Criteria and Toxic Air Pollutants Emissions Inventory for Base and Future Milestone Years

Assembly Bill (AB) 617
Community Air Initiatives

Technical Advisory Group Meeting
Friday, October 23, 2020

South Coast
Air Quality Management District

Source Attribution

What is source attribution?

Rigorous accounting of sources, their emissions and their contribution to cumulative exposure burden

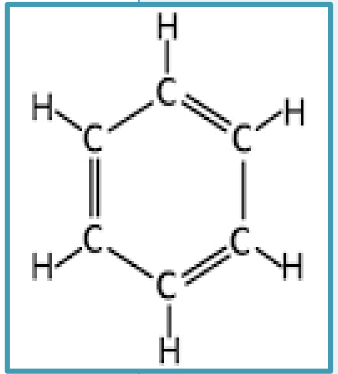
Why are we doing this?

Meet AB617 statutory requirement: *provide "[a] methodology for assessing and identifying the contributing sources or categories of sources, including, but not limited to, stationary and mobile sources, and an estimate of their relative contribution to elevated exposure to air pollution in impacted communities…"*

Air Pollutants Included in the Source Attribution

Criteria Air Pollutants (CAP)

- VOC, NOx, SOx,NH3, PM2.5 and Pb



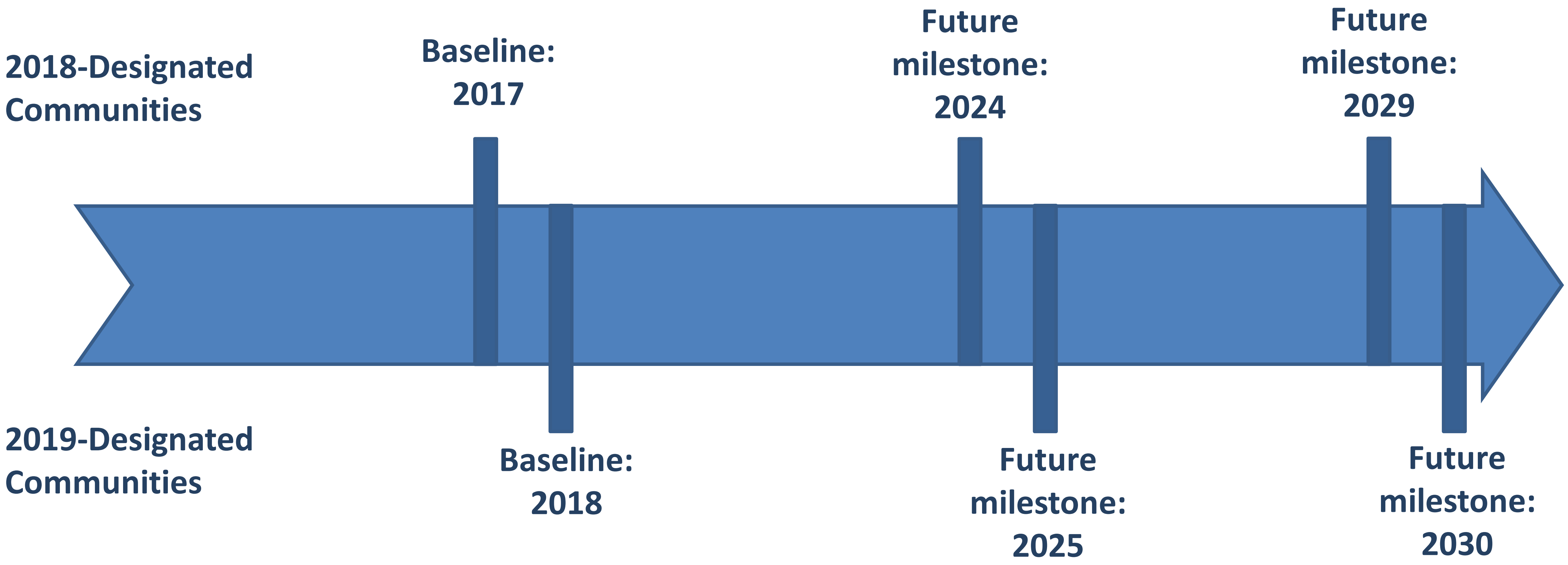
Toxic Air Contaminants (TAC)

- 24 reported

Selected List of Air Toxic Contaminants and Their Associated Cancer Risk Factor

		Cancer unit risk 1/(ug/m3)	Relative factor To DPM
1	Benzene	6.77E-05	0.09
2	Ethylene oxide	8.80E-05	0.12
3	Formaldehyde	1.42E-05	0.02
4	Perchloroethylene	1.42E-05	0.02
5	1,3-Butadiene	4.06E-04	0.55
6	PAHs(Polycyclic aromatic hydrocarbon)	2.64E-03	3.55
7	Asbestos	1.90E-04	0.26
8	Cadmium	1.01E-02	13.58
9	Hexavalent chromium	3.45E-01	463.71
10	Nickel	6.16E-04	0.83
11	Arsenic	8.12E-03	10.91
12	Lead	2.84E-05	0.04
13	Diesel Particulate Matter (DPM)	7.44E-04	1.00

Emissions Inventory Milestone Years



Emissions Forecasting

- Emissions are forecasted from base-year inventory using the following equation to incorporate the impacts of growth and regulations.

$$E_{FY} = E_{BY} \times GF \times CF$$

where:

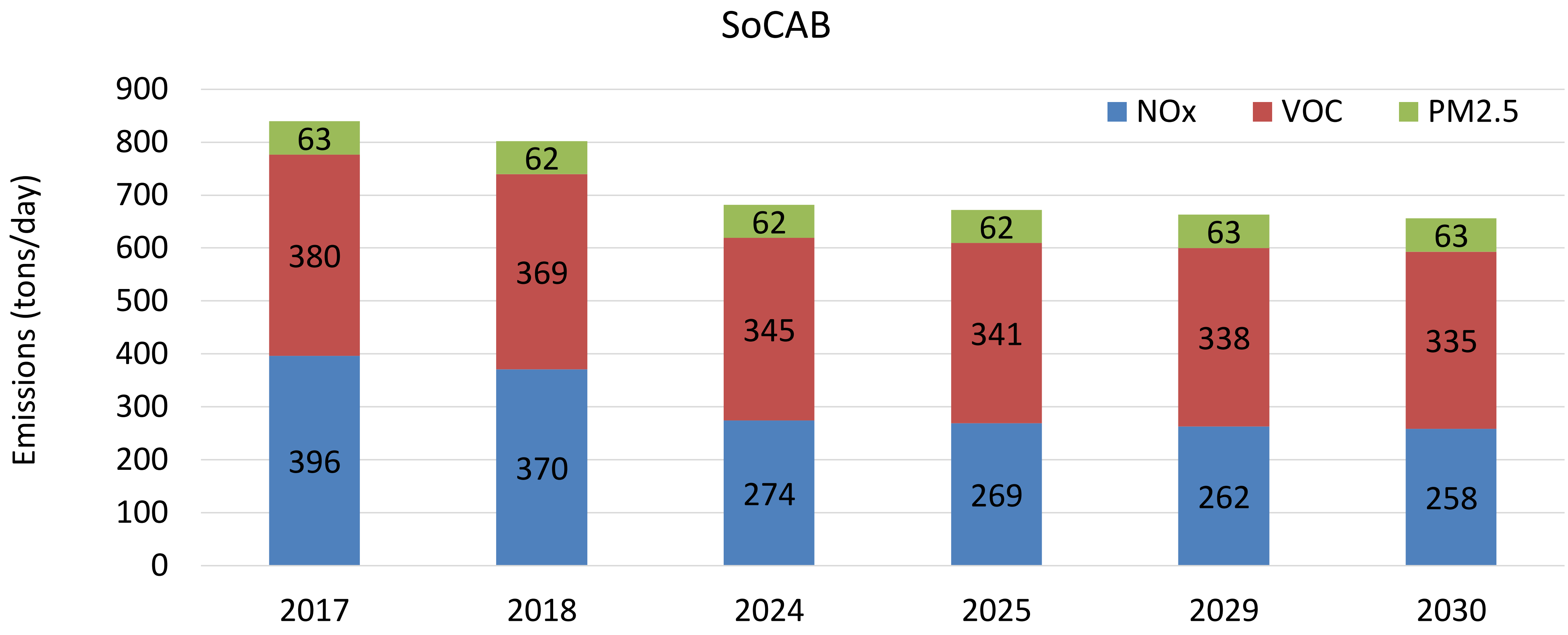
E_{FY} = Future year emissions

E_{BY} = Base year emissions

GF = Growth Factor

CF = Control Factor

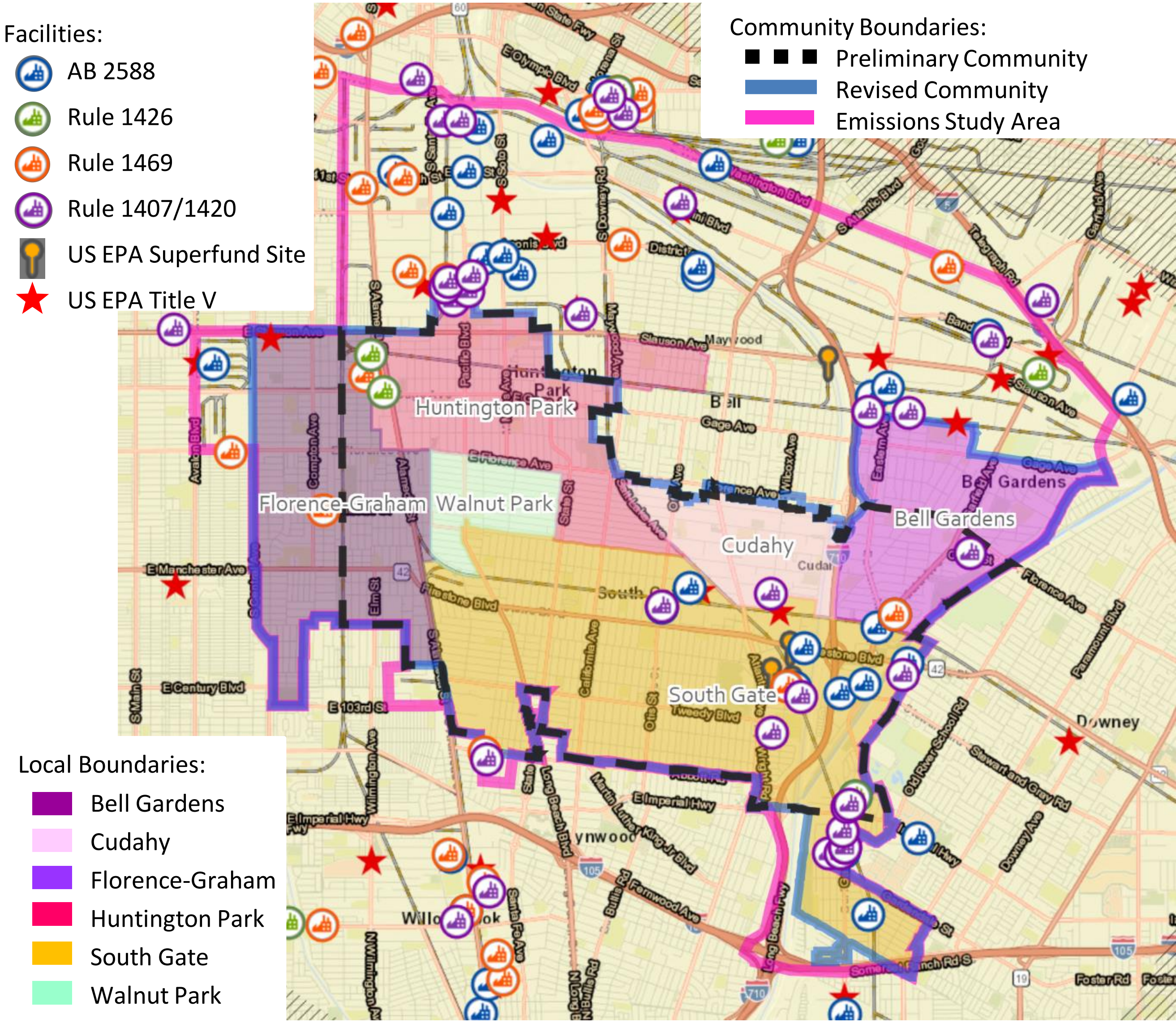
South Coast Air Basin Criteria Air Pollutants



