

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

Report by Pasadena CAC Plants

2023 Data and Trends

Short Presentation

FINAL 10-25-24

*Based on reports from 17 of 18 PCAC plants.
Next Wave Energy Partners not yet operating in 2023.*

JENNA TIMTIMAN

SEKISUI SPECIALTY CHEMICALS

OCTOBER 22, 2024

Parts of the Emissions Report

Orientation Packet: Background information on why the CAC presents emissions reports, on air pollution, and on how the data is collected.

Spreadsheet Handout: List of plants and what they make or do. TCEQ Emissions Inventory (EI) section and EPA Toxics Release Inventory section with a worksheet for each covered pollutant. Each pollutant worksheet shows trends and has plant-specific data for 2019-2023, totals, percentage change over 5 years, significant reasons for change. Color-coded to show significant increases and decreases in pounds and percentages. Plants exempt from reporting inventories are indicated.

Highlights Page: Lists pollutants covered in the spreadsheets, pounds released in 2023 and the percentage they changed from 2022 to 2023 (**red** = increase, **green** = decrease). Lists the number of plants reporting each inventory.

“Full” Presentation: Contains all the information in the format that has been used in our traditional face-to-face meetings, including main reasons for increases and decreases.

1-Year Change in PCAC Plant Releases 2022-2023

- **2% increase** in total TCEQ Air Emissions Inventory (EI) releases to air
- **3% decrease** in total EPA Toxics Release Inventory (TRI) releases to air
 - Least pounds of TRI Releases to Air EVER!
- Variety of reasons for mixture of increases and decreases

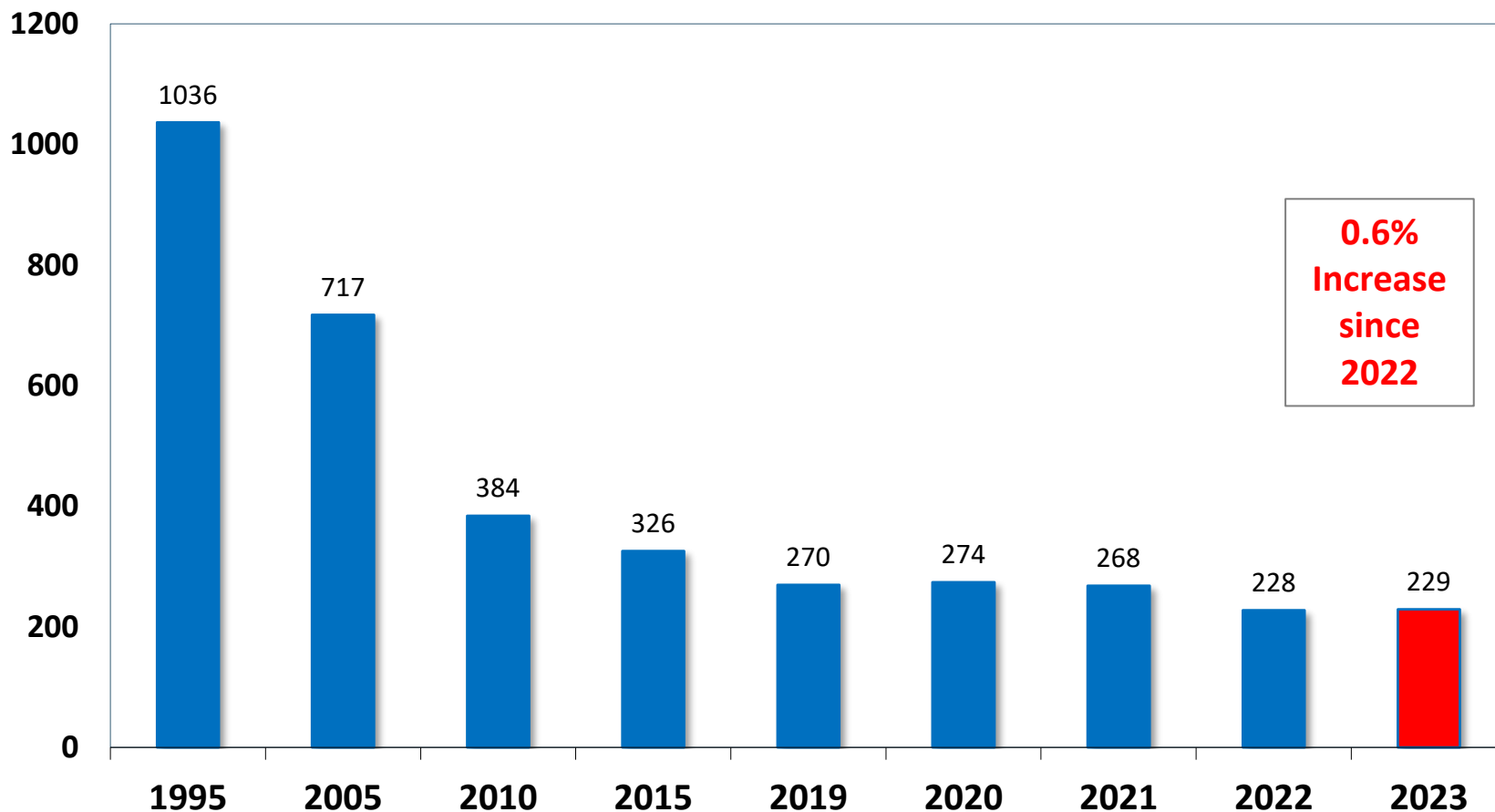
TCEQ Air Emissions Inventory (EI) Trends in PCAC Plants

Change in PCAC Plants TCEQ Air Emissions Inventory

	2019-2023	2022-2023
Total PCAC Air Emission Inventory (EI)	- 22%	+ 2%
Nitrogen Oxides (NOx)	- 16%	- 1%
Volatile Organic Compounds (VOCs)	- 8%	- 0.04%
Highly Reactive VOCs (HRVOCs)	+ 13%	+ 22%
Carbon Monoxide (CO)	+ 11%	+ 7%
Total Suspended Particulates (TSP)	- 25%	- 3%
Particulate Matter (PM 2.5)	- 16%	+ 1%
Sulfur Oxides (SOx)	- 68%	+ 8%
Routine Permitted Emissions	- 20%	+ 3%
Maintenance Emissions	+ 270%	- 23%
Upset Emissions	- 82%	- 40%

Pounds of TCEQ EI per Million Pounds of Product for PCAC Plants 1995, 2005, 2010, 2015, 2019-2023

