



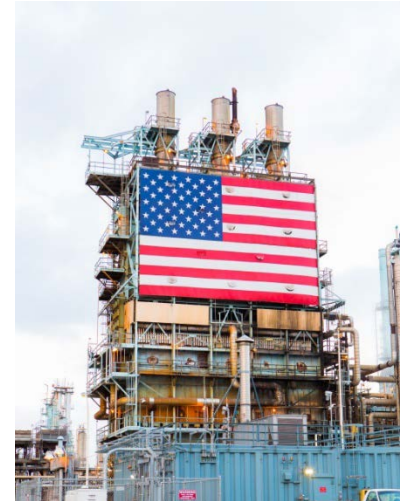
Los Angeles Refinery –
Overview
Safe, Compliant, Reliable
Operation

July 11, 2019

LAR overview



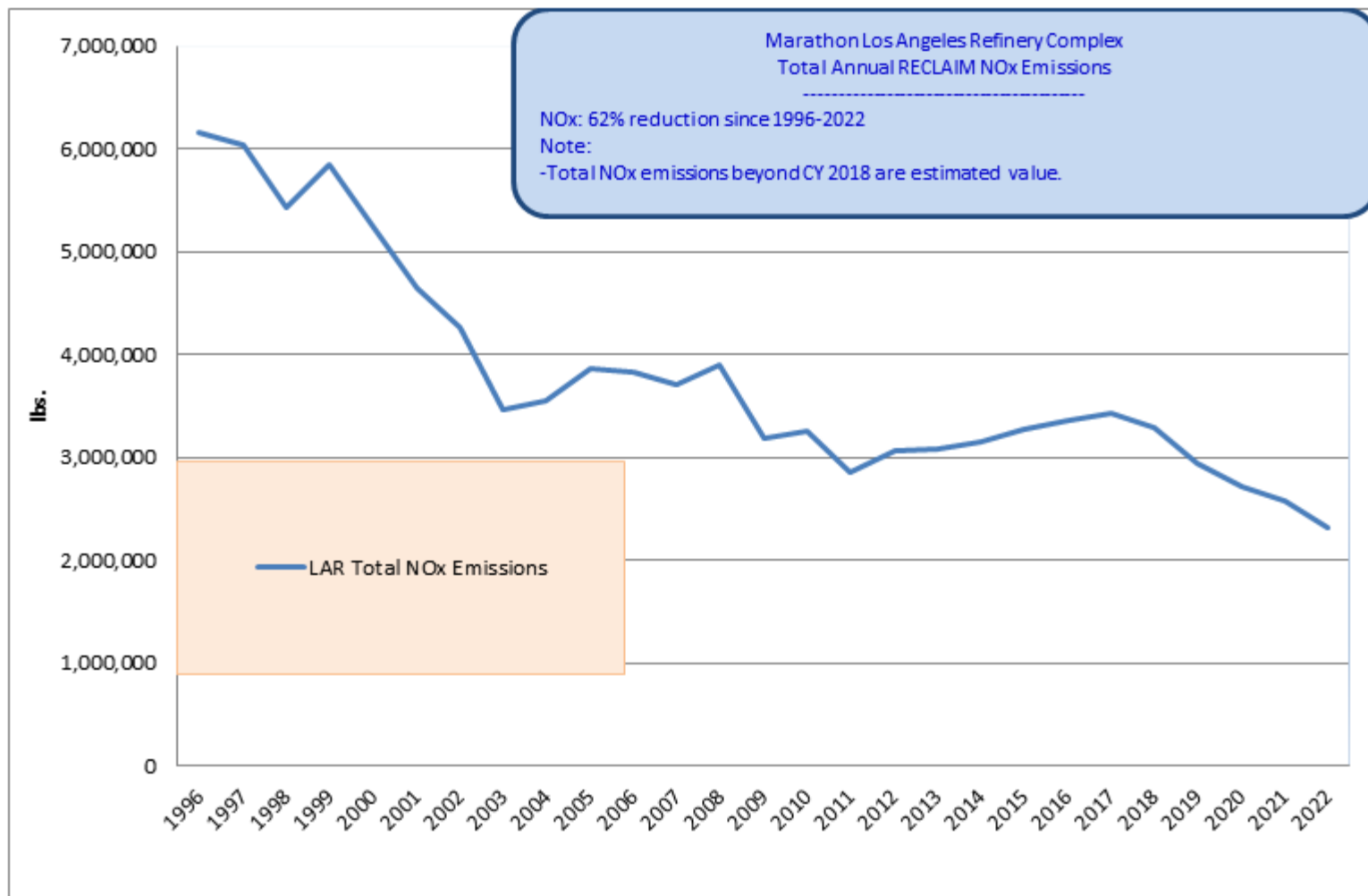
- **Crude Capacity of approximately 363,000 barrels per calendar day**
 - Produce transportation fuels for the Los Angeles area
- **Site: 1000+ acres**
- **Personnel: 1620 employees**
 - Contractors: 2000+
- **Operations in Wilmington, Long Beach and Carson**