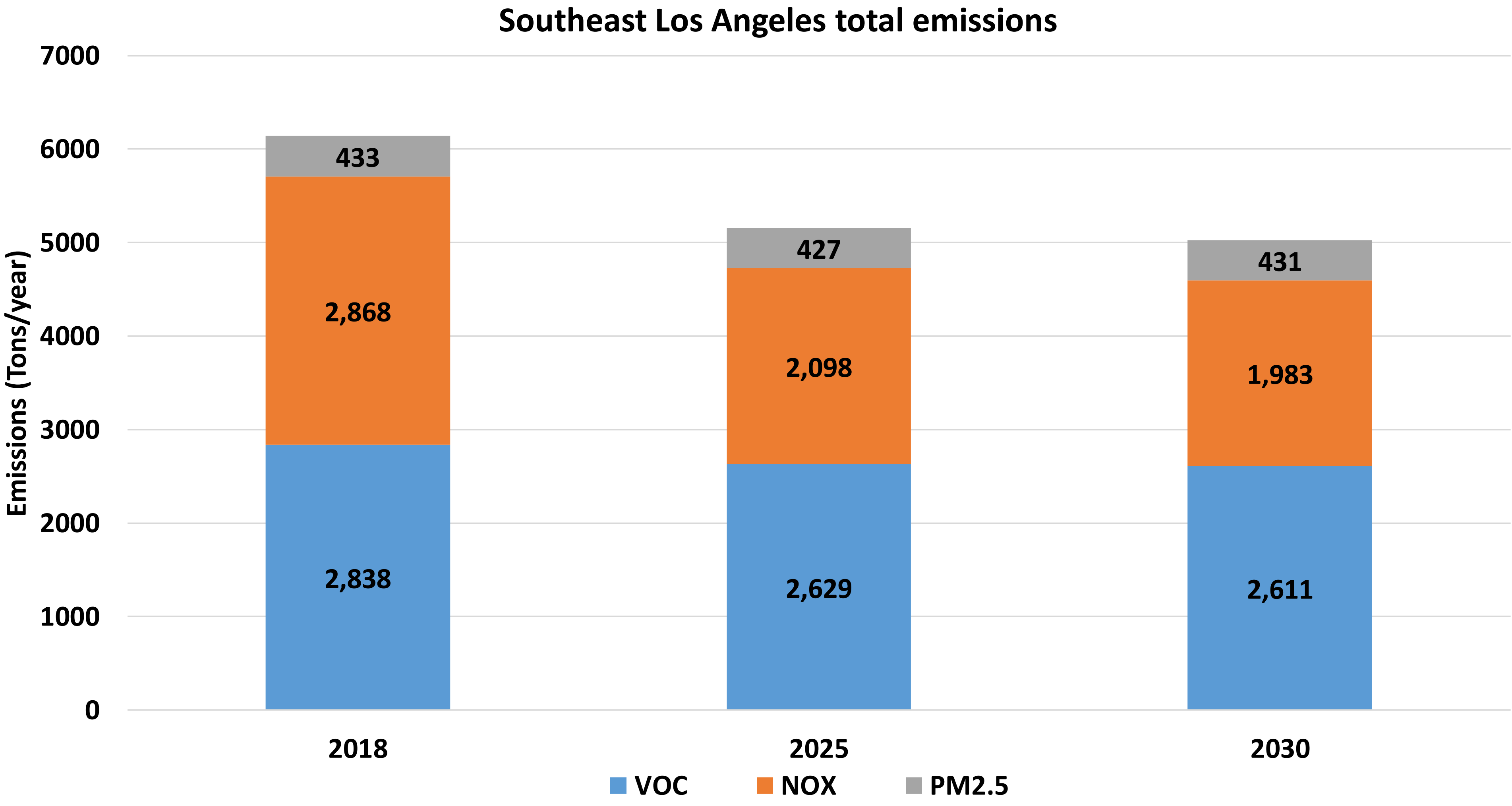
Southeast Los Angeles

Main sources:

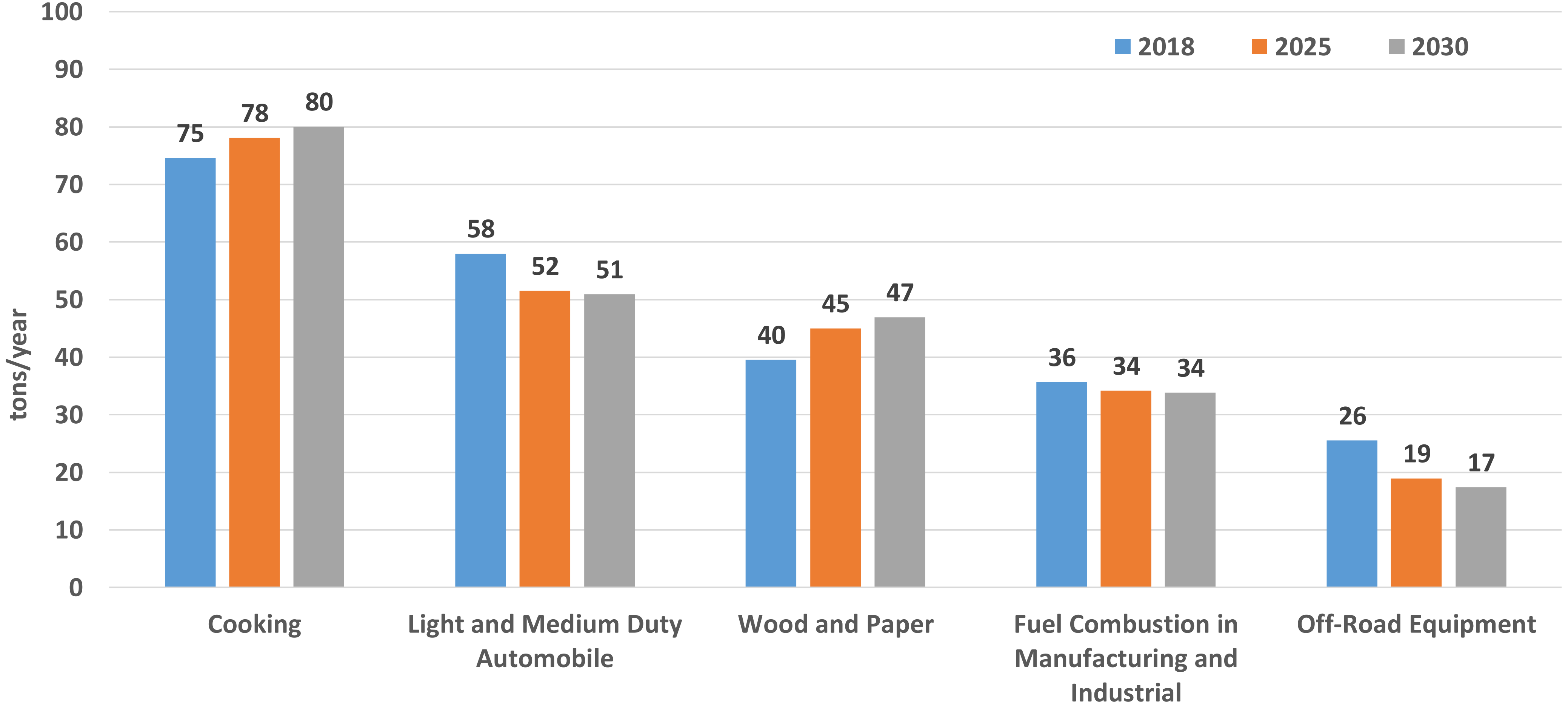
- 70+ facilities with reporting emissions
  - Foundries and metal plating, manufacturing, finishing
  - Auto body shops
  - Rendering
  - Packing
- Large railyards
- I-710 and Alameda corridor



CAPs emissions trend in Southeast LA Community



Top 5 Sources of PM25 in the Southeast Los Angeles



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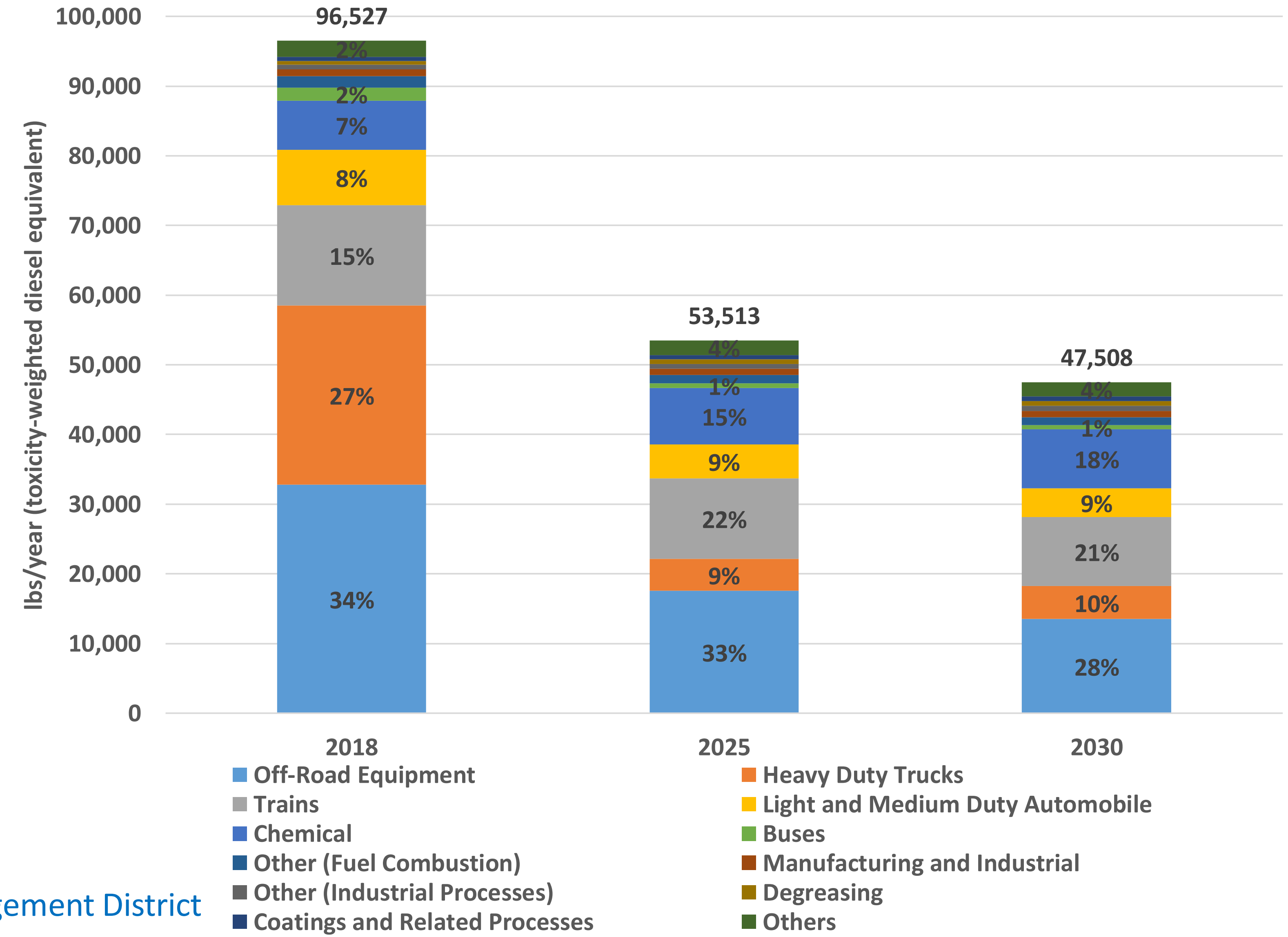
TACs in Southeast Los Angeles