Pounds

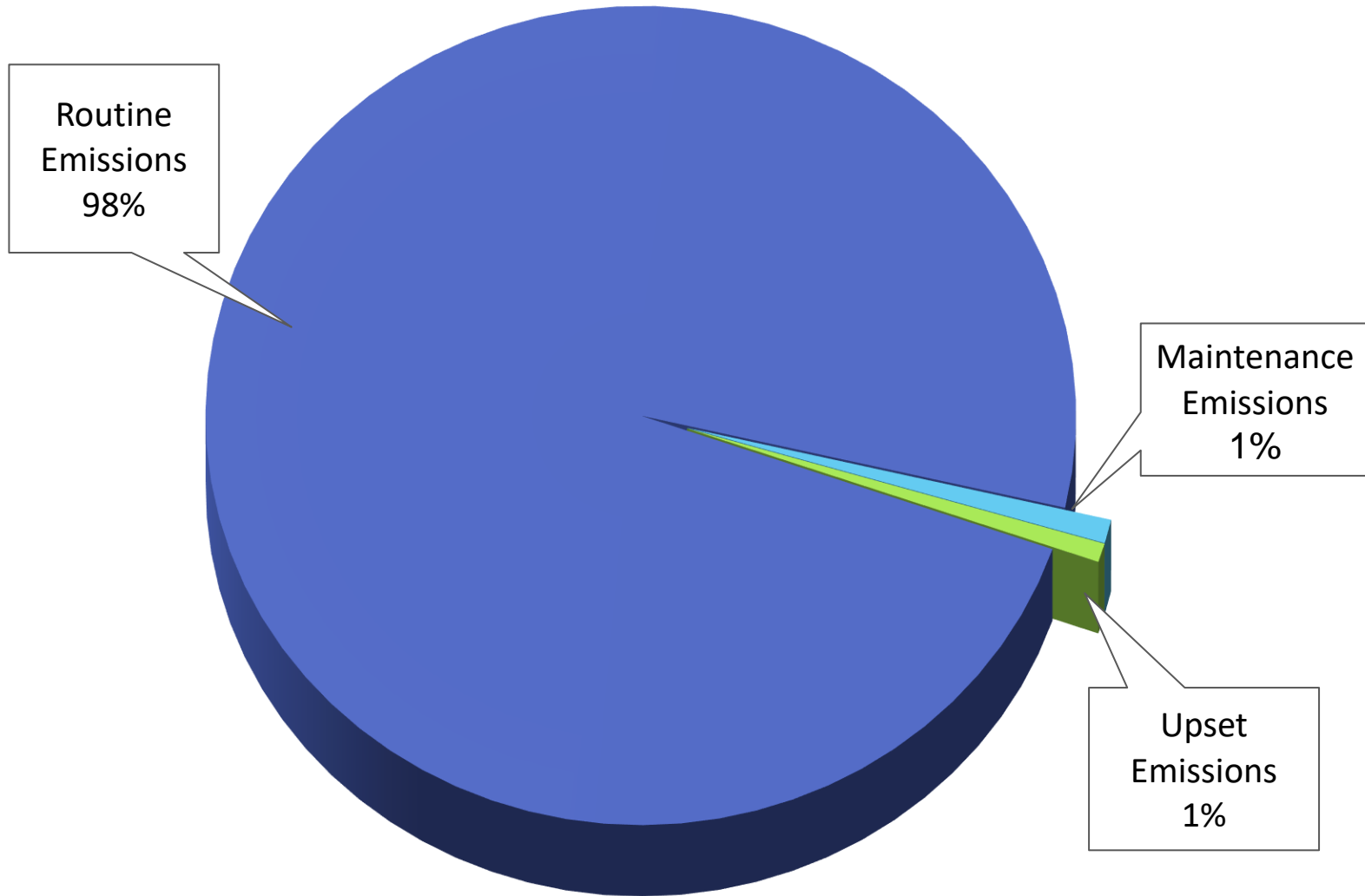


**0.6%
Increase
since
2022**

1995→2023 : 78% Reduction in EI Emissions per Million Pounds of Product

Since 1995, PCAC plants have produced 47-57 billion pounds of product each year.

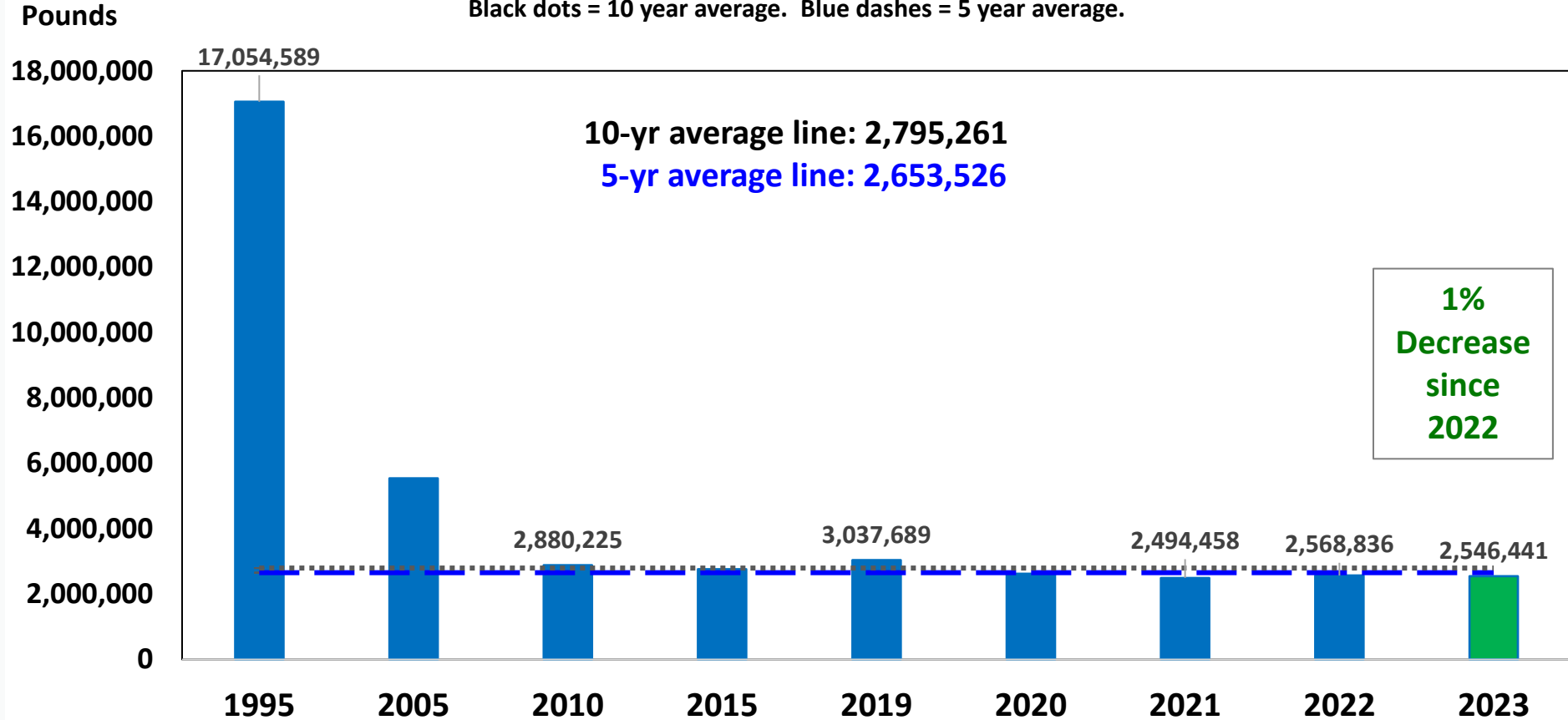
2023 TCEQ EI Emissions by Cause



Nitrogen Oxides (NOx)

1995, 2005, 2010, 2015, 2019-2023 TCEQ Air Emissions Inventory

Black dots = 10 year average. Blue dashes = 5 year average.