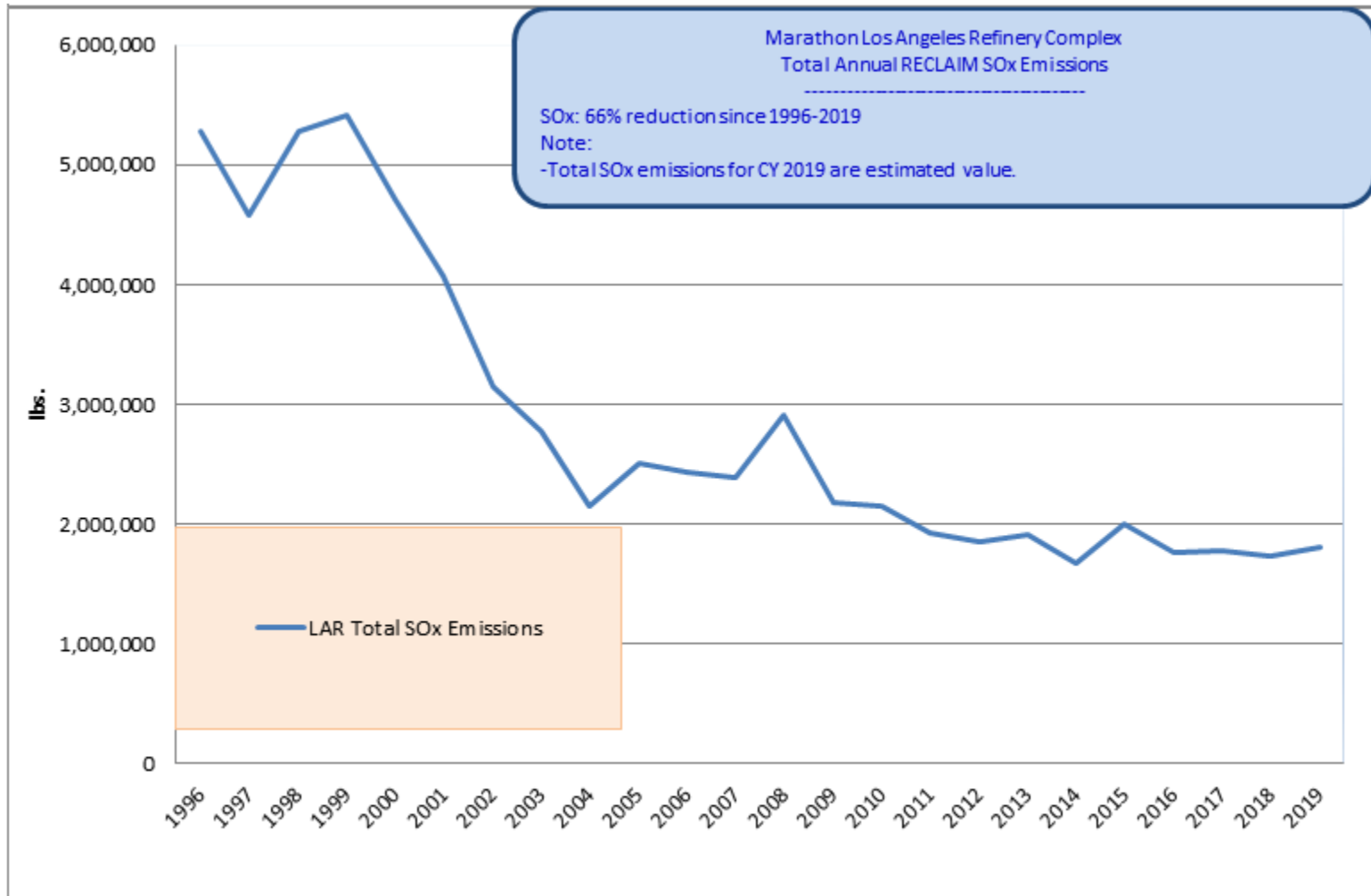


What has Marathon done
at the refinery to reduce
emissions?

3.8 million pounds of NOX reductions



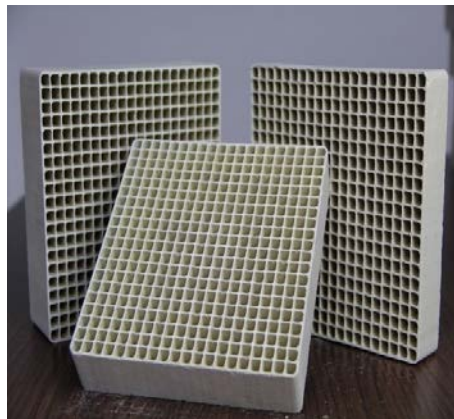
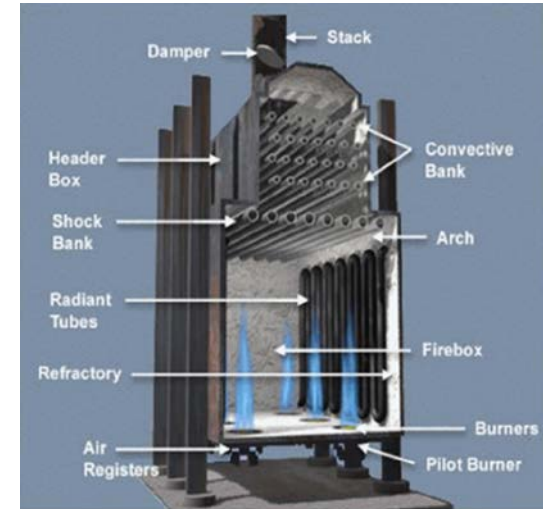
More than 3 million pounds of SOX reductions-