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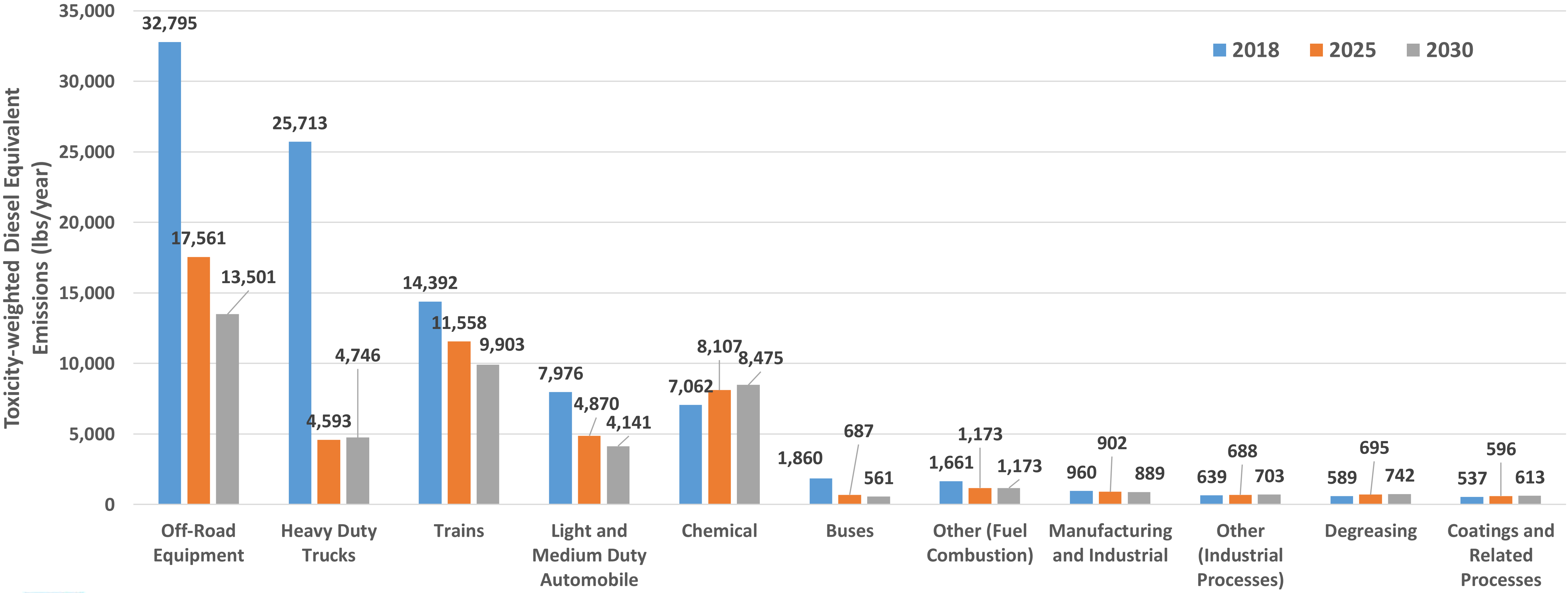
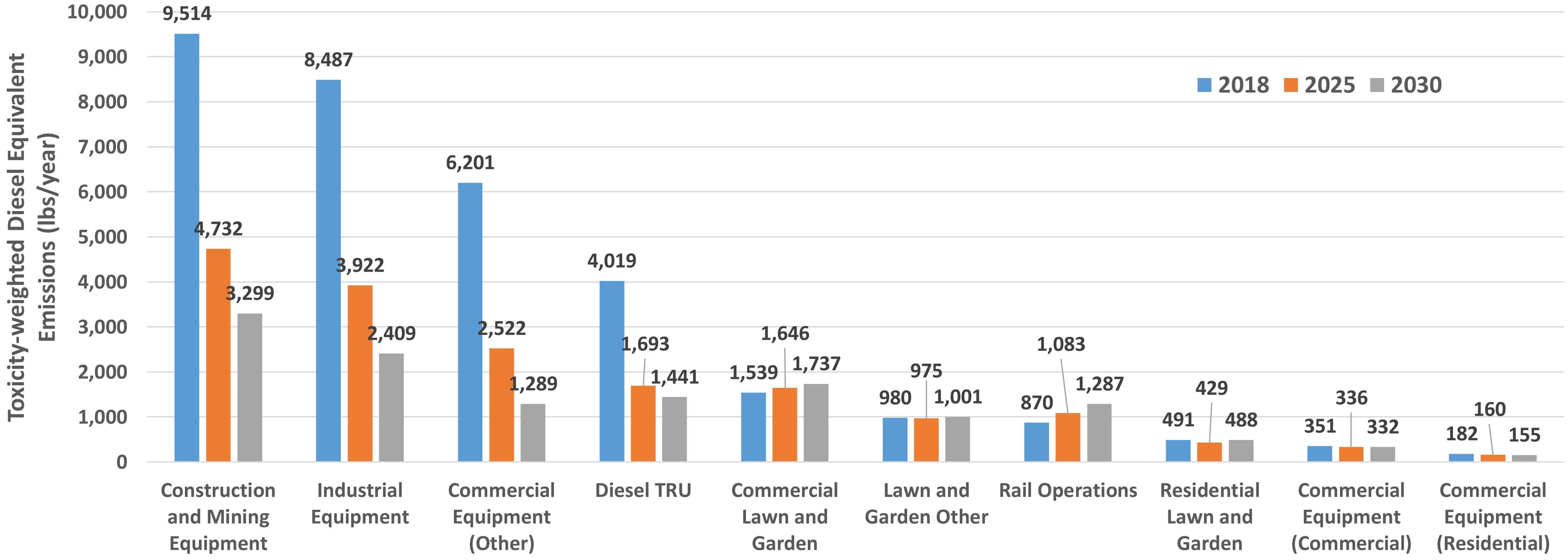
Top 10 Sources of TACs in the Southeast Los Angeles



Categories included in Off-Road Equipment in SELA



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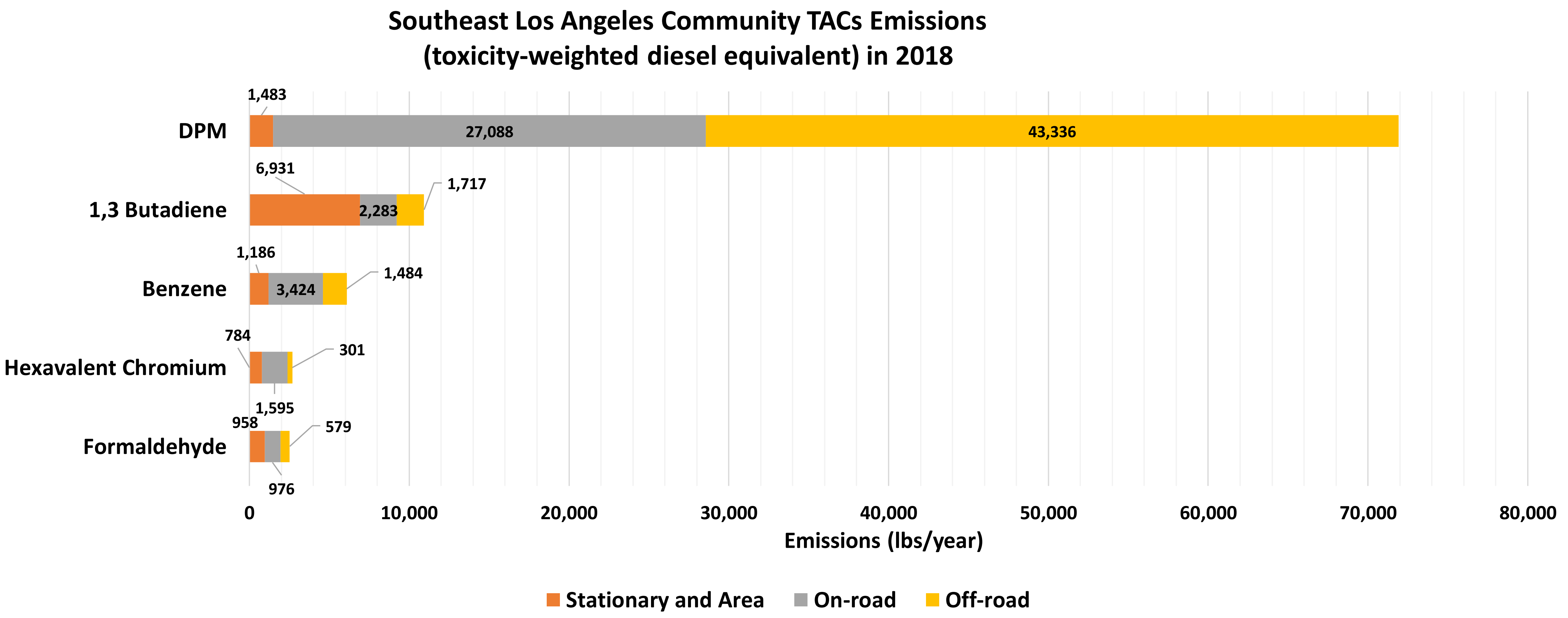
Top 5 TACs in Southeast Los Angeles: 2018



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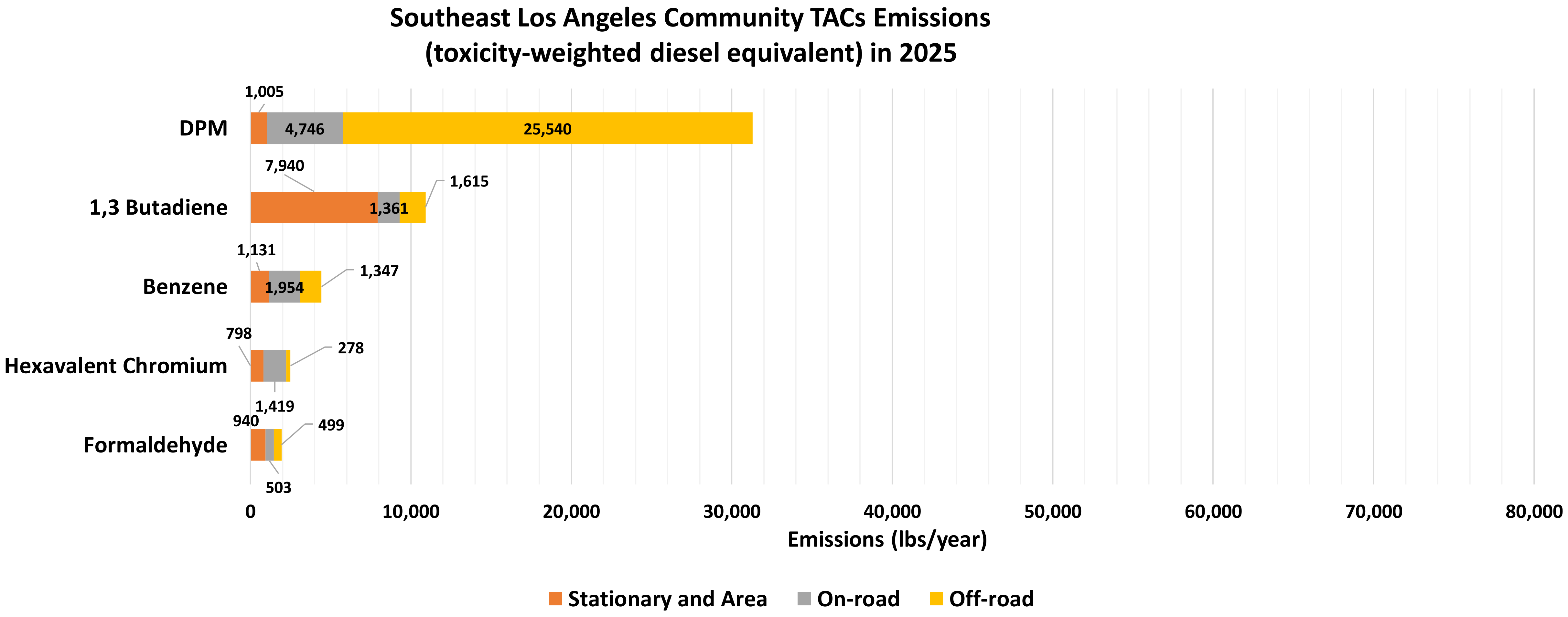
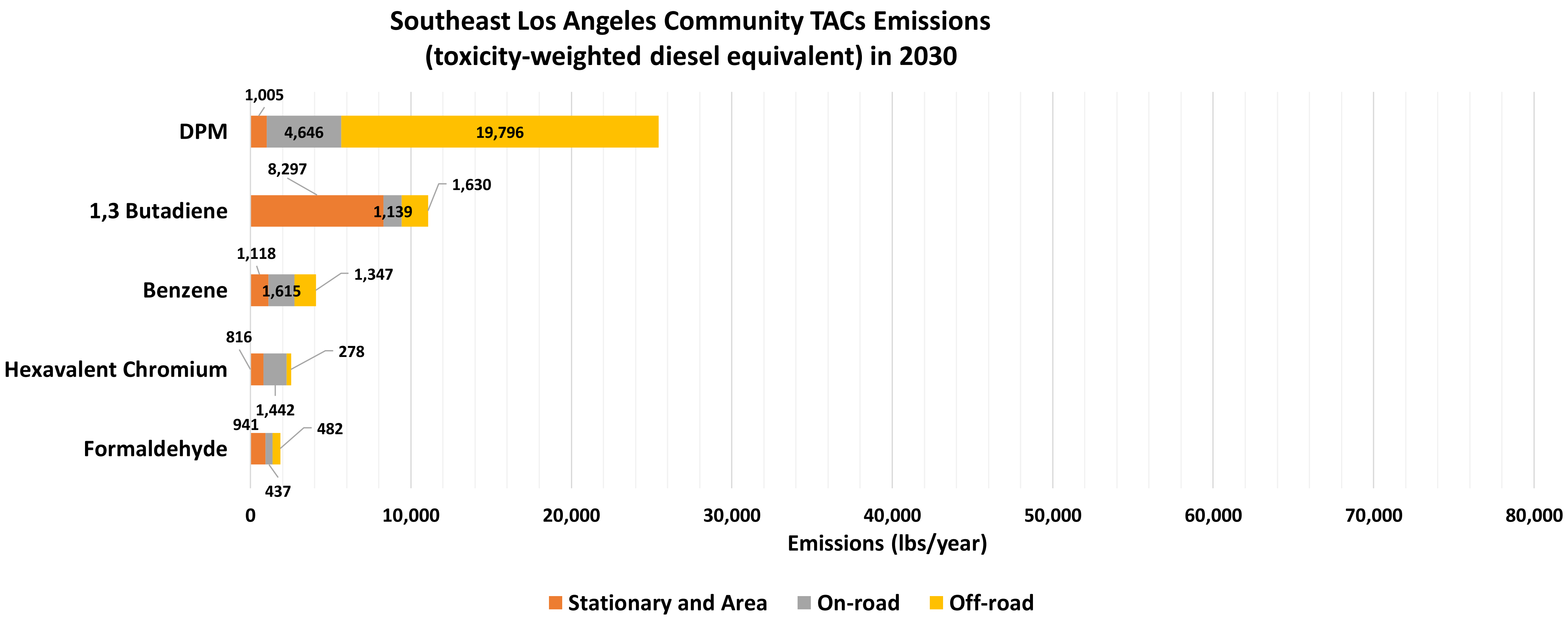
Top 5 TACs in Southeast Los Angeles: 2025