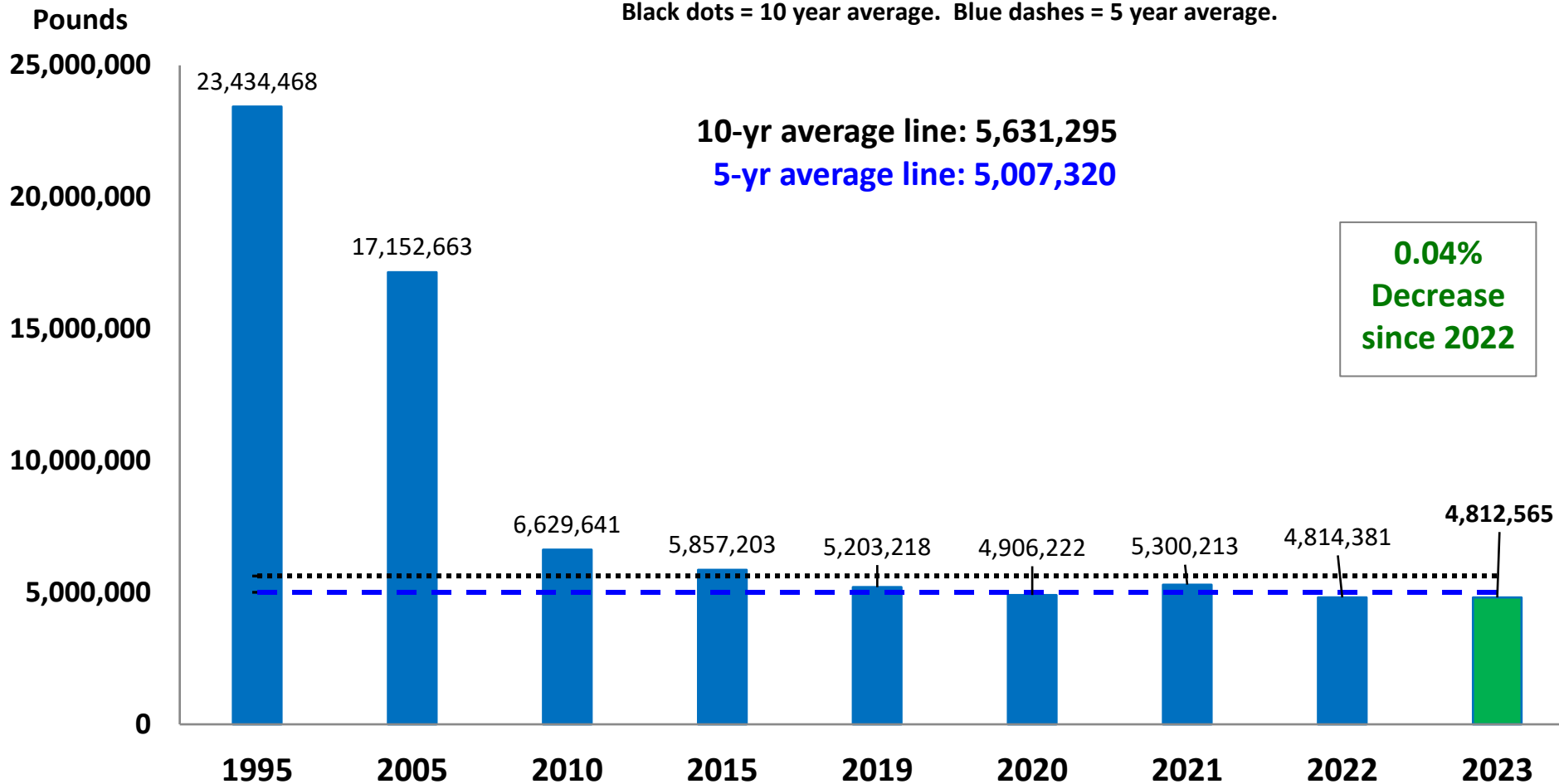
1995→2023: 85% Reduction in NOx Emissions

Biggest change since 2022 was decrease at Chevron Refinery:
Primarily from reduced operating hours of the Reformer Process Unit (*temporary*)
and updated calculations for Boiler 10 (*sustainable*).

All Volatile Organic Compounds (VOCs)

1995, 2005, 2010, 2015, 2019-2023 TCEQ Air Emissions Inventory

Black dots = 10 year average. Blue dashes = 5 year average.