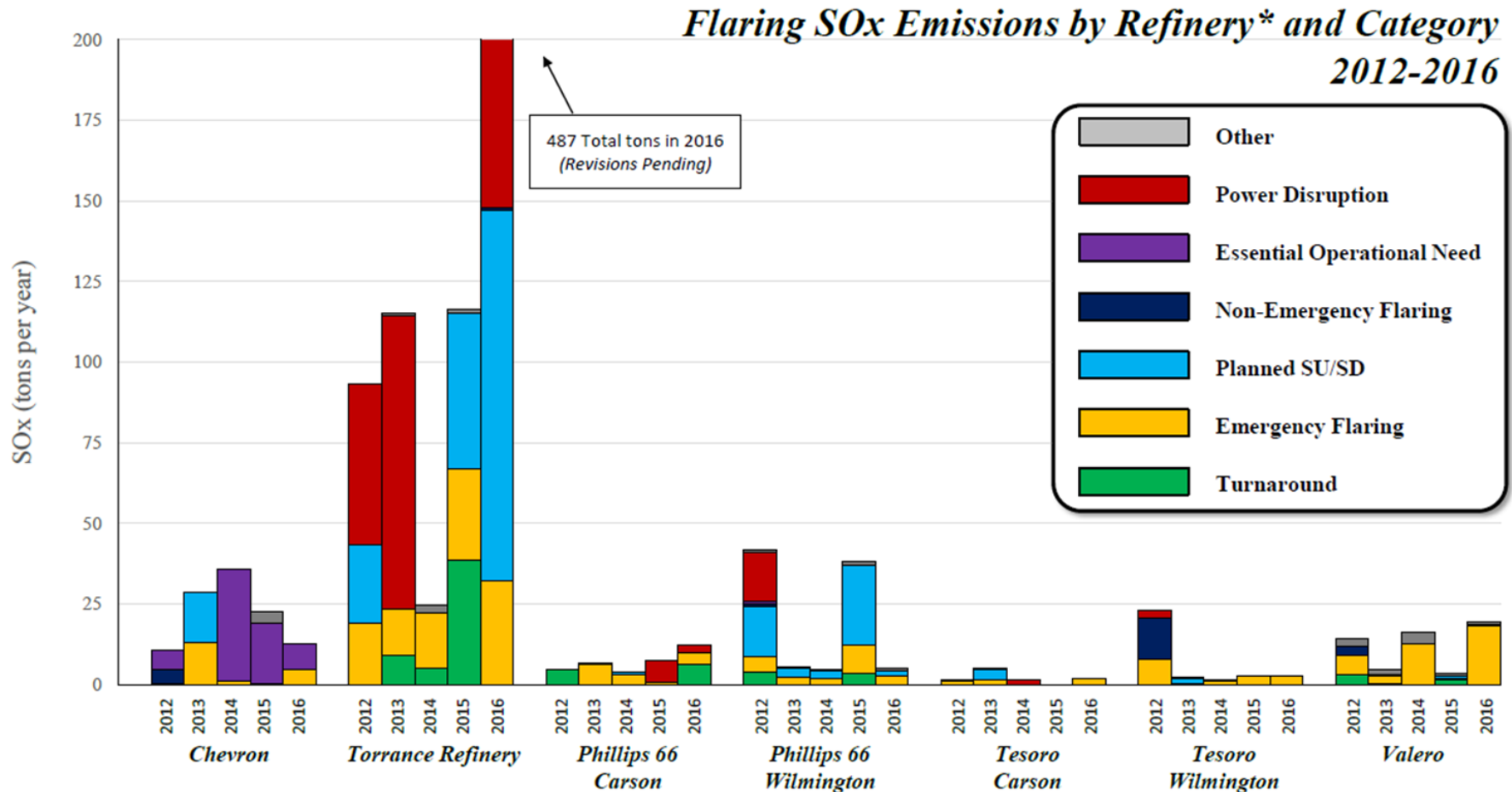
Technology to burn fuel cleaner



- Lower emission burners
- NOx removal equipment - Selective Catalytic Reduction (SCR)
 - SCR on Carson Fluid Catalytic Cracking Unit (FCC) is one of the largest in any refinery