Top 5 TACs in Southeast Los Angeles: 2030



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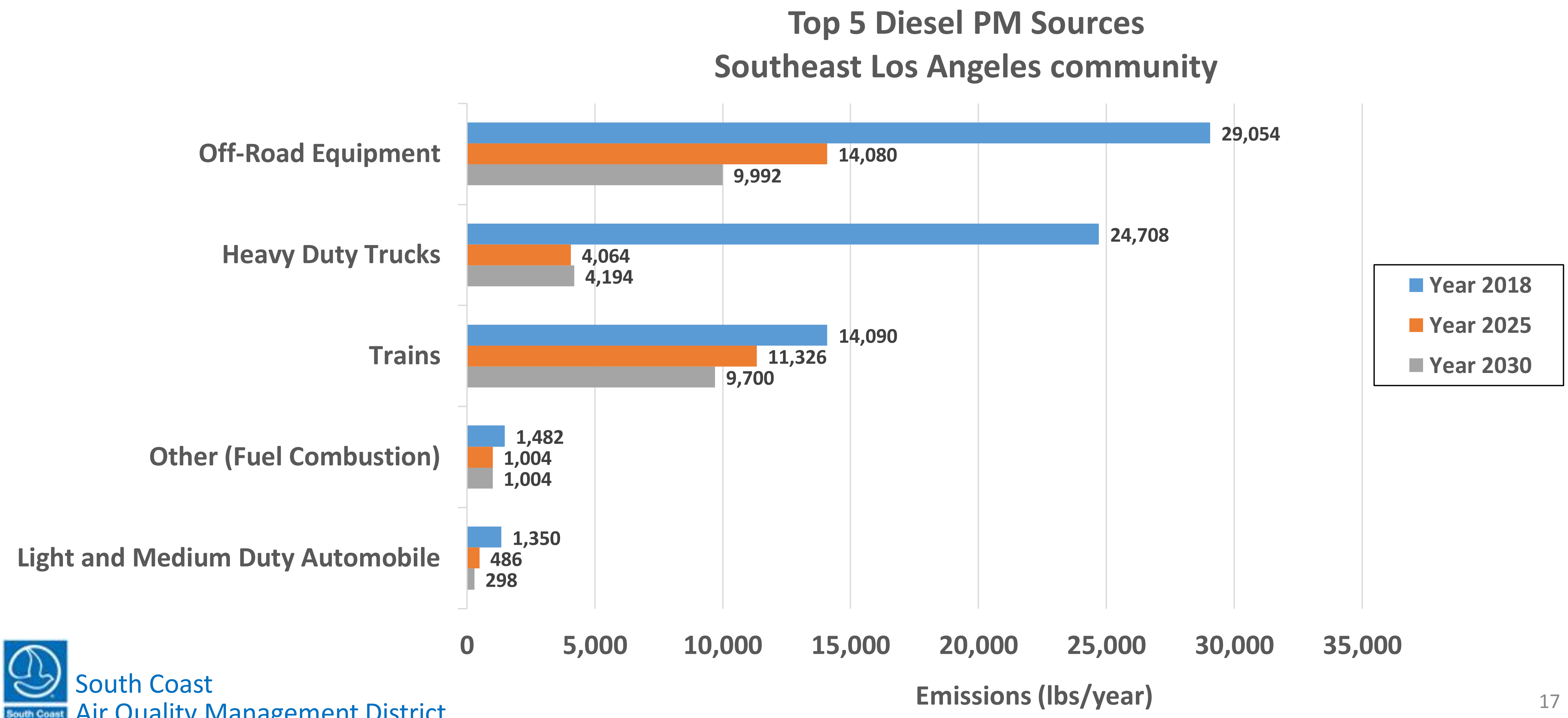
Top 5 Diesel PM Sources in Southeast Los Angeles



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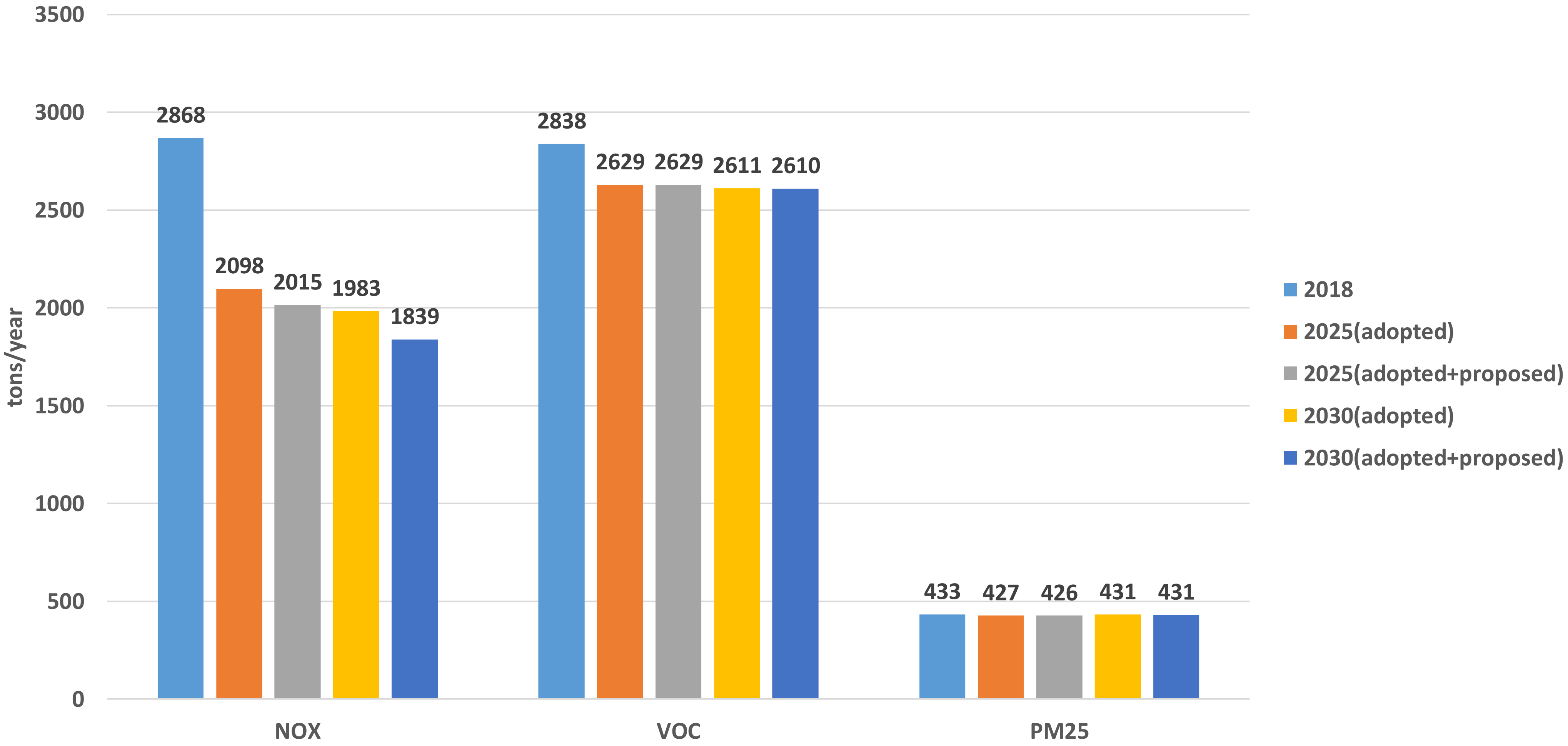
Proposed Regulations Reflected in the Future Emissions

Table 4. Control Factors for Emissions from Vehicles

Regulation	Pollutant	Control Factor	
		2025	2030
Proposed Heavy-Duty Low NOx Engine Standard	NOx	0.972-0.992	0.814-0.933
Proposed Heavy-Duty Inspection and Maintenance	$PM_{2.5}$	0.614	0.571
Proposed Heavy-Duty Inspection and Maintenance	NOx	0.851	0.827
Proposed Advanced Clean Car 2.0	$PM_{2.5}$	1.000	0.976-0.992
Proposed Advanced Clean Car 2.0	NOx	1.000	0.955-0.998

Effect of Proposed Regulations on CAP Emissions in SELA



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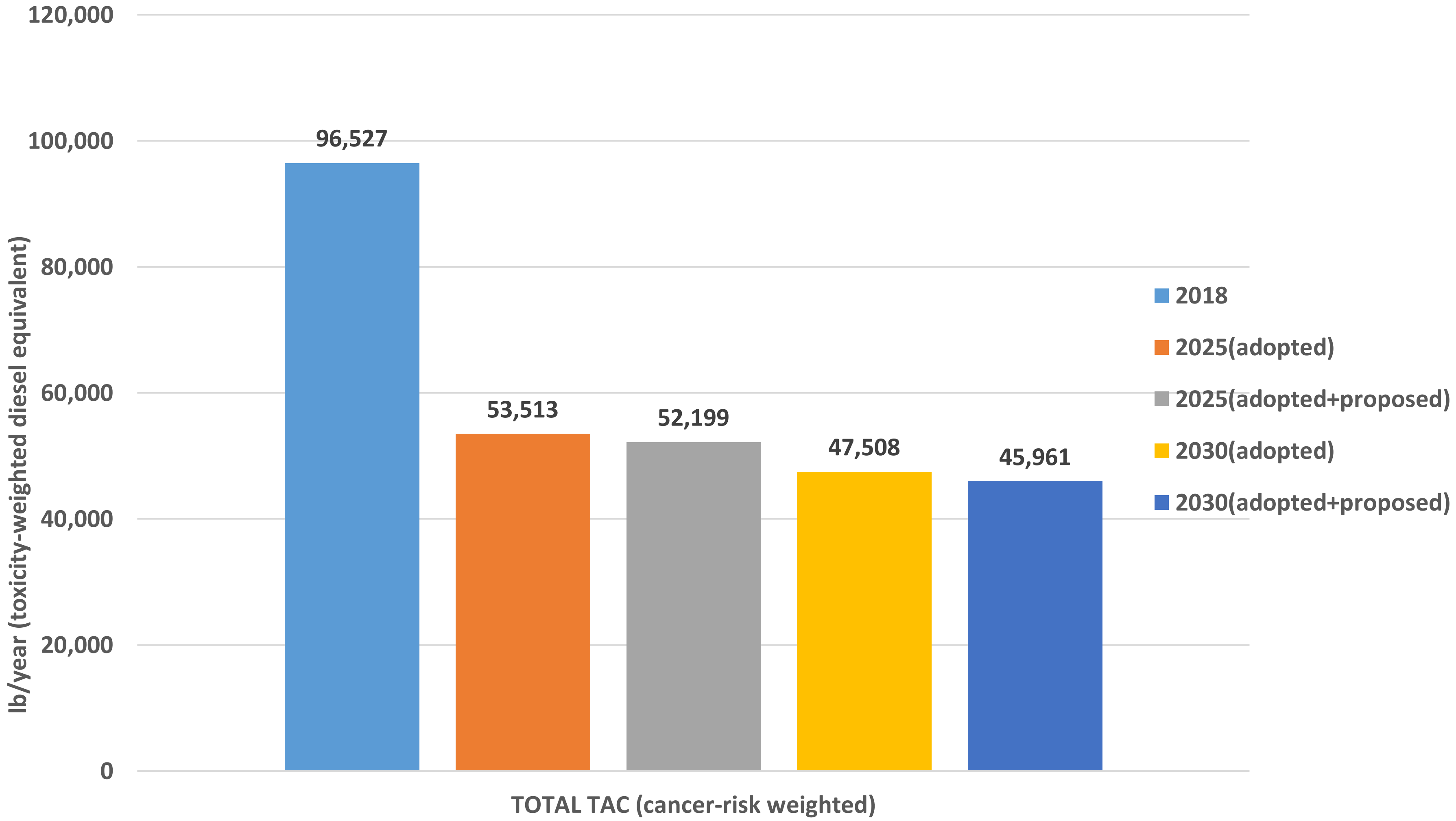
Effect of Proposed Regulations on TAC Emissions in SELA



