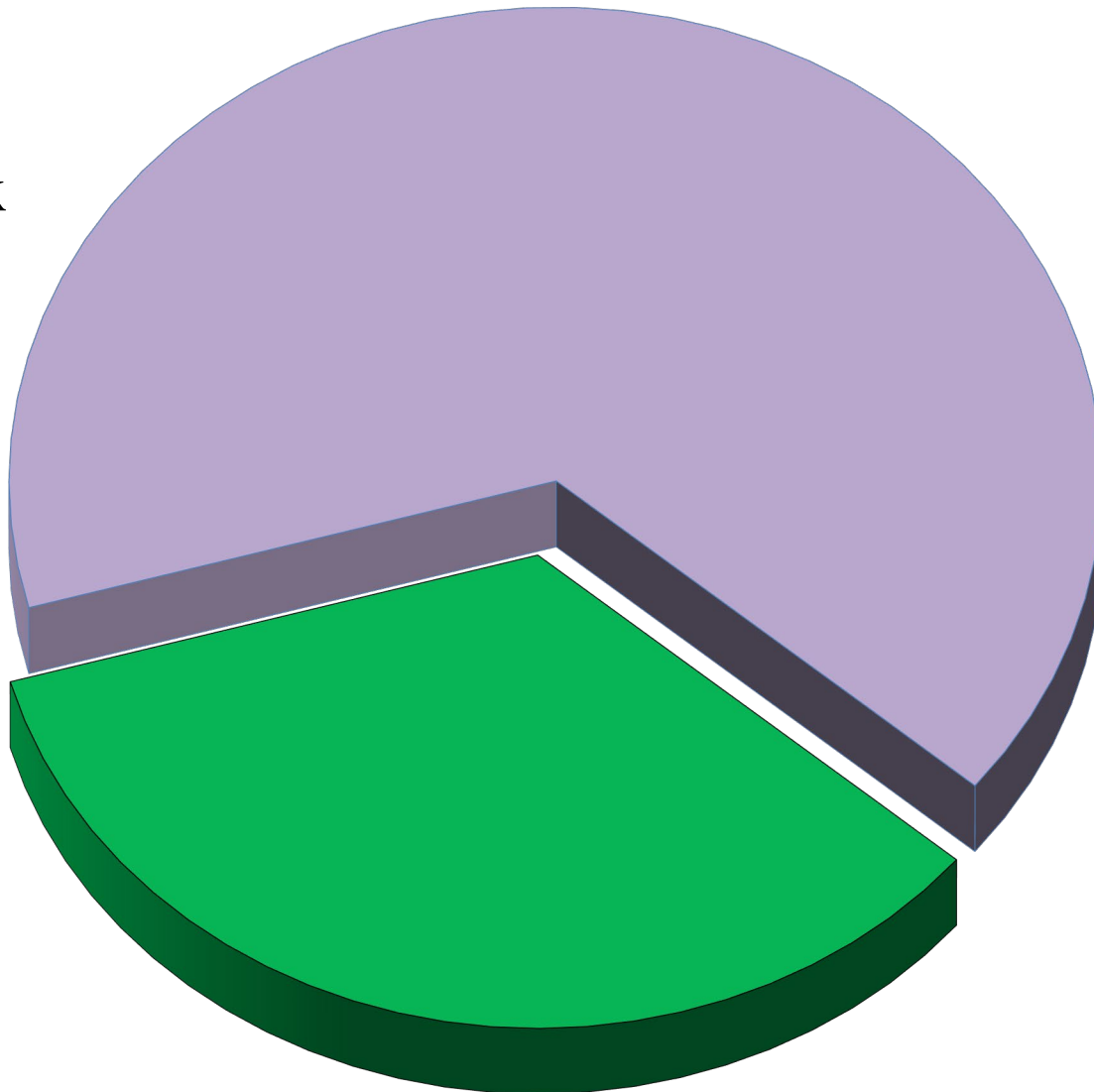


1995→2019: 84% Reduction in Pounds of TRI Releases per Million Pounds of Product

Since 1995, PCAC plants have produced 50-57 billion pounds of product each year.

2019 EPA TRI Releases by Source for PCAC Plants

**Point
Source/Stack
65%**

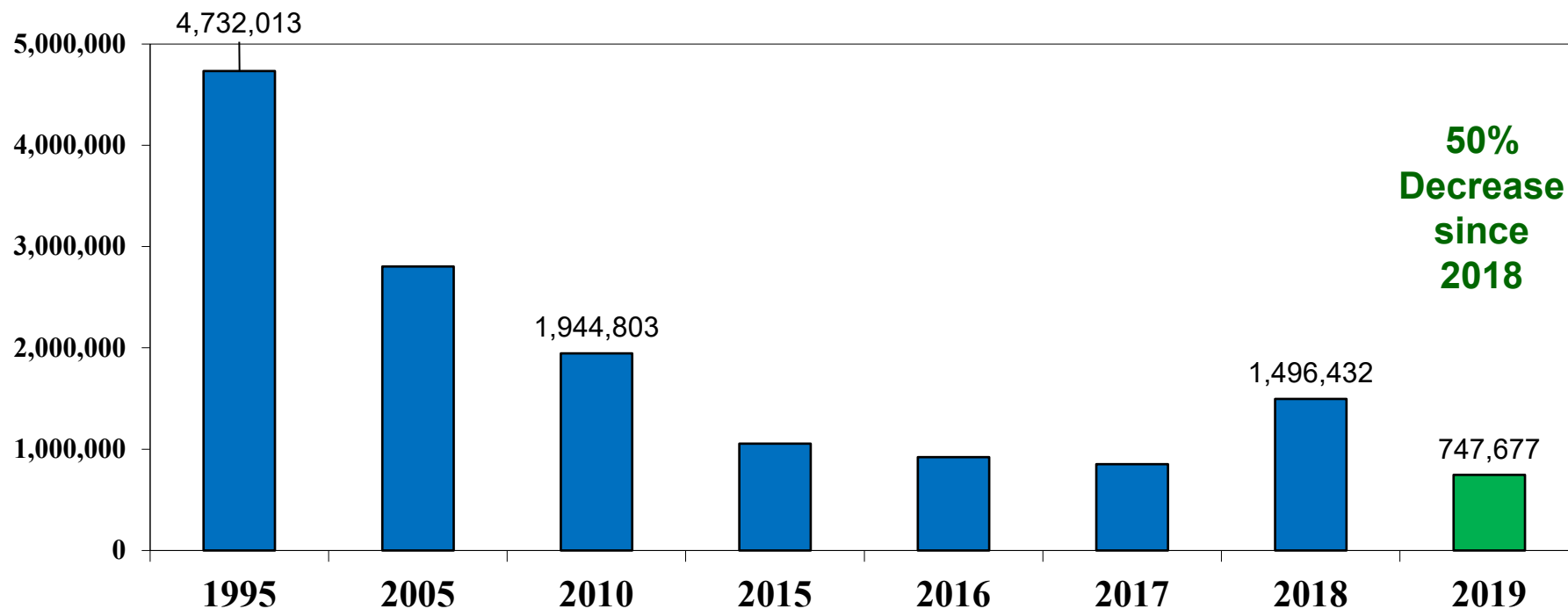


**Fugitive
Emissions
35%**

EPA TRI Total Air Releases for PCAC Plants 1995, 2005, 2010, 2015-2019

Pounds

1995→2019 : 68% Reduction in TRI Total Air Releases



Biggest change from 2018 was decrease at Chevron Pasadena Refinery:
Temporary Decrease in Operating Hours. Emission event from 2018 didn't occur in 2019.

Total TRI Air Releases 2019 Changes

Increase

PCI Nitrogen (+18,552 lbs.)

- Increase in onstream time and production (25% Change)

Total TRI Air Releases

2019 Changes

Decreases

Chevron Pasadena Refinery (-587,724 lbs.)

- **Fugitive:** *Temporary:* decrease of annual operating hours.
Sustainable: reduction of measured LDAR leaks, removed equipment no longer in service, and used a more accurate emission factor to calculate non-monitored components
- **Point Source/Stack:** *Sustainable:* 2018 included an emission event that did not occur in 2019.
(93% Change)

Total TRI Air Releases

2019 Changes

Decreases

INEOS Phenol (-117,609 lbs.)

- **Point Source/Stack: Sustainable:** 2018 included an emission event that did not occur in 2019. (68% Change)

Albemarle (-53,000 lbs.)

- **Fugitive and Point Sources:** Activity level for some chemicals fell below reporting threshold (43% Change)

Comparison With Other CACs 2010 – 2018

BAYCAP (25 plants)

- TRI air - 23%
- NOx - 5%
- VOCs - 17%

Pasadena CAC (18 plants)

- TRI air - 26%
- NOx + 14%
- VOCs - 9%

Deer Park CAC (14 plants)

- TRI air - 23%
- NOx - 16%
- VOCs - 23%

La Porte CAC (47 Reports)

- TRI air - 17%
- NOx - 1%
- VOCs - 6%

2018 Texas and Harris County Comparisons

VOCs

- Texas 178,977,109 lbs.
- Harris Co. 33,171,085 lbs.
- PCAC 6,101,020 lbs.

- **3%** of Texas VOC Emissions Inventory from PCAC plants
- **18%** of Harris County VOC EI from PCAC plants

NOx

- Texas 496,879,418 lbs.
- Harris Co. 32,407,690 lbs.
- PCAC 3,312,243 lbs.

- **0.7%** of Texas NOx Emissions Inventory from PCAC plants
- **10%** of Harris County NOx EI from PCAC plants

***Of facilities that reported EI in 2018,
1,947 facilities in state, 273 facilities in county, 16 PCAC plants***

Questions?