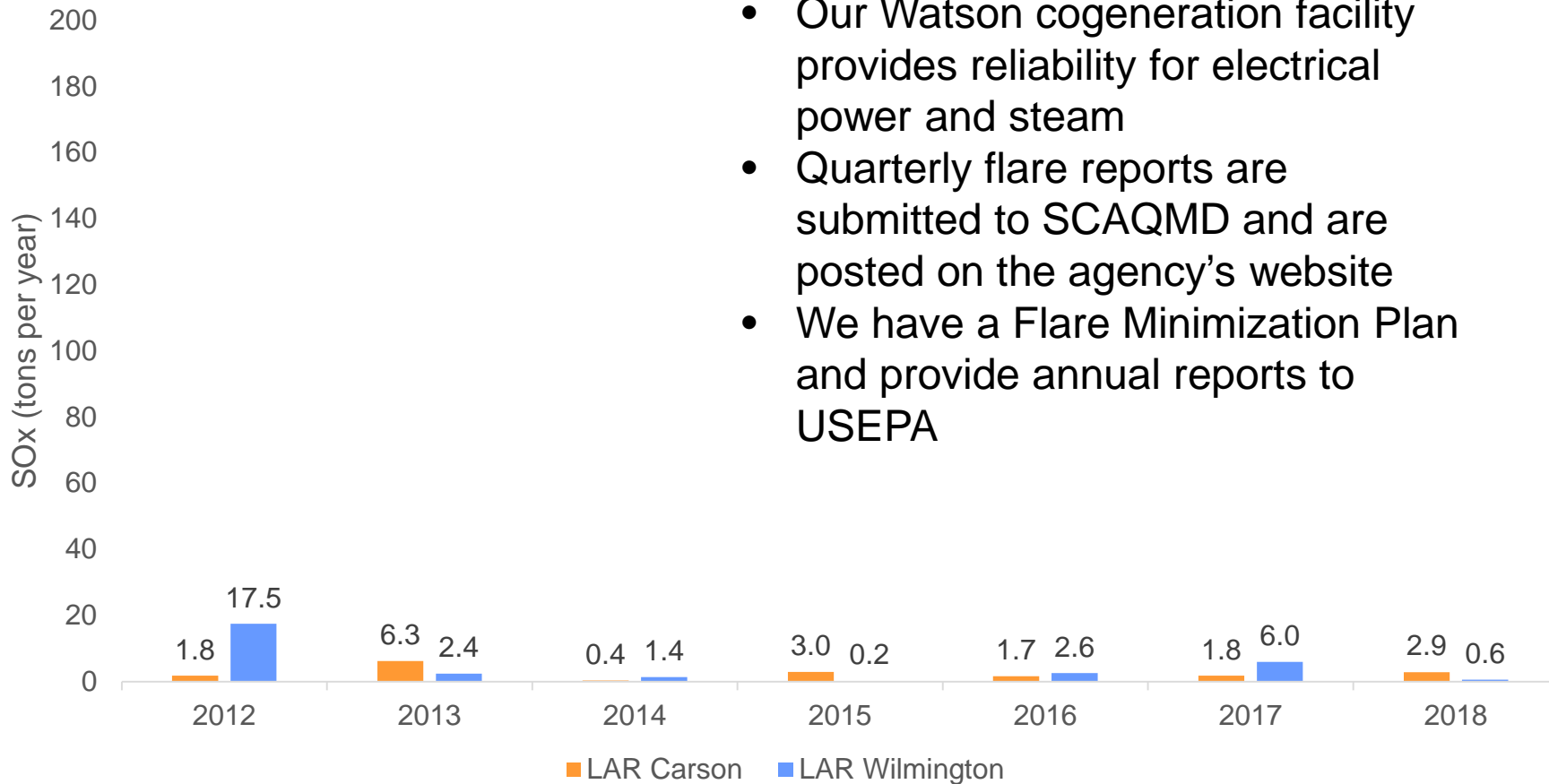


Reducing emissions from flares



FROM: SCAQMD 1118 staff report July 2017

Marathon Los Angeles Refinery flaring thru 2018

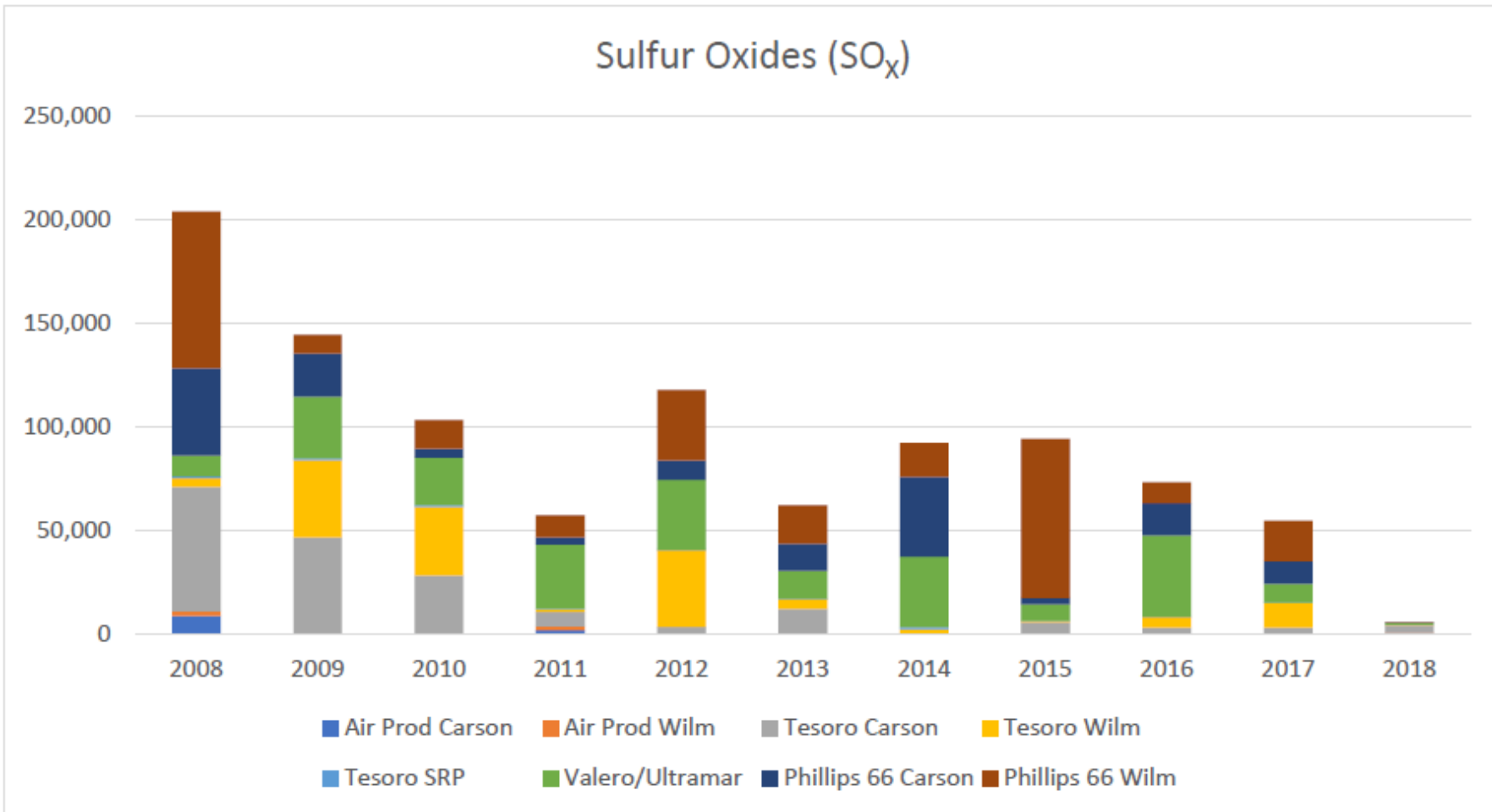


- Our Watson cogeneration facility provides reliability for electrical power and steam
- Quarterly flare reports are submitted to SCAQMD and are posted on the agency's website