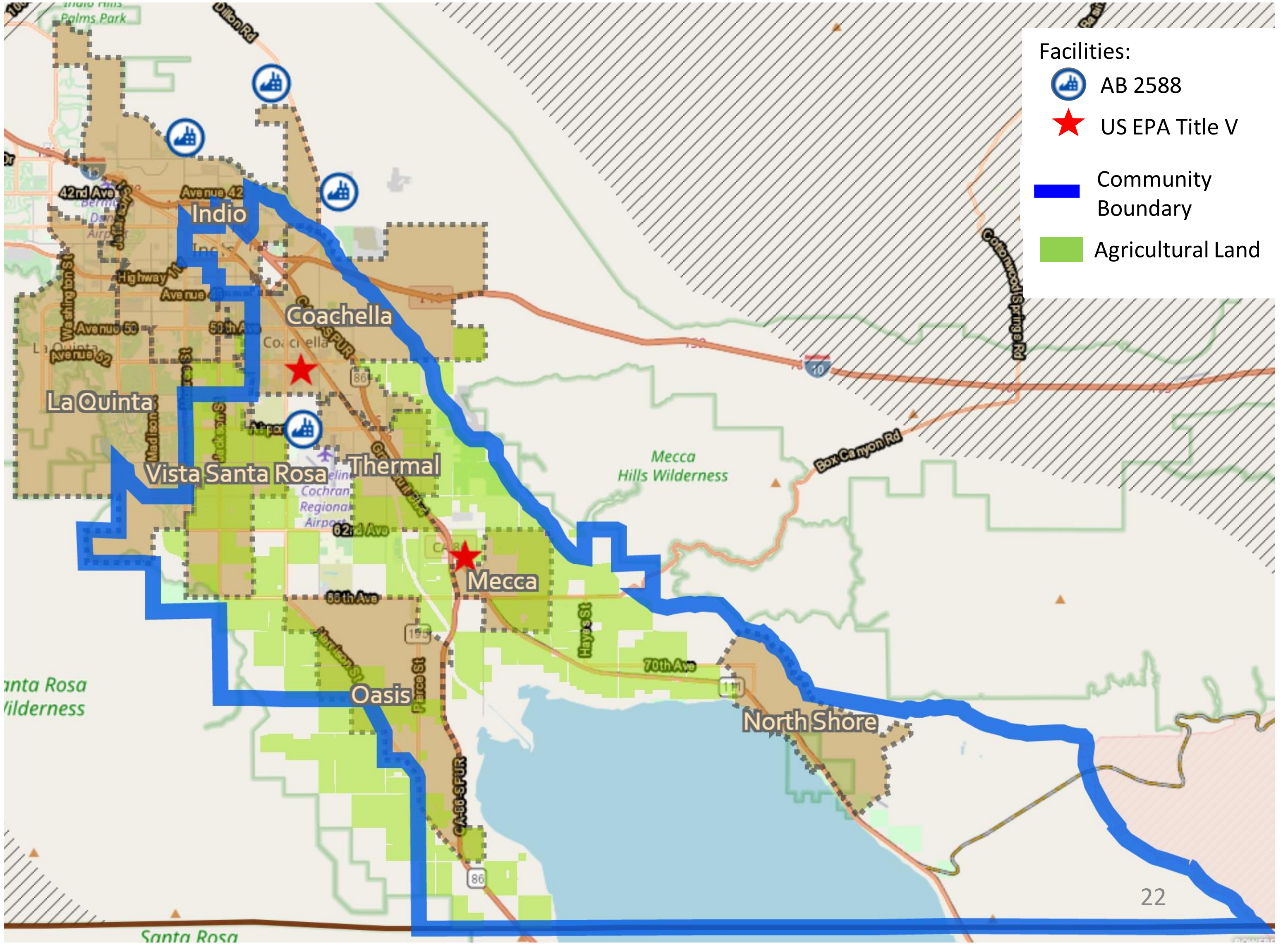
Summary for SELA

- Total toxicity-weighted TACs emissions are expected to decline in future years
- Off-road equipment is the largest source of TAC emissions
- Diesel PM is the largest contributor to TAC emissions
- Diesel PM declines substantially in future years, but it remains the largest contributor to toxic emissions in the future

Eastern Coachella Valley

Main sources:

- Agricultural activities
- Transport through I-10, and routes 88 and 111
- Freight rail transport
- Construction and demolition



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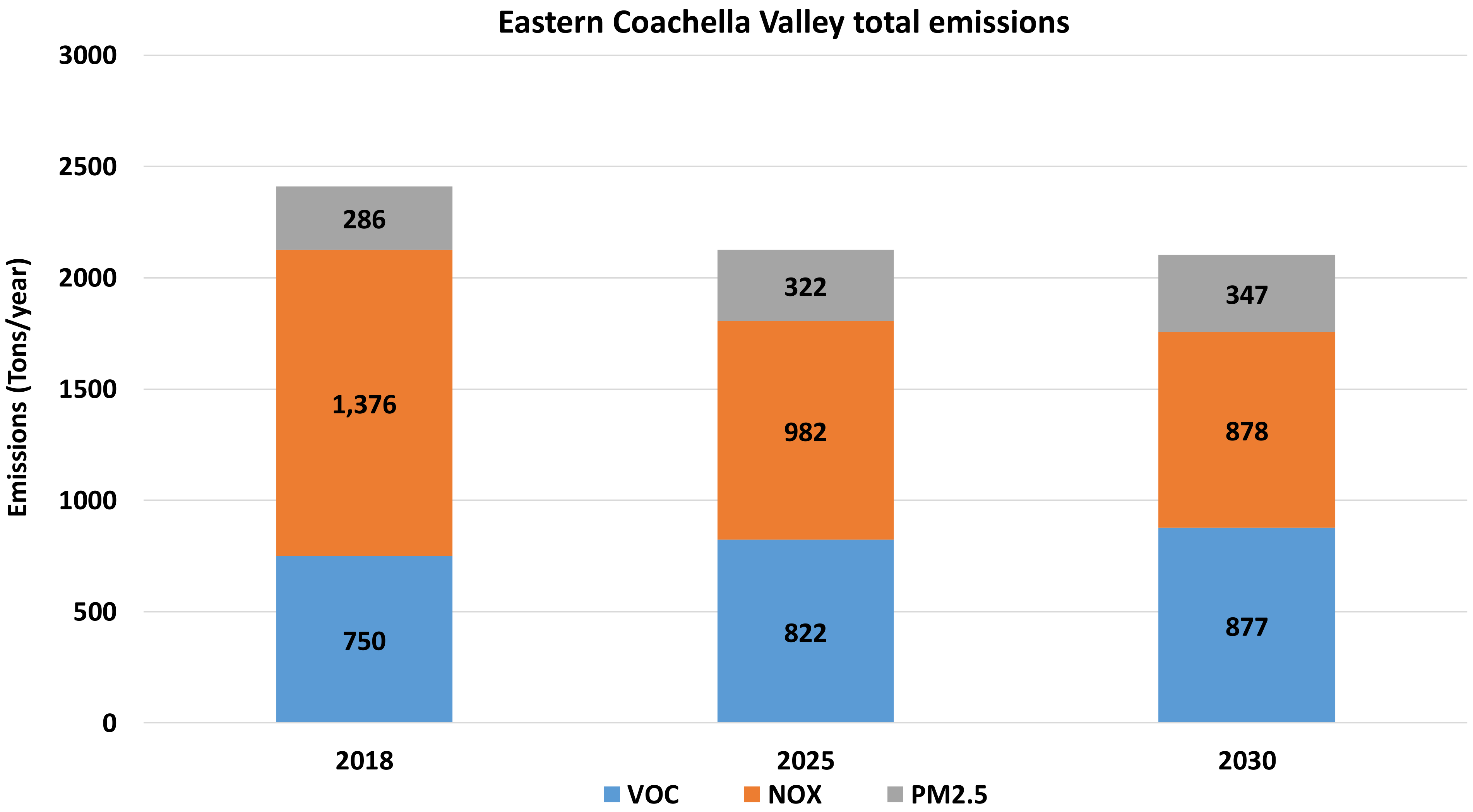
CAPs Emissions Trend in Eastern Coachella Valley



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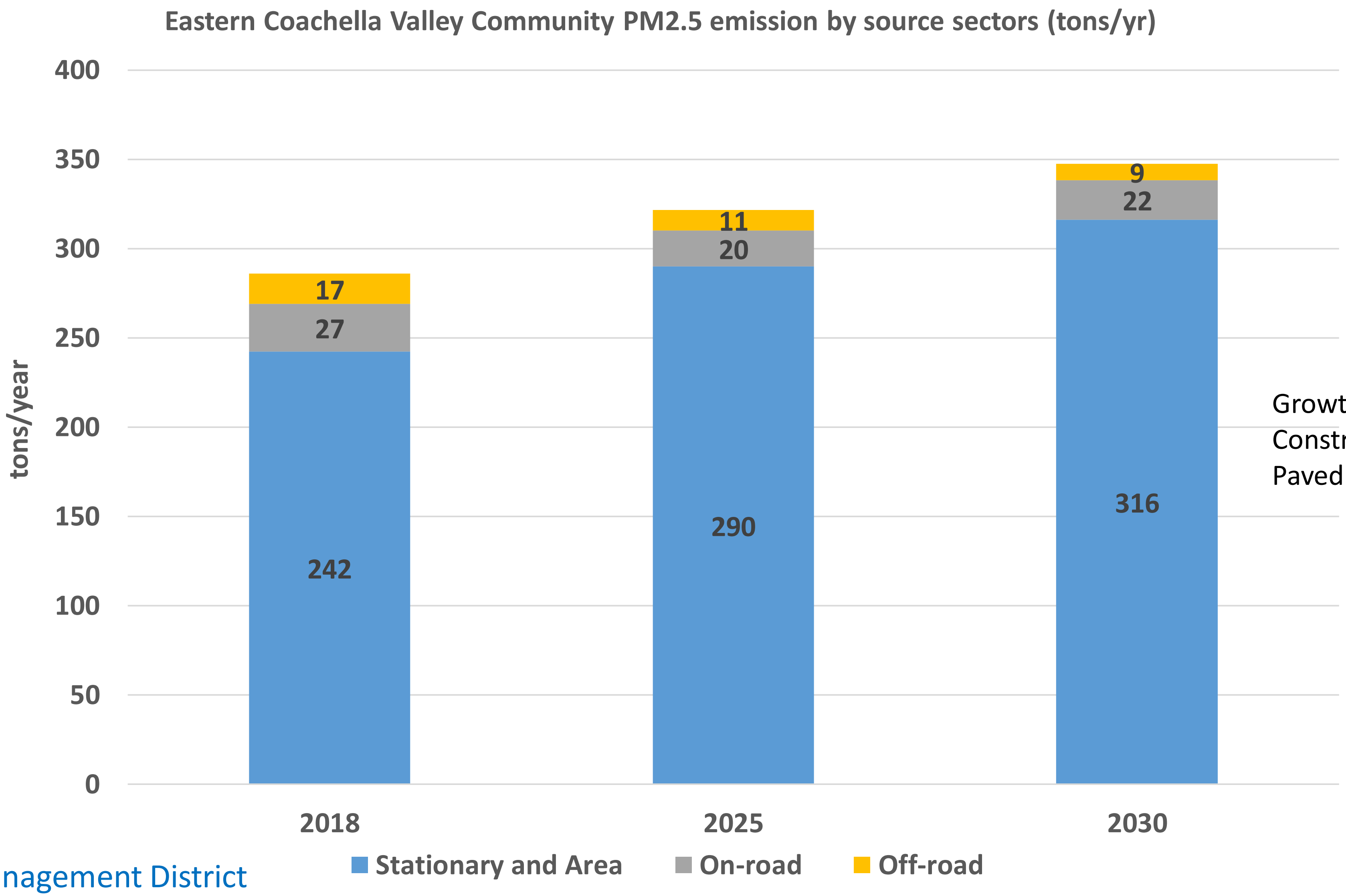
PM2.5 emission trend in Eastern Coachella Valley