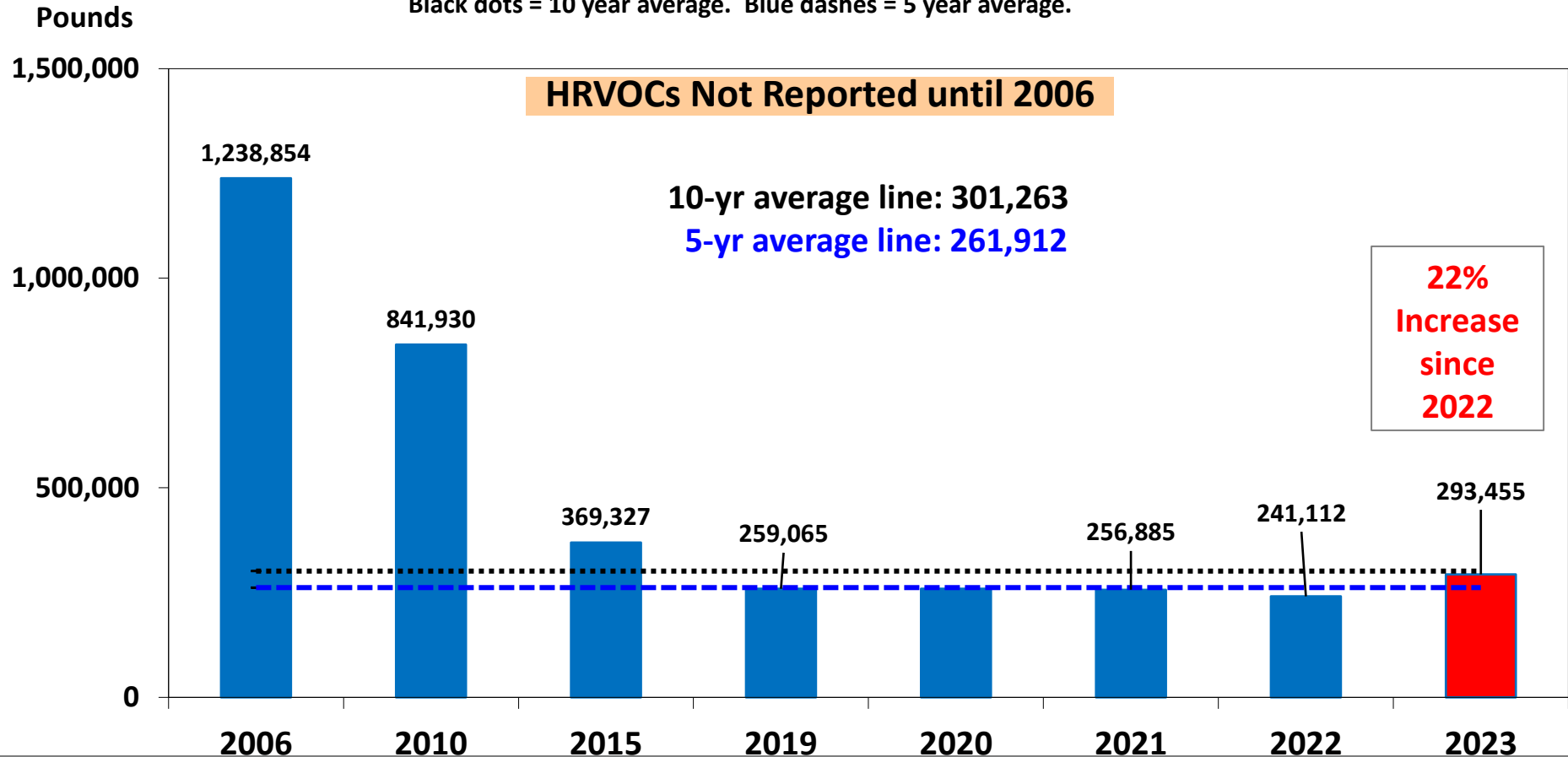


1995 → 2023: 79% Reduction in All VOC Emissions

Biggest change since 2022 was decrease at Chevron Refinery:
Temporary: Primarily from tank maintenance.

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

2006, 2010, 2015, 2019-2023 TCEQ Air Emissions Inventory
Black dots = 10 year average. Blue dashes = 5 year average.



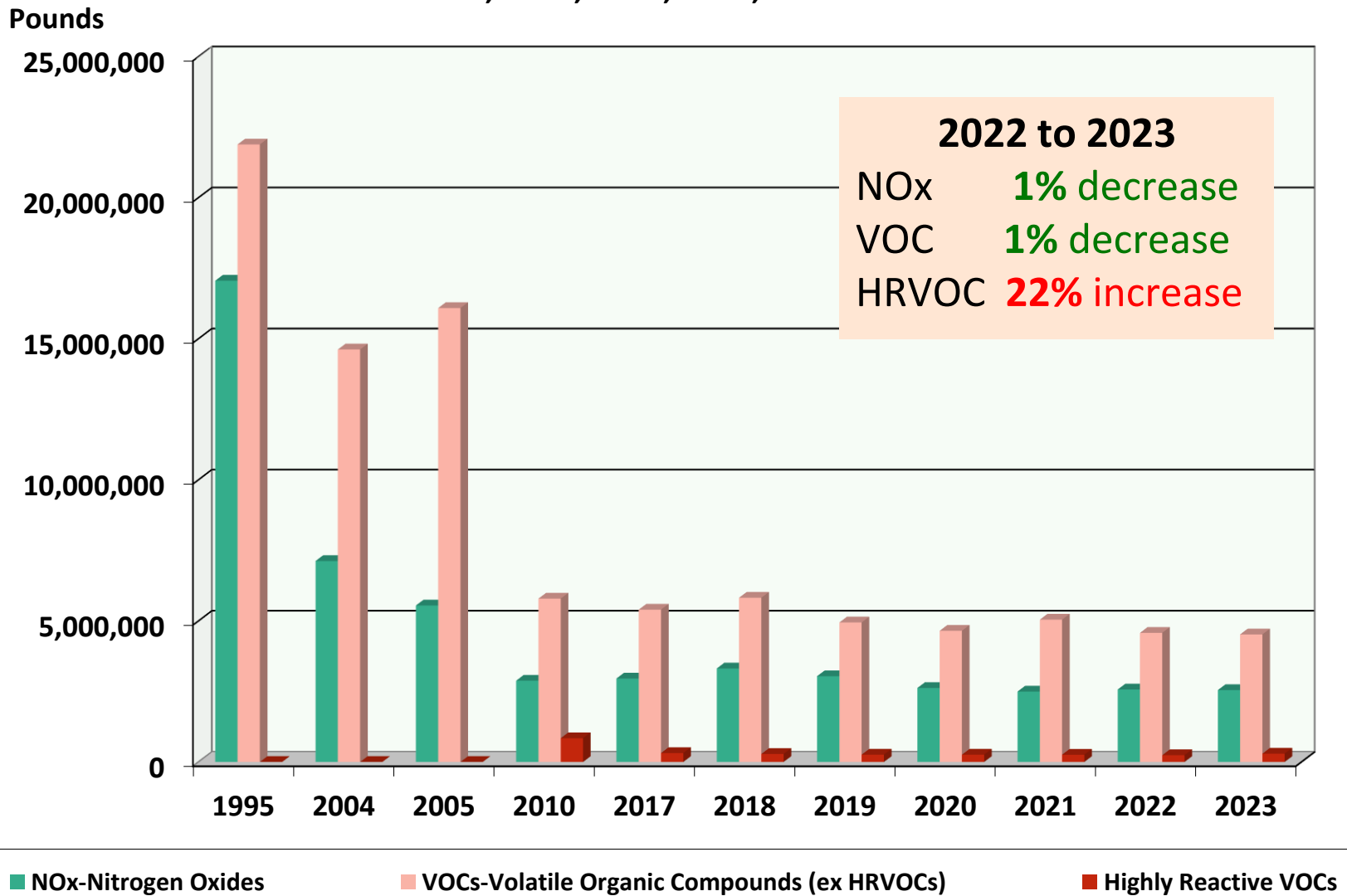
2006→2023: 76% Reduction in HRVOC Emissions

Biggest change since 2022 was increase at BASF:
Temporary: Fugitive releases.