- We have a Flare Minimization Plan and provide annual reports to USEPA

WCWLB flaring – SO_x emissions (from SCAQMD flare report at June CSC meeting)



Sulfur Oxides (SO_x)

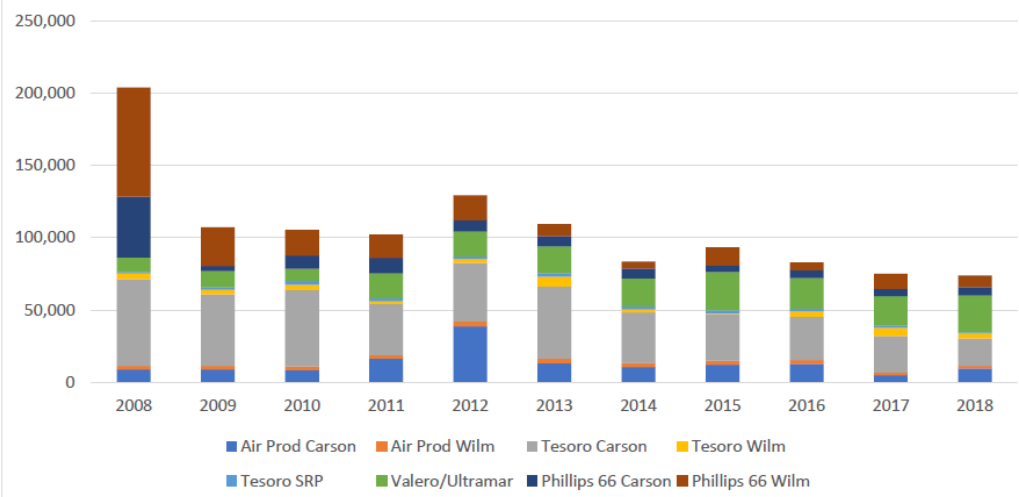


WCWLB flaring & WCWLB on-road 2017 emissions

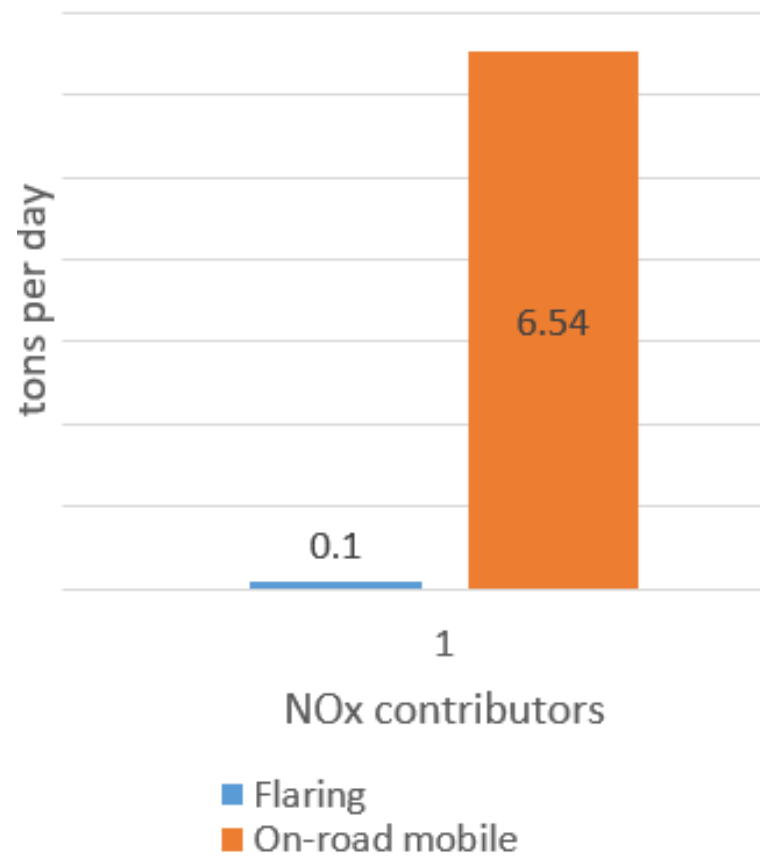
(June 13 CSC meeting) (May 29 TAG meeting)