Growth in PM2.5 driven by Construction and Demolition and Paved Road Dust

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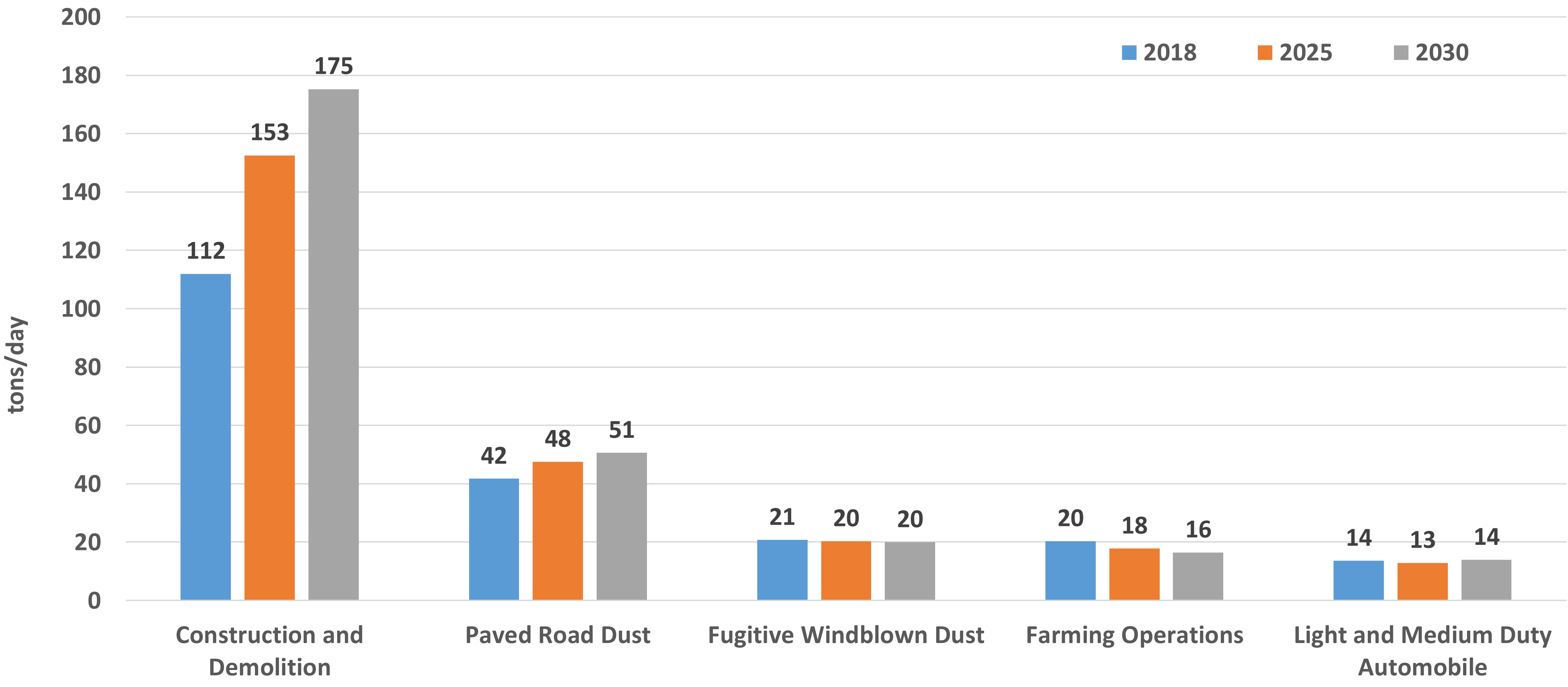
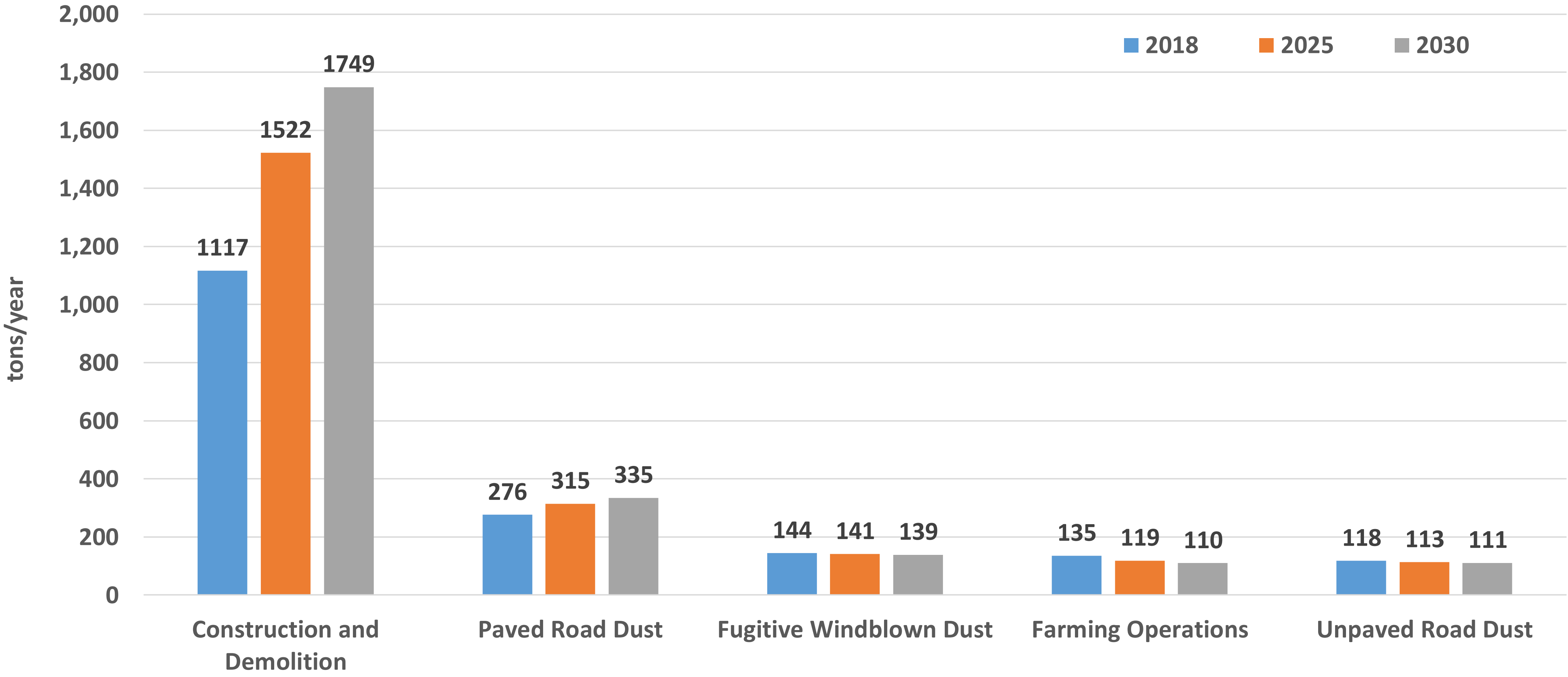
Top 5 Sources of PM2.5 in Eastern Coachella Valley



Top 5 Sources of PM10 in Eastern Coachella Valley



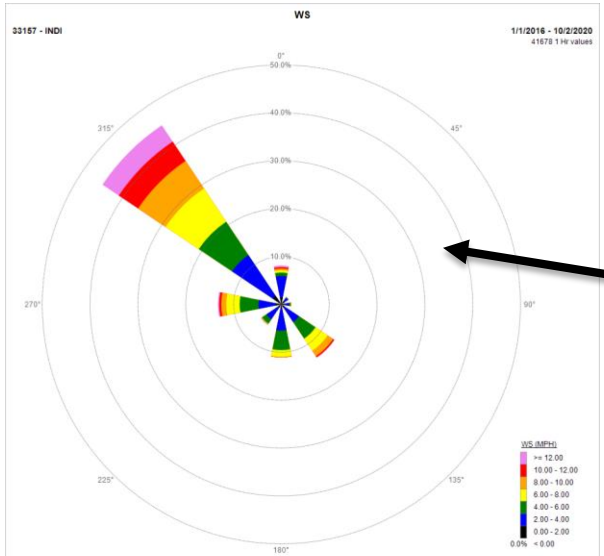
Unaccounted Sources of PM Emissions

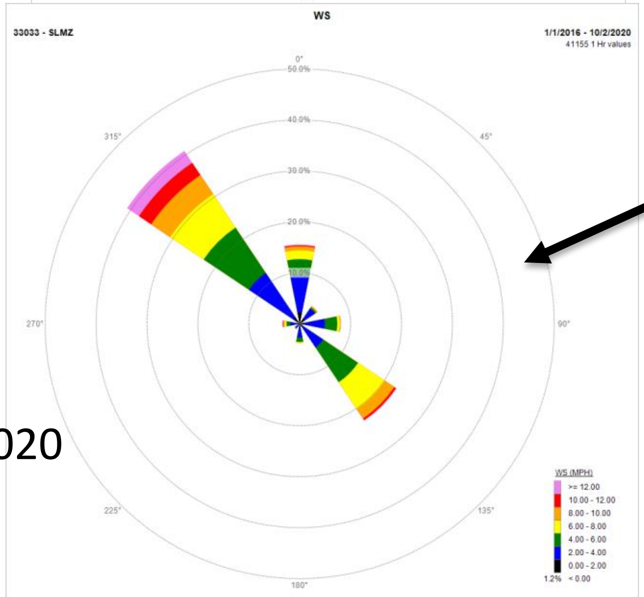
- There are several sources not included in the inventory:
  - Unpermitted/Illegal burning
  - Wildfire emissions
  - Windblown dust
  - Natural emissions
    - For example, dust from the Salton Sea playa

Prevailing Winds and Dust Sources in ECV

Percentage of Total Salton Sea Playa Emissions

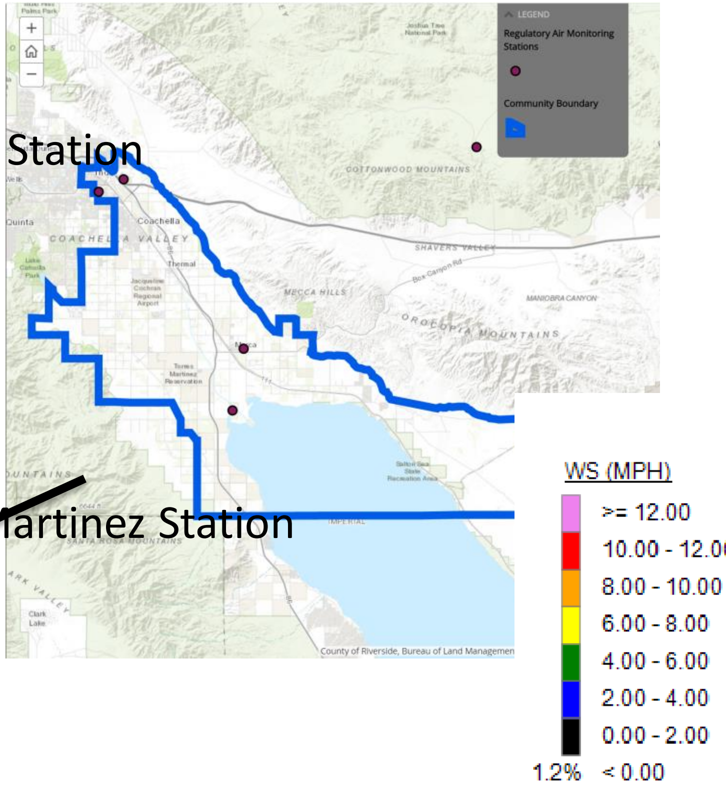
Source: Imperial Irrigation District Salton Sea Air Quality Mitigation Program
https://saltonseaprogram.com/aqm/emissions-estimate.php





Indio Station

Saul Martinez Station



Wind Rose, data from 01/2016 to 10/2020

The strongest and most frequent hourly winds are northwesterly (desert area).