Ozone Formation

NOx, VOCs (excluding HRVOCs) & HRVOCs

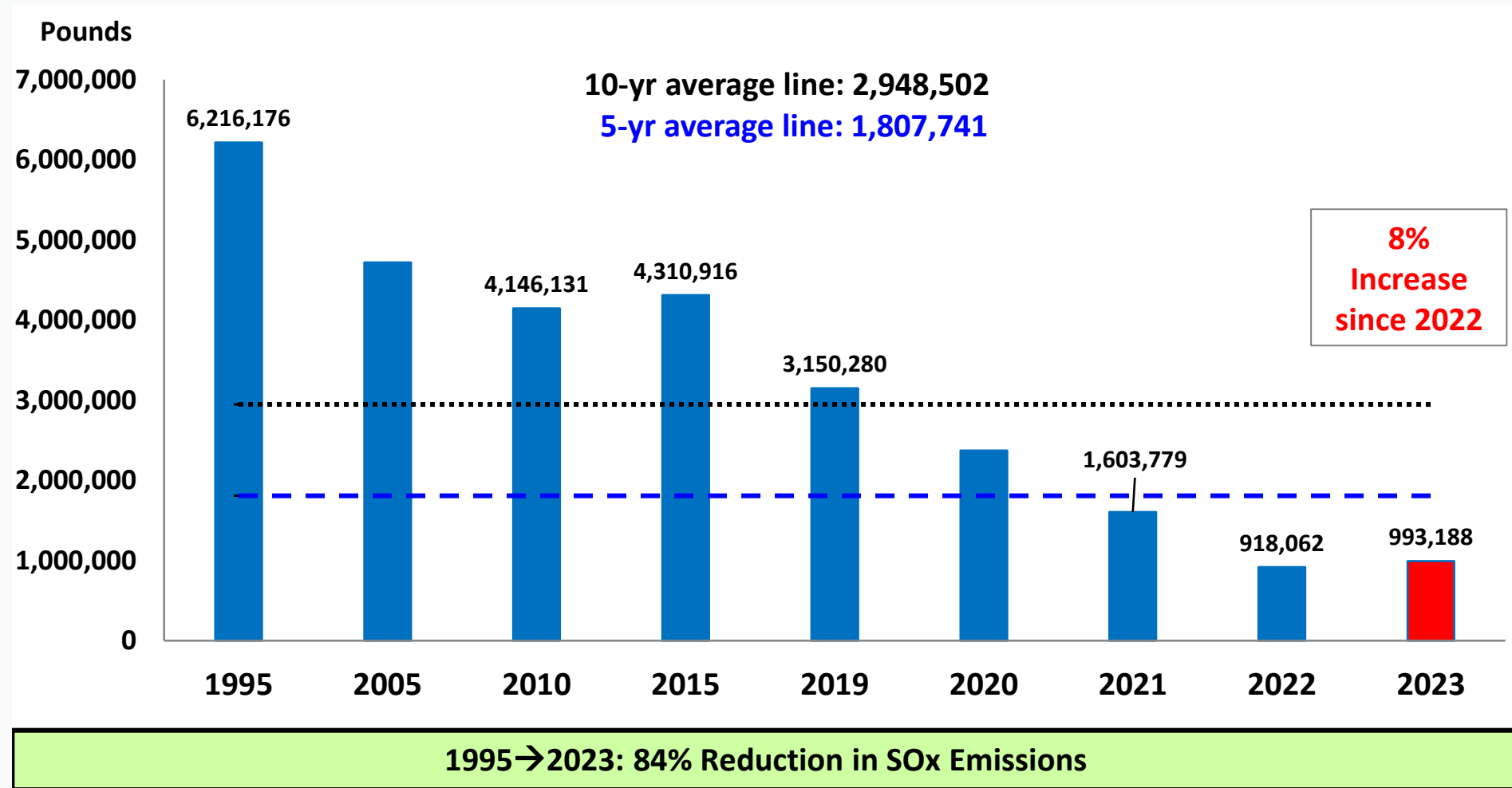
1995, 2005, 2010, 2015, 2019-2023



Sulfur Oxides (SOx)

1995, 2005, 2010, 2015, 2019-2023 TCEQ Air Emissions Inventory

Black dots = 10 year average. Blue dashes = 5 year average.



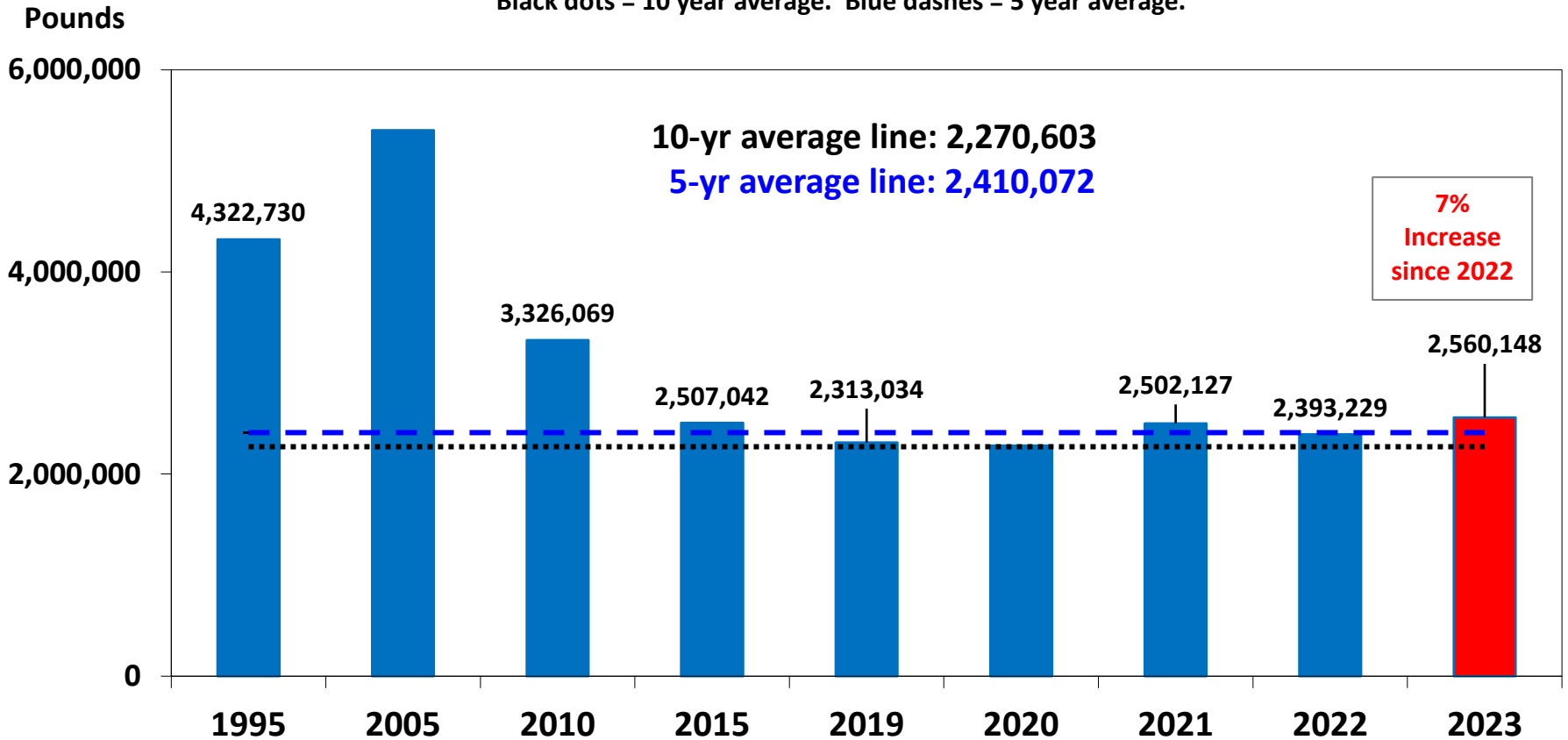
Biggest change since 2022 was increase at LyondellBasell Refinery:

In general, higher emissions from combustion sources (i.e., process heaters, flares, FCCU).

Carbon Monoxide (CO)

1995, 2005, 2010, 2015, 2019-2023 TCEQ Air Emissions Inventory

Black dots = 10 year average. Blue dashes = 5 year average.