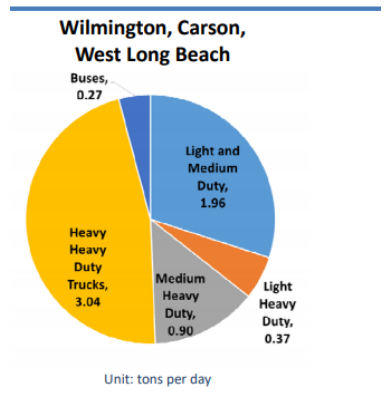
Nitrogen Oxides (NO_x)



WCWLB NOx Emissions in 2017



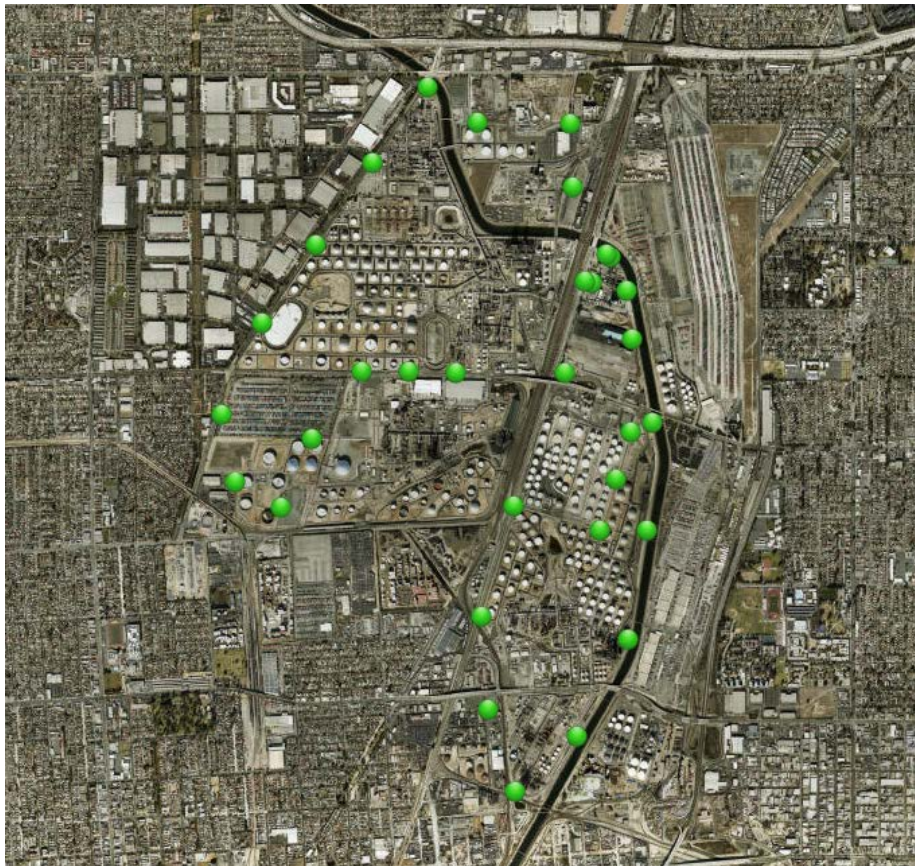
On-Road NOx



EPA benzene fence line monitoring



- Started monitoring in 2017
- USEPA action level is 2.8 ppb
- Concentration at our refinery fenceline is much less than the action level



Reducing fugitive emissions (LDAR)



- **About 650,000** fugitive components such as valves and pumps are monitored every 3 months
- **About 9,500** drain system components are monitored monthly
- Total Vapor Analyzers (TVAs) and FLIR cameras used to find leaks
- **About 40 certified technicians** work full time to monitor these components
- BACT is applied on valves, pumps, compressors, and drain system components
- Closed loop sampling systems (Texas samplers) are used for sample collection
- All leaks are repaired promptly. No delay of repair.