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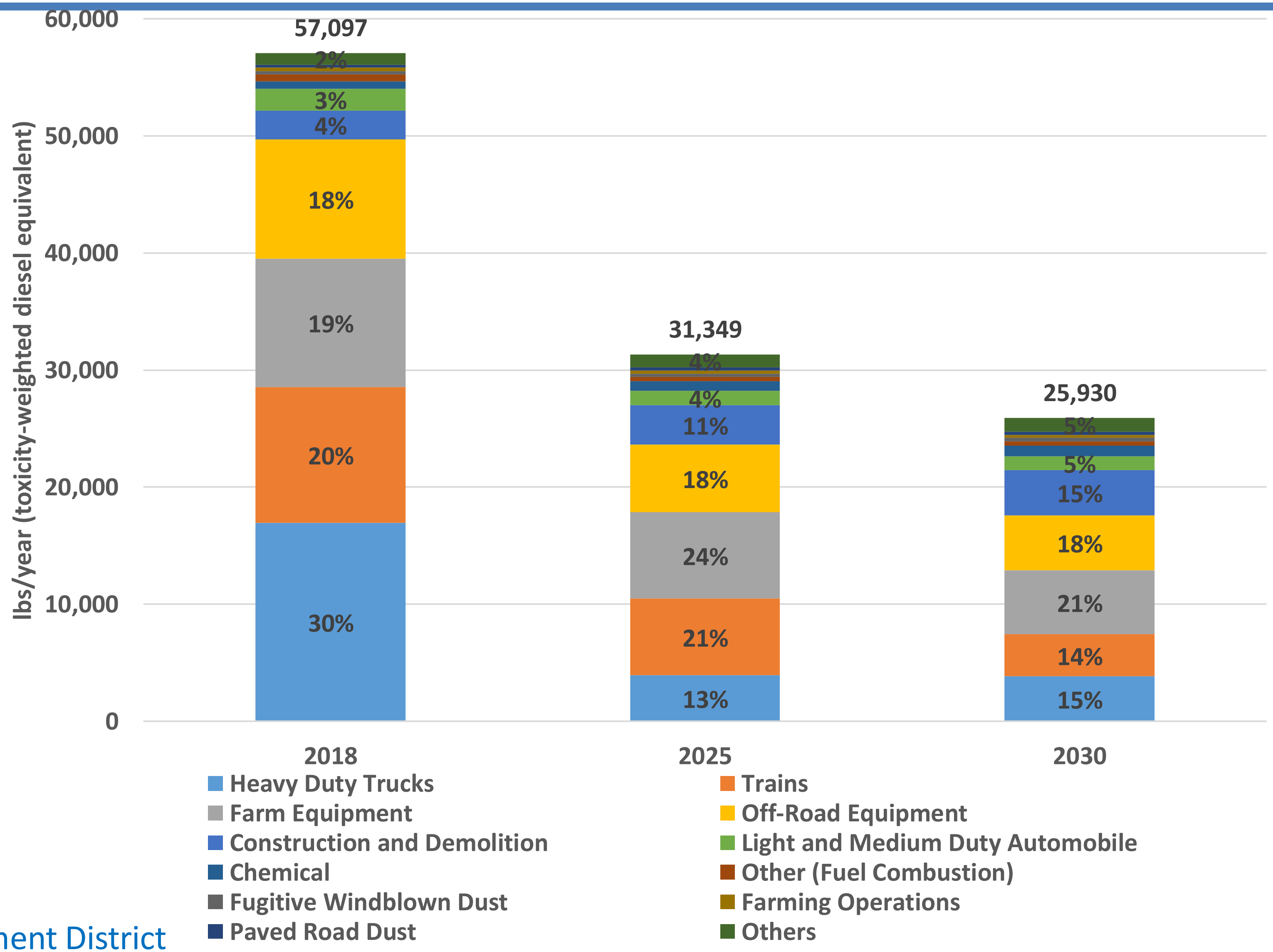
TACs in Eastern Coachella Valley



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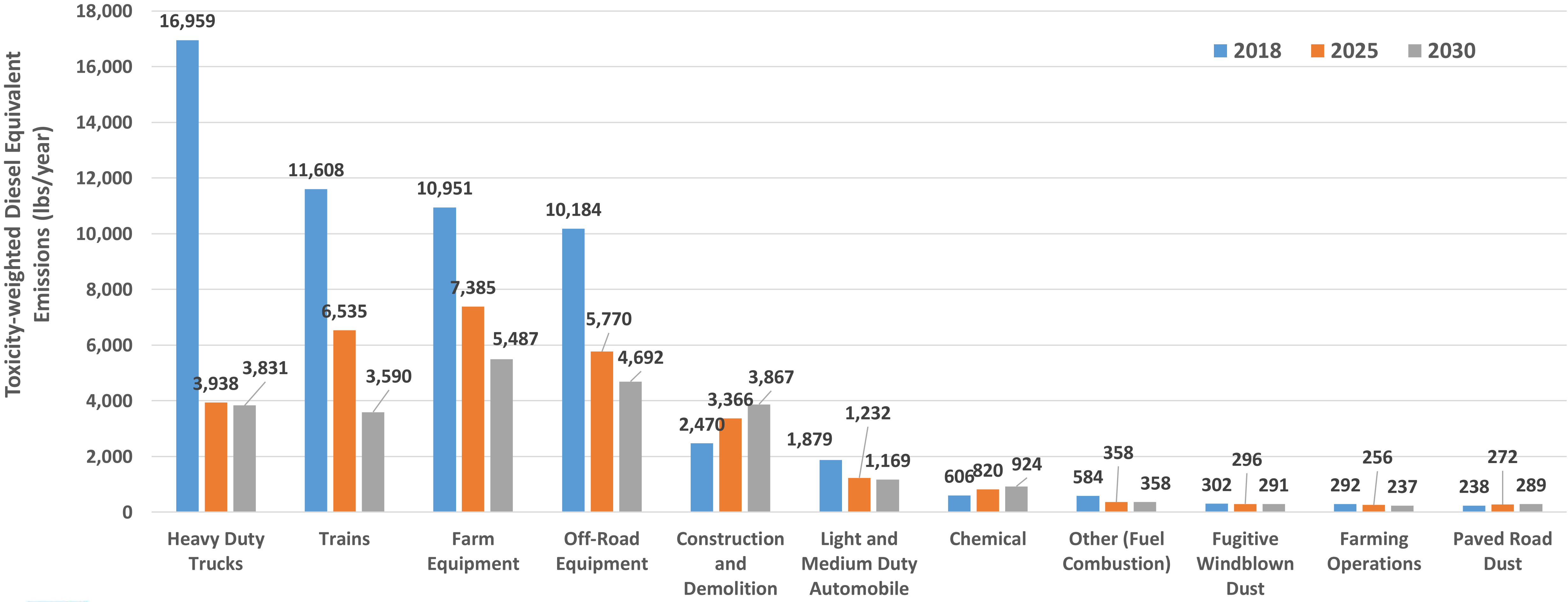
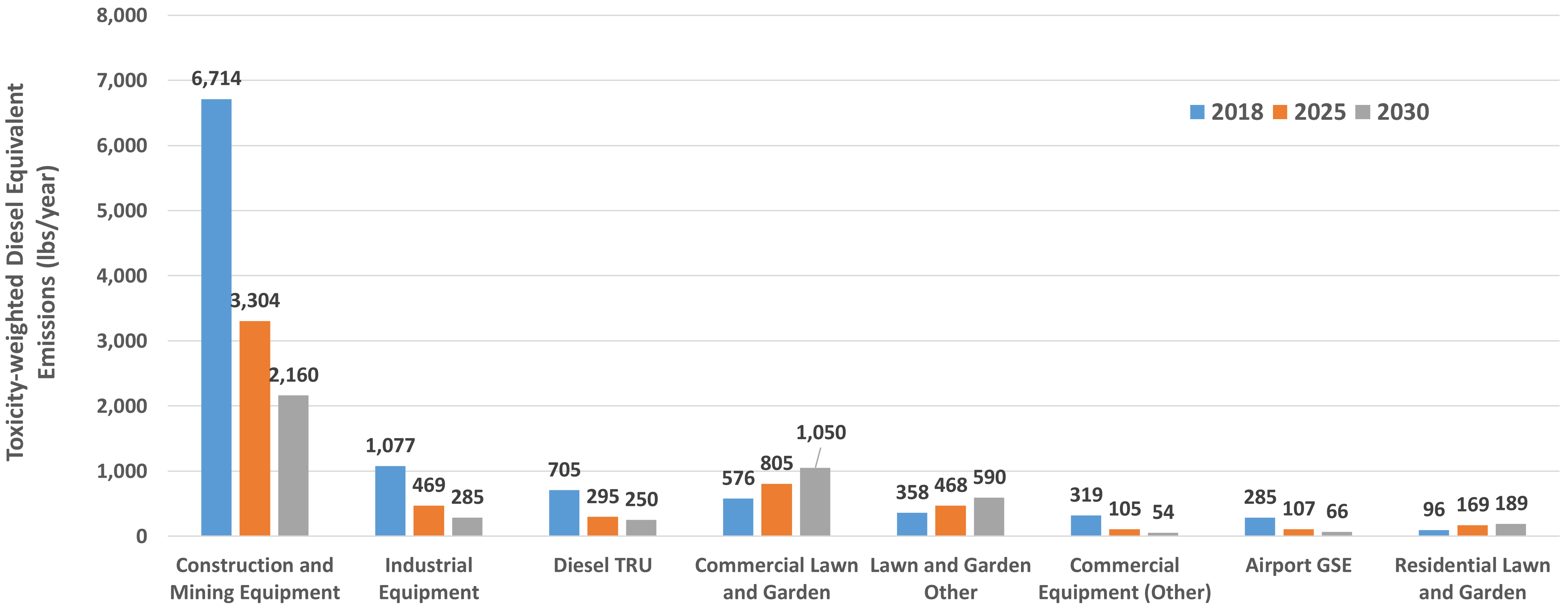
Top 10 Sources of TACs in Eastern Coachella Valley