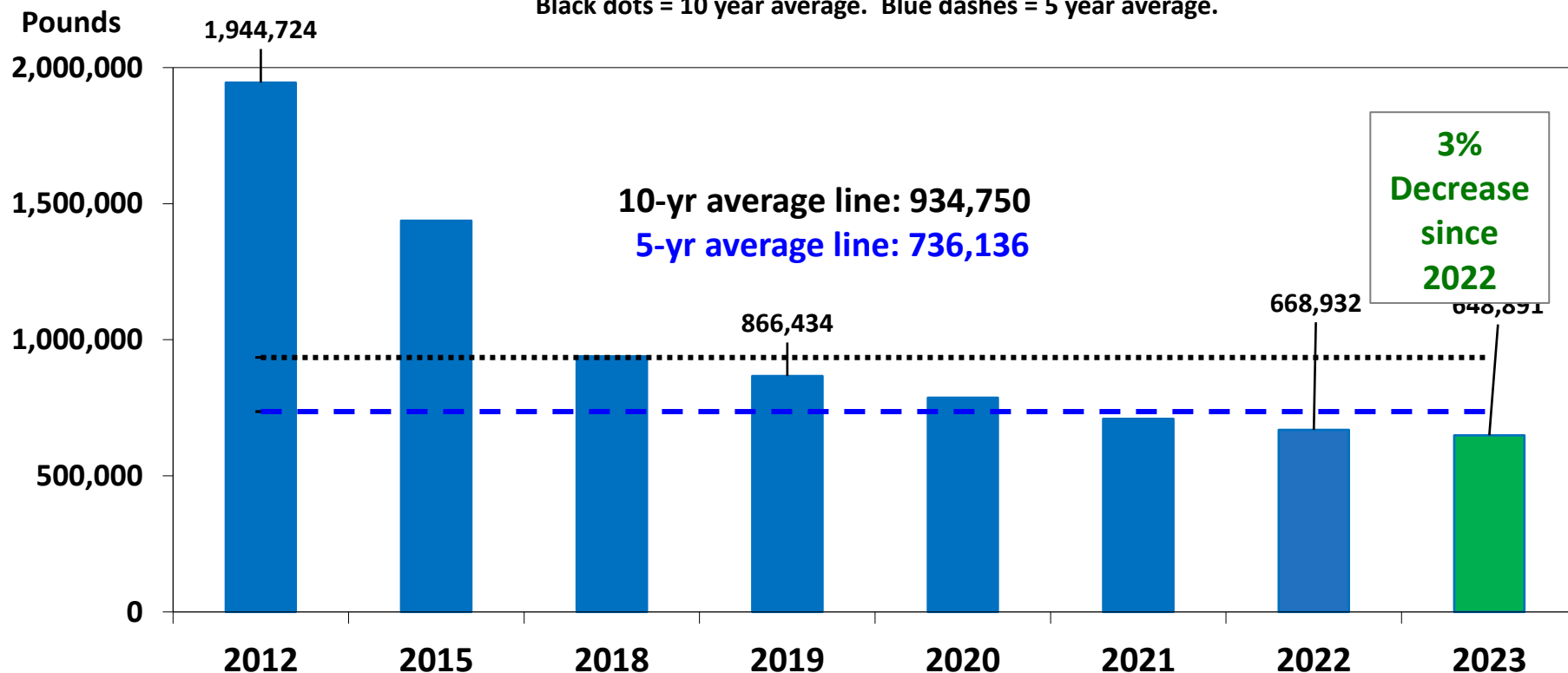


1995→2023: 41% Reduction in CO Emissions

Biggest change since 2022 was increase at Chevron Phillips:
Temporary: Higher flare natural gas usage.

Total Suspended Particulates (TSP) 2012, 2015, 2019-2023 TCEQ Air Emissions Inventory

Black dots = 10 year average. Blue dashes = 5 year average.



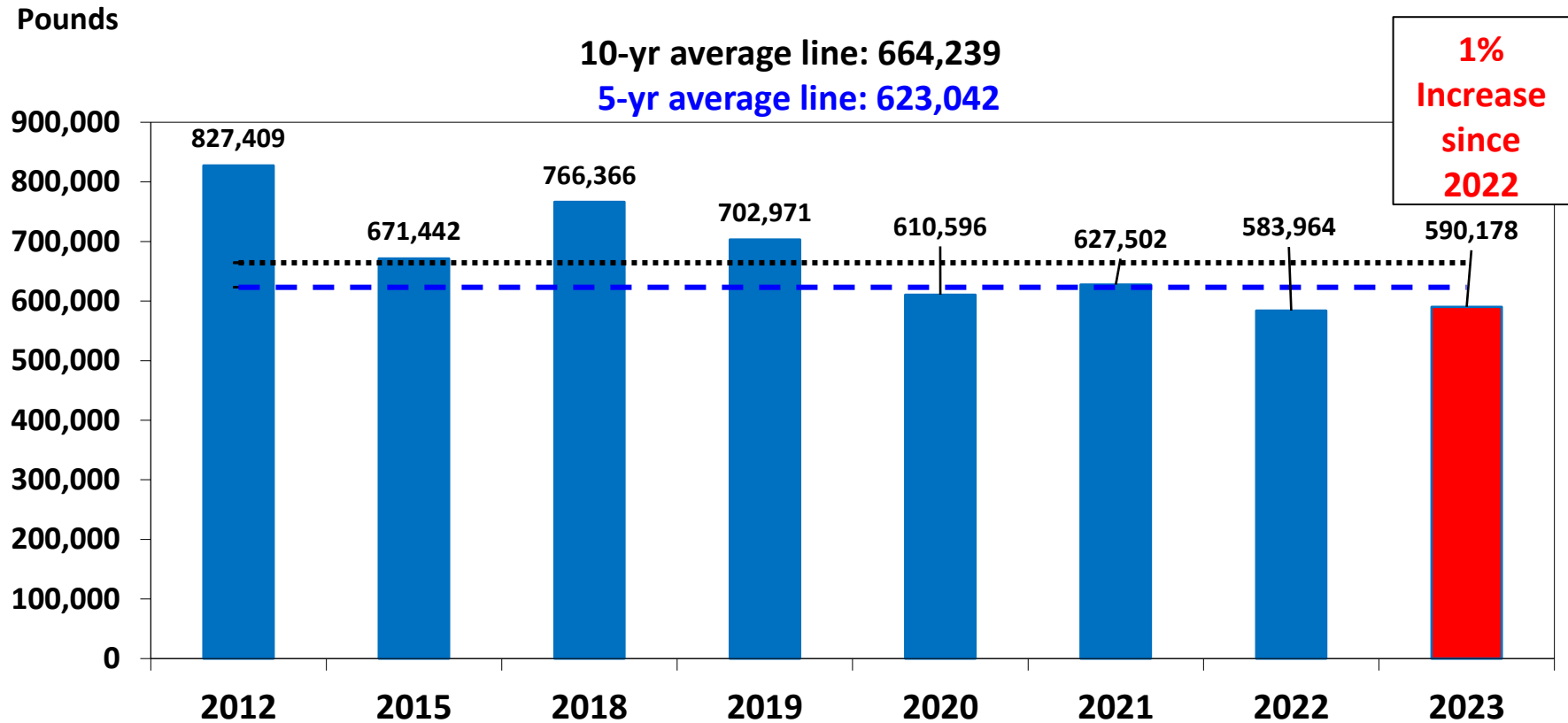
2012 → 2023: 67% Reduction in TSP Emissions

Biggest change since 2022 was decrease at Chevron Pasadena Refinery:
Sustainable: Primarily from updated calculations for Boiler 10
(*calculation method change*).

Total Suspended Particulates Reported as PM 2.5

2012, 2015, 2019-2023 TCEQ Air Emissions Inventory

Black dots = 10 year average. Blue dashes = 5 year average.



2012 → 2023: 29% Reduction in PM 2.5 Emissions

Biggest change since 2022 was increase at Albemarle (now Ketjen):

Sustainable: Change to method of reporting PM2.5.

Current method now assumes PM10=PM2.5.

Questions?

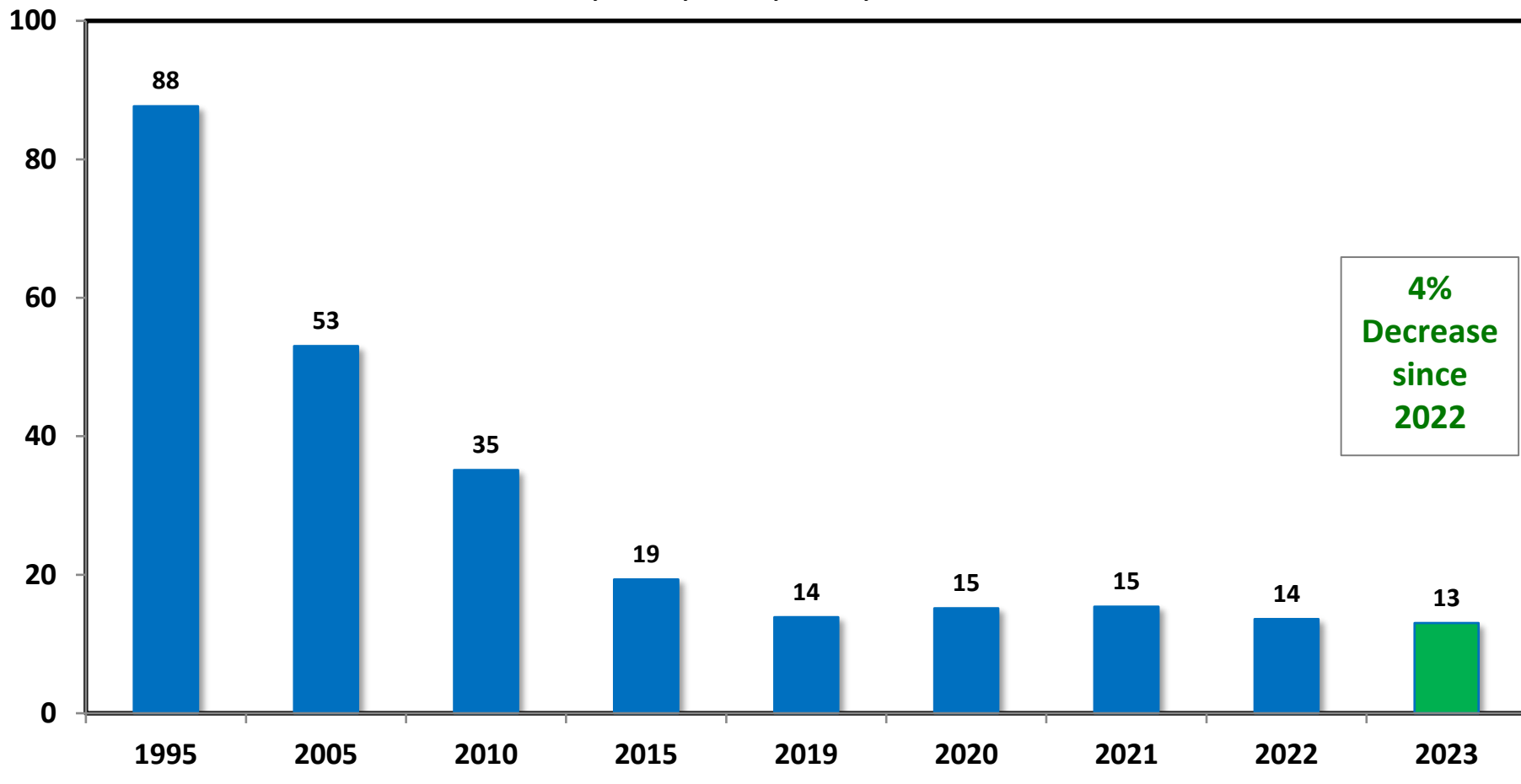
EPA Toxics Release Inventory (TRI) Releases to Air Trends for PCAC Plants

Change in PCAC Plants EPA Toxics Release Inventory Releases to Air

	2019-2023	2022-2023
Total PCAC TRI Releases to air	- 14%	- 3%
From fugitive sources	- 14%	- 5%
From point sources	- 13%	- 1%