Reducing fugitive emissions (Tanks)



- All fixed roof tanks in hydrocarbon service are monitored every 3 months
 - Total Vapor Analyzers (TVAs) and FLIR cameras used to find leaks
- All floating roof tanks in hydrocarbon service are inspected every 6 months
 - Special tools are used to measure gaps in primary and secondary seals, leg socks and tank deck fittings
 - Lower Explosive Limit monitoring conducted
- Certified inspectors perform tank inspections
- All leaks are repaired promptly (within 72 hrs). No delay of repair



Other ways emissions are reduced



- Flare Gas Recovery
 - Reduces sulfur and VOCs
- FCC Electrostatic Precipitator
 - Reduces particulate matter
- Electrification
- Use of lower emission construction equipment
- Storage Tank Doming and Fitting Upgrades
 - Reduce vapor emissions
- Vapor Recovery System
 - reduces tank emissions
- Amine contactors
 - Reduces sulfur in refinery fuel gas
- Liquid Recovery Unit
 - Reduces sulfur in refinery fuel gas
- Voluntary Risk Reduction Plan
 - Solar-powered light towers
 - Lower emission electrical power instead of diesel-generated power for temporary equipment



Los Angeles Refinery Integration and Compliance Project



● Optimization and Compliance

- Pipelines between Wilmington and Carson
- **Shut down Wilmington FCC**
- Ability to remove more sulfur from our gasoline product

Project Net Local Emissions Changes from CEQA

Greenhouse Gases
(Metric Tonnes/year)

CO₂e
(70,000)



Criteria Pollutants
(Tons/year)

SO _x	NO _x	PM	CO	VOC
(3)	(56)	(1.5)	(85)	9*



* After offsets

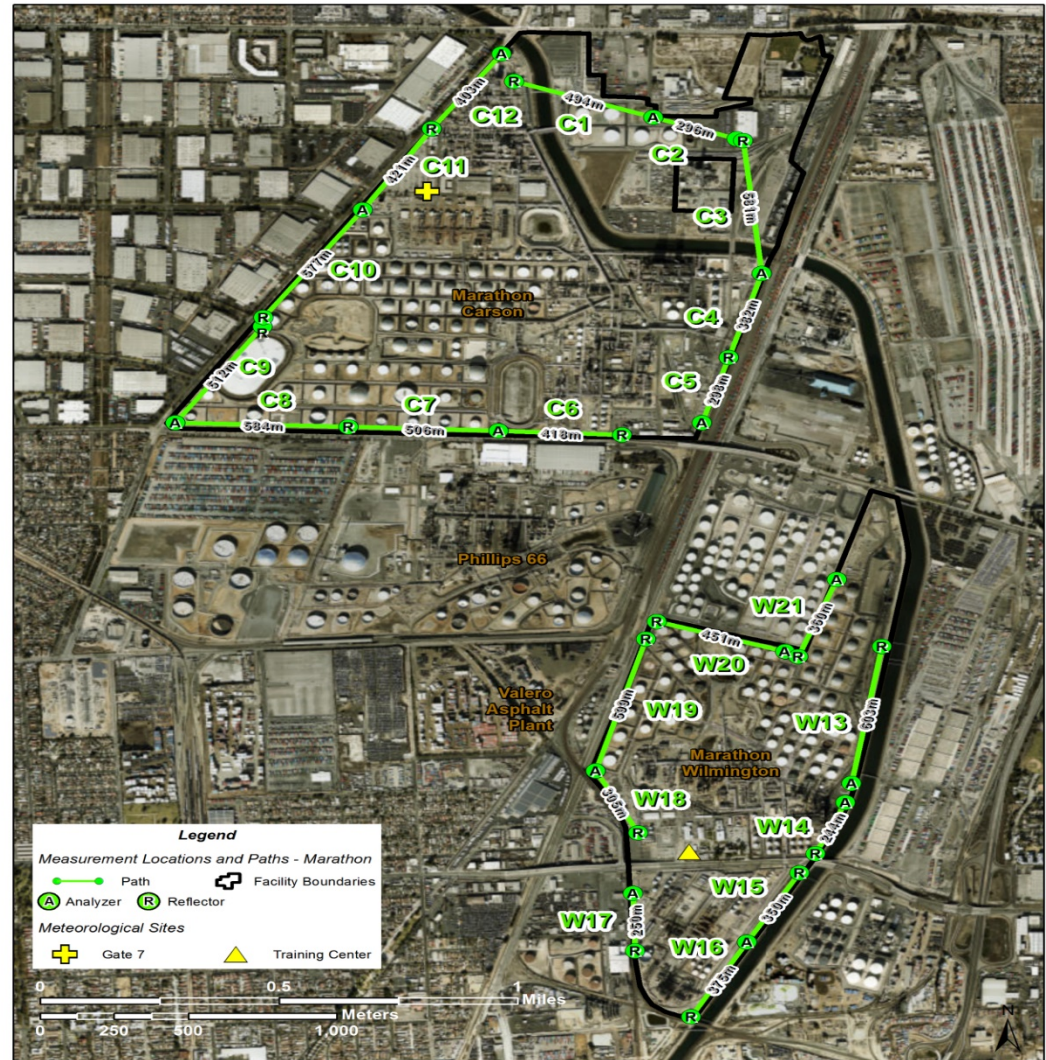


What more is Marathon
doing at the refinery?