Categories included in Off-Road Equipment in ECV



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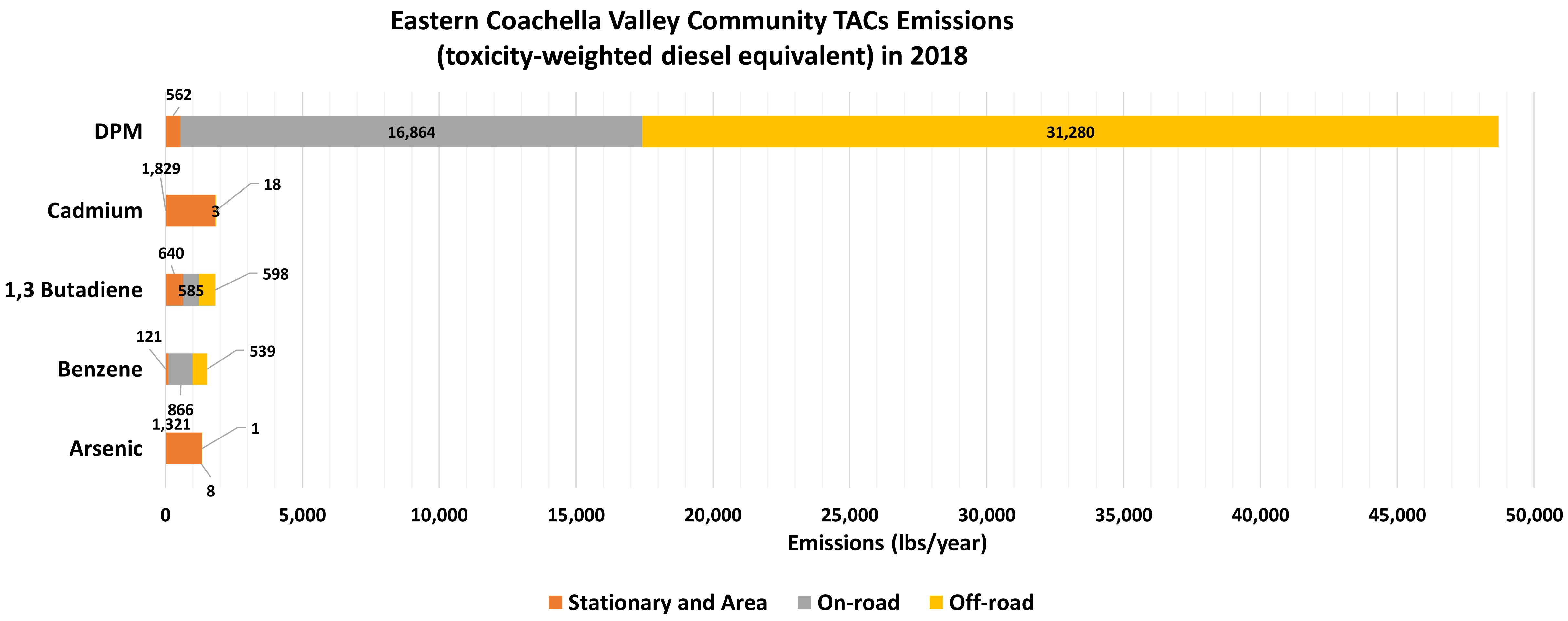
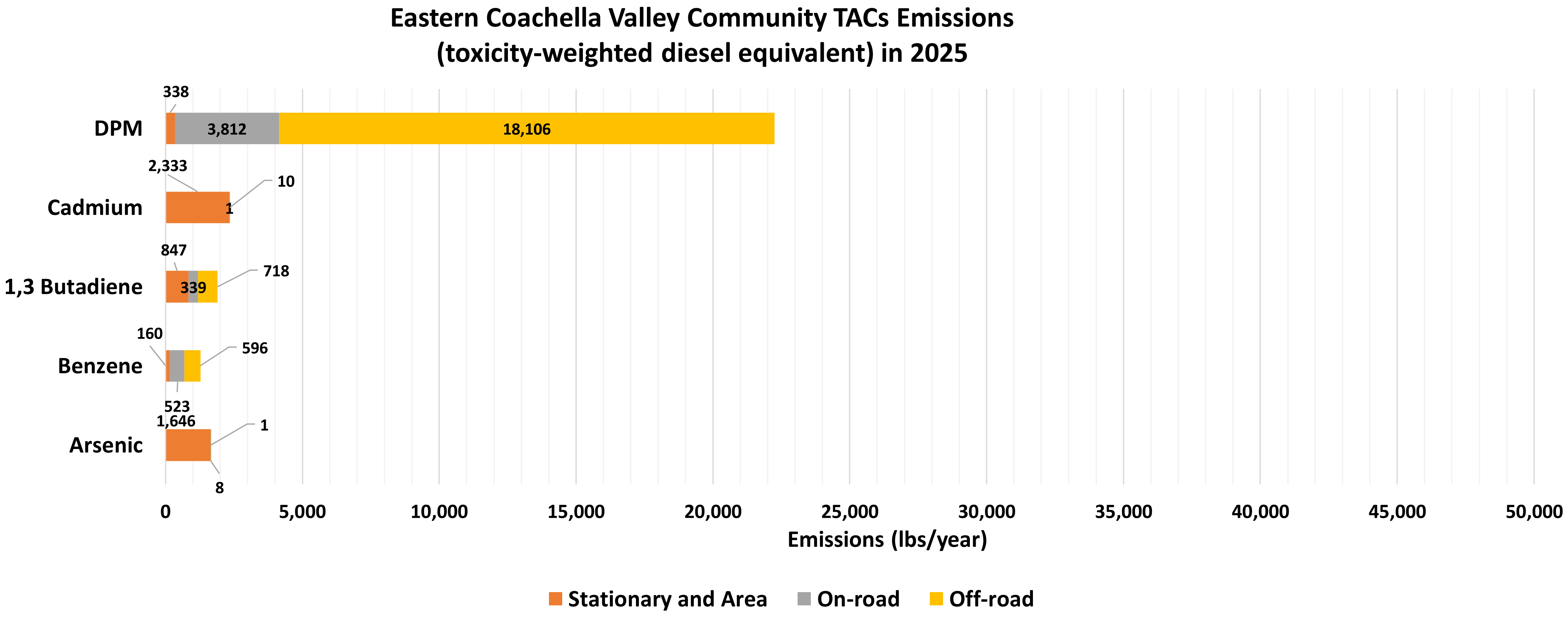
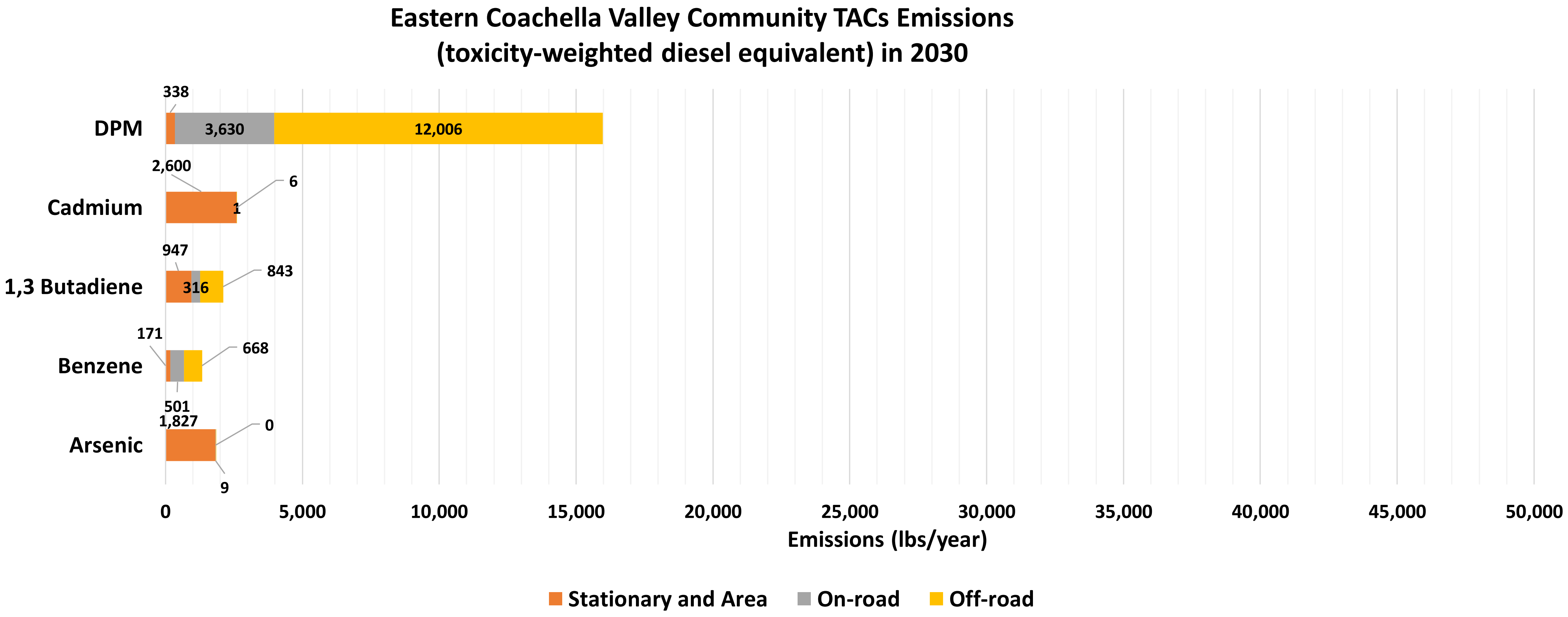
Top 5 TACs in Eastern Coachella Valley: 2018



Top 5 TACs in Eastern Coachella Valley: 2025



Top 5 TACs in Eastern Coachella Valley: 2030



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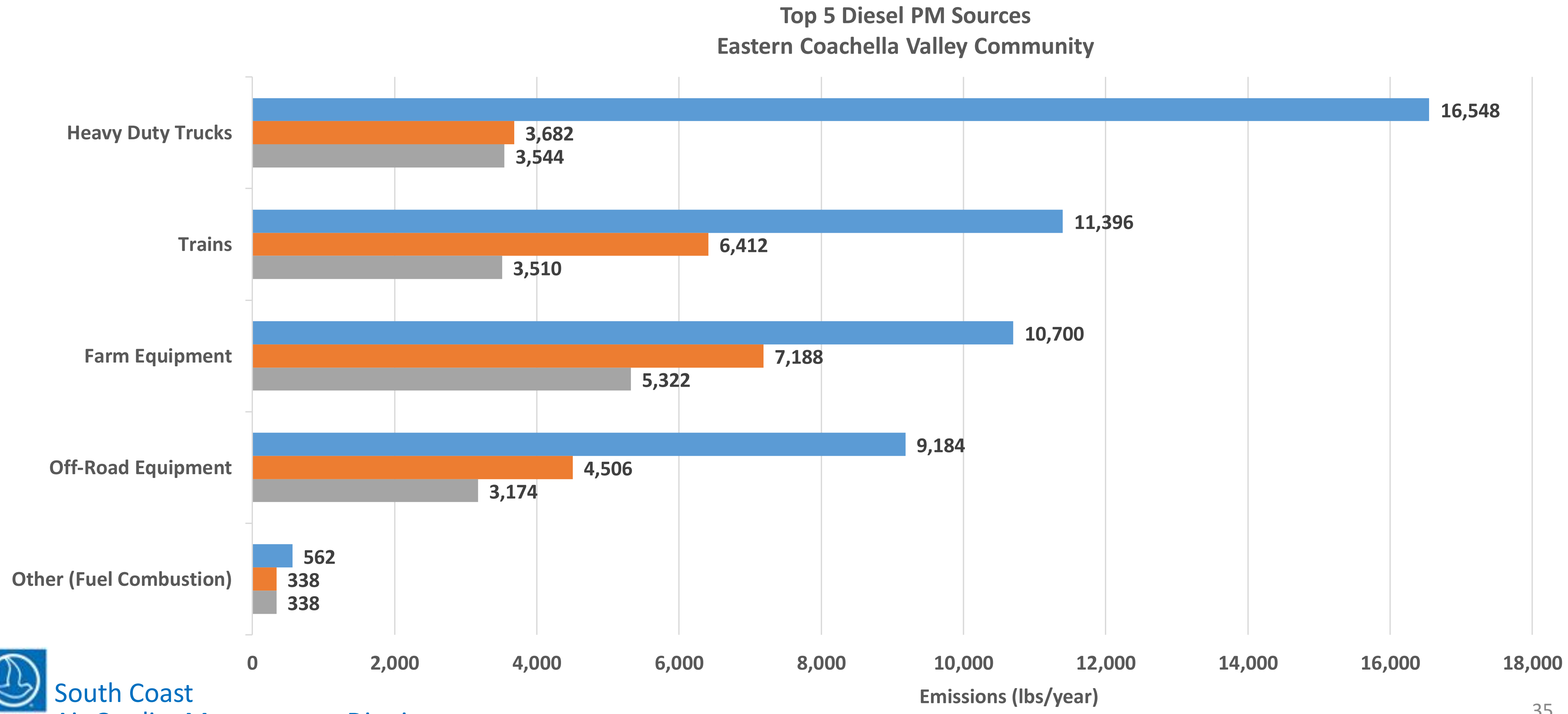
Top 5 Diesel PM Sources in Eastern Coachella Valley



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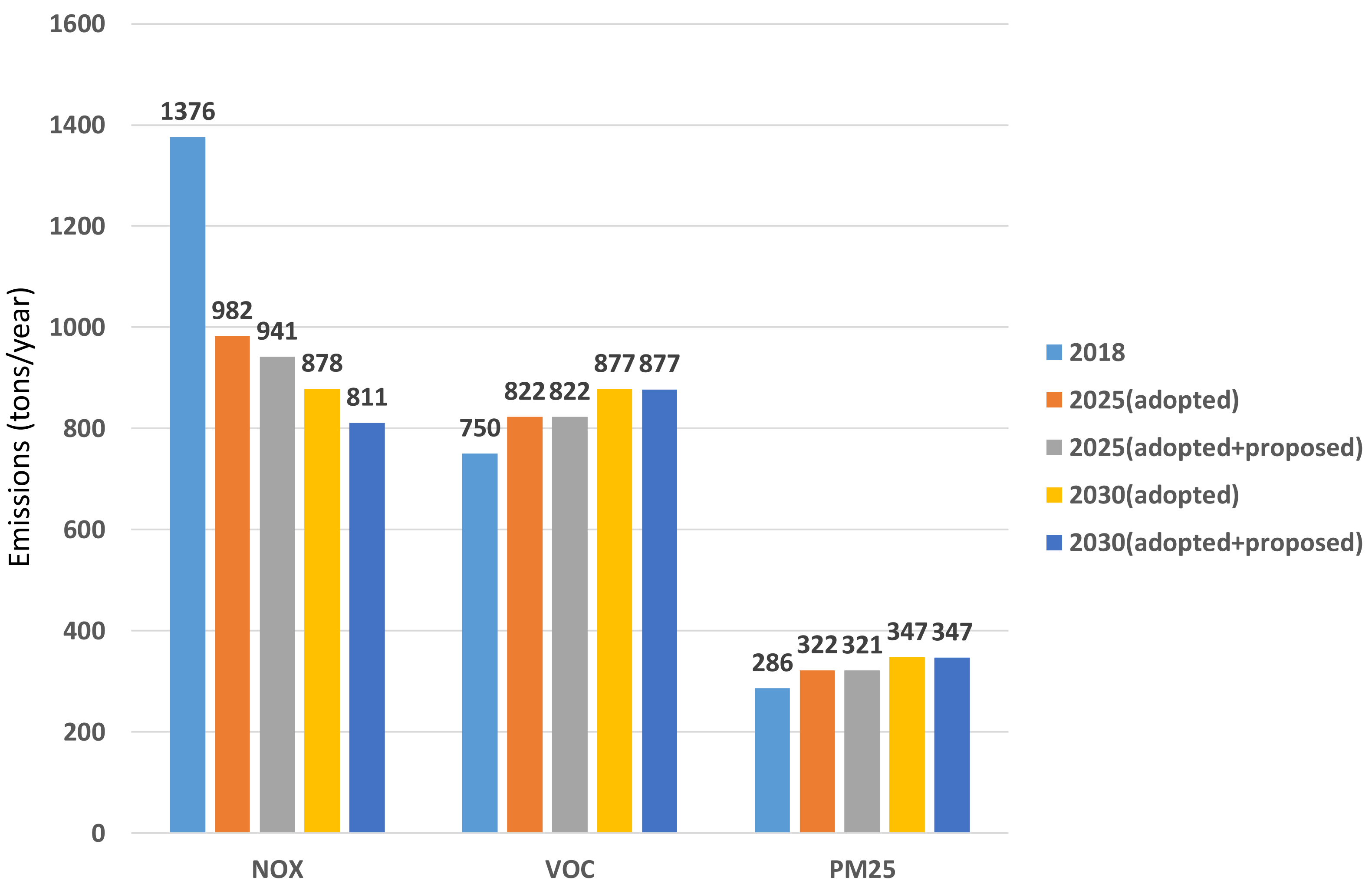

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