Pounds EPA TRI per Million Pounds of Product 1995, 2005, 2010, 2015, 2019-2023

Pounds

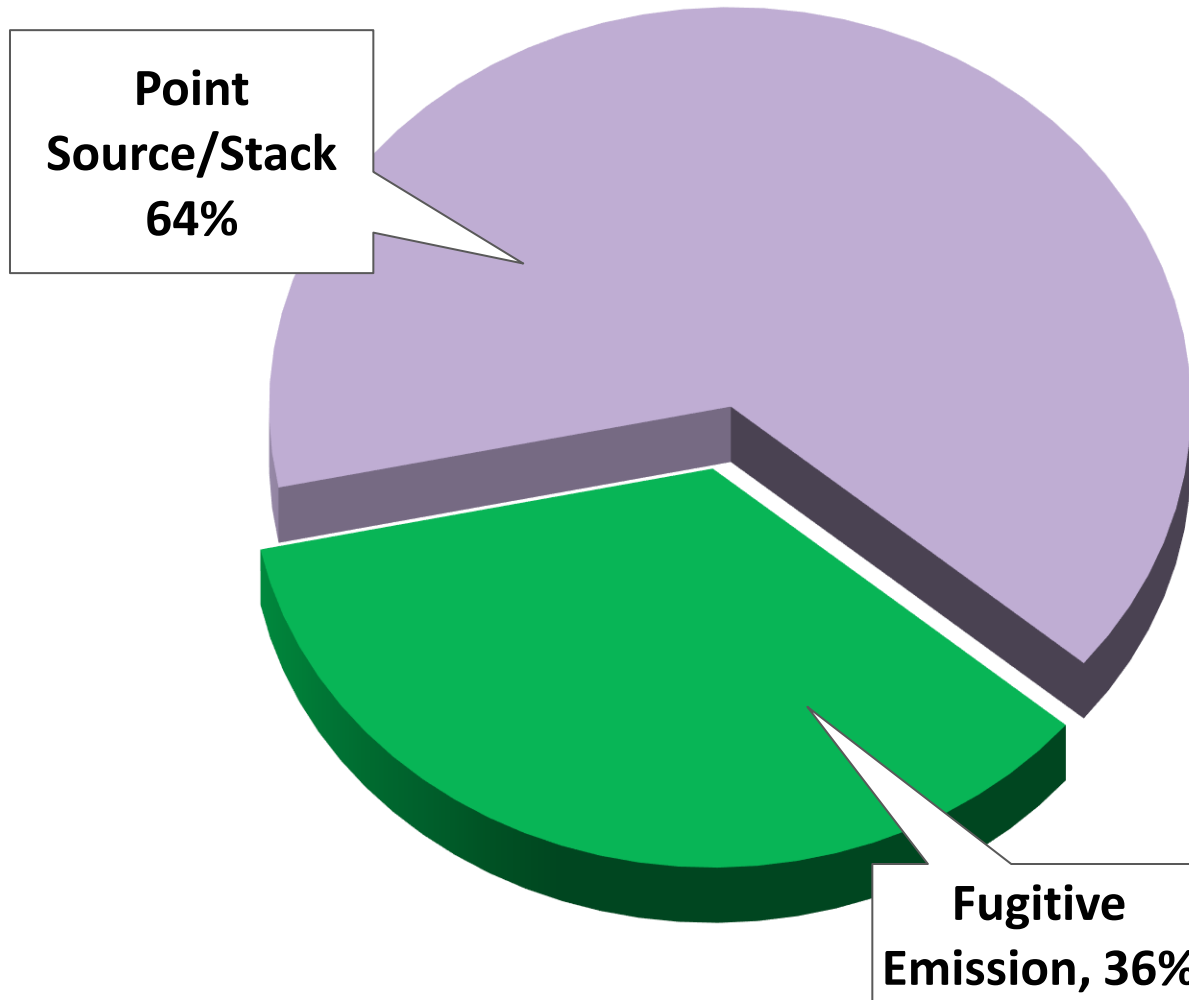


4%
Decrease
since
2022

1995→2023: 85% Reduction in Pounds of TRI Releases per Million Pounds of Product

Since 1995, PCAC plants have produced 47-57 billion pounds of product each year.

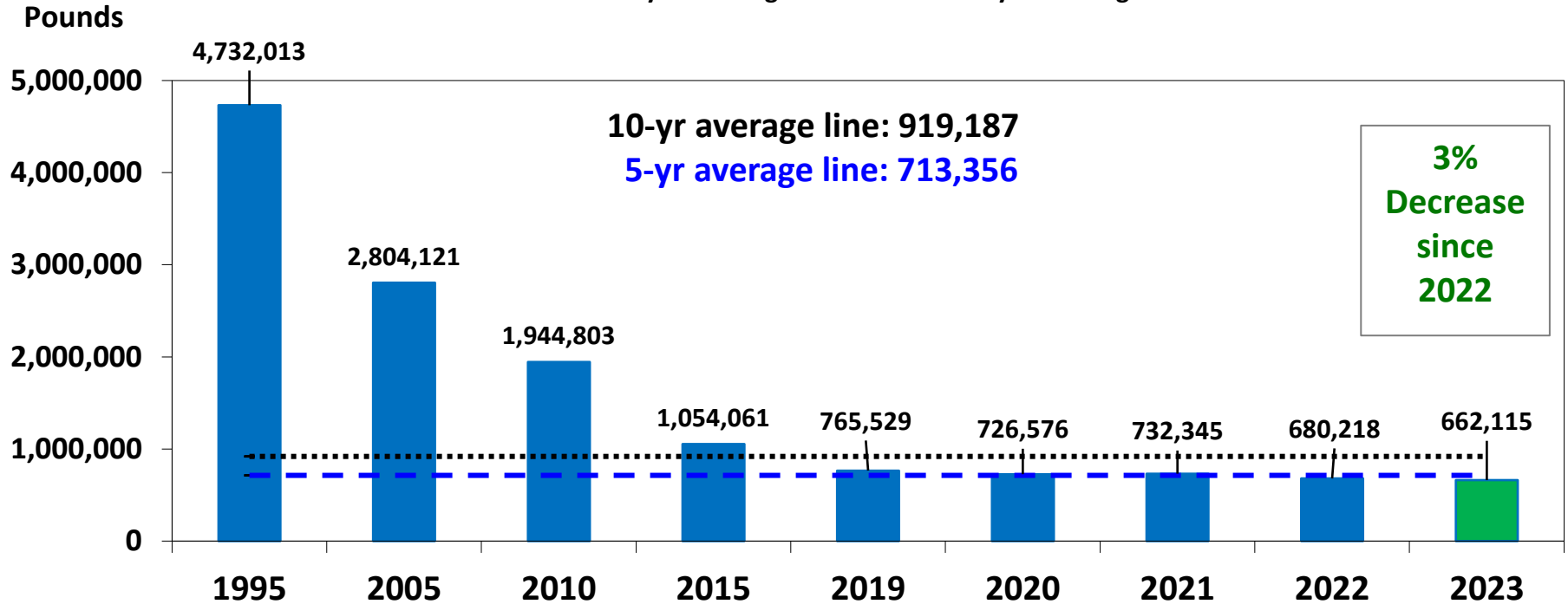
2023 EPA TRI Releases by Source



EPA TRI Total Air Releases

1995, 2005, 2010, 2015, 2019-2023

Black dots = 10 year average. Blue dashes = 5 year average.



1995→2023 : 86% Reduction in TRI Total Air Releases

Biggest change since 2022 was decrease at Chevron Refinery:

Fugitives: Sustainable - Primarily from updated speciation of wastewater air emissions based on additional sampling. *Point sources:* Decrease in emissions of several specific TRI compounds (e.g., ammonia, benzene, toluene, xylene, hexane, propylene).

2022-2023 at a Glance by Pollutant

DECREASES

EI TSP	-3%
TRI Air Total	-3%
-Fugitive	-5%
-Point source	-1%
NOx	-1%
EI VOCs	-0.04%

INCREASES

HRVOCs	+22%
EI SOx	+8%
EI CO	+7%
EI Total	+2%
TSP PM 2.5	+1%

2022-2023 at a Glance by Cause

DECREASES

Upset Emissions	- 40%
Maintenance Emissions	- 23%

INCREASES

Routine Permitted Emissions	+3%
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Are 5-yr Higher or Lower Than 10-yr Averages?

5-YR HIGHER

5-YR LOWER

SOx	- 39%
TRI Total Air	- 22%
TSP	- 21%
HRVOCS	- 13%
All VOCs	- 11%
CO	- 6%
PM 2.5	- 6%
NOx	- 5%

Comparison With Other CACs

No. of Plants in CAC in 2022

2010 – 2022

	BAYCAP (25 plants)	Deer Park CAC (14 plants)	La Porte CAC (45 Plants)	Pasadena CAC (18 plants)
TRI Air	- 31%	- 24%	+69%	- 66%
NOx	+11%	- 24%	- 5%	- 11%
VOCs	- 28%	- 35%	-27%	- 28%

2022 Texas and Harris County Comparisons

	Number of Facilities reporting EI in 2022	VOCs	NOx
Texas	1,840	168,000,000 lbs.	444,000,000 lbs.
Harris County	266	30,500,000 lbs.	33,400,000 lbs.
PCAC	15	4,814,381 lbs.	2,568,836 lbs.

PCAC portion of Emissions Inventory

	VOCs	NOx
Texas	3%	0.6%
Harris County	16%	8%

Texas Facilities That Report EI

In addition to chemical plants, refineries, and storage terminals like those in CACs, facilities in Texas include airports, bakeries, petroleum pipelines, electric services, boiler shops, iron and steel forging, malt beverages, metal barrel makers, metal coating services, refrigeration and heating equipment, refuse systems, space research and technology, steel foundries, transportation services, wood office furniture, and woodworking machinery.

Questions?