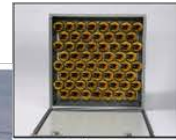
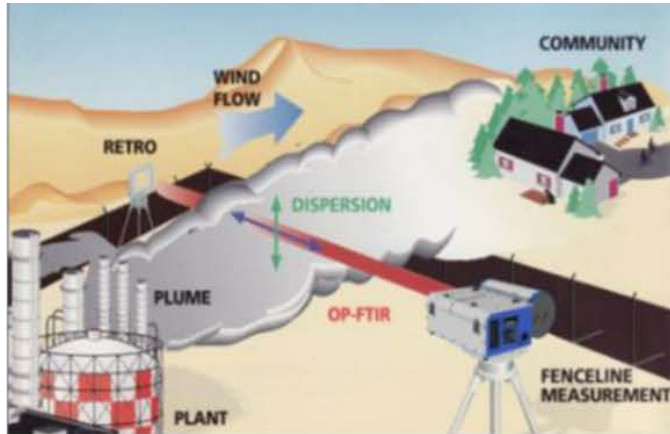
RULE 1180 fence line monitoring



Pollutant	Instrument
Criteria Air Pollutants	
Sulfur Dioxide	OP UVDOAS with Xenon
Nitrogen Oxides	OP FTIR
Volatile Organic Compounds (VOC)	
Total VOCs	OP FTIR
Formaldehyde	OP FTIR
Acetaldehyde	OP FTIR
Acrolein	OP FTIR
1.3-Butadiene	OP FTIR
Styrene	OP FTIR
BTEX Compounds	OP UVDOAS with Xenon
Other Compounds	
Hydrogen Sulfide	OP TDLAS
Carbonyl Sulfide	OP FTIR
Ammonia	OP FTIR
Black Carbon	Point Aethalometer
Hydrogen Cyanide	OP FTIR
Hydrogen Fluoride	N/A (not used at this refinery).



RULE 1180 equipment and shelter

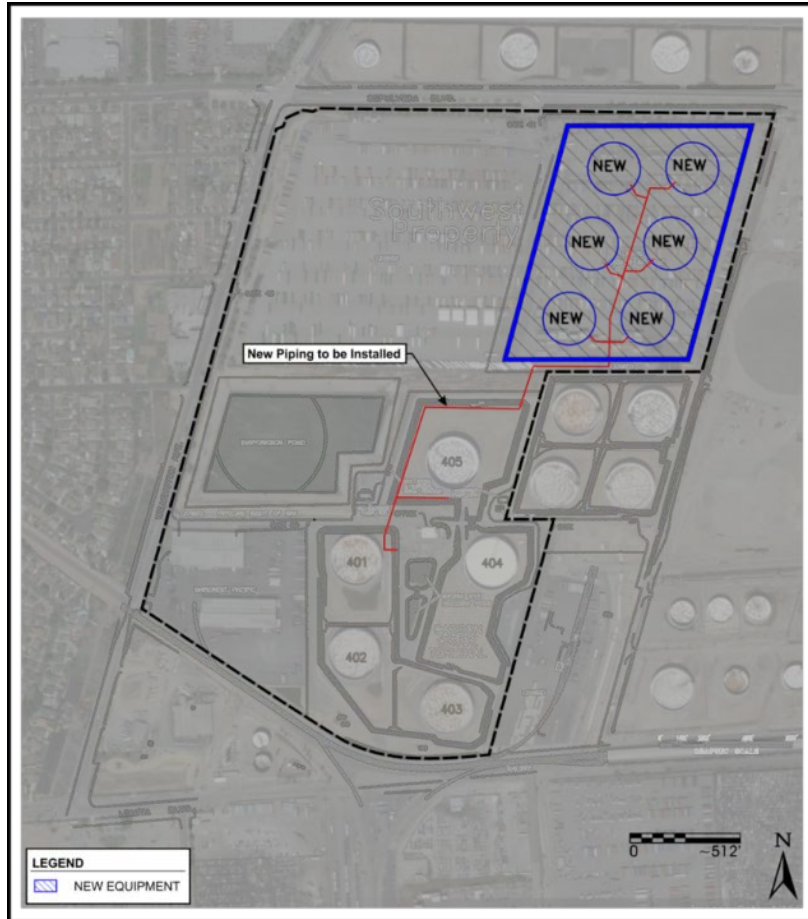


Projects under evaluation



- Retrofit heaters with new low NOx burners and/or SCR to reduce NOx emissions
 - Cost effectiveness for projects under evaluation
- Electrification projects to replace portable diesel powered air compressors to reduce NOx and diesel PM
- Diesel alternatives to portable diesel powered ICE's

LARIC crude tank project at LAR



**reductions not accounted for in LARIC Environmental Impact Analysis*

Marine Vessel Emissions Reductions in Tons *

SO _x	NO _x	PM	CO	VOC
3	200	8	25	36

- Designed to meet Best Achievable Control Technology
- Will enable marine vessels at Port of Long Beach to unload cargoes in one dock trip rather than making multiple trips and waiting at sea in between.

LAR Summer Youth Program



- We have had a Summer Youth Program for 27 years
 - More than 800 youth have participated
- This year we have a class of 33
 - All from our community of WCWLB
- The program teaches the necessary life skills needed to get a sound job.
 - We have a 1:1 mentor/youth ratio
- Summer Youth video
<https://vimeo.com/260131550>
Password: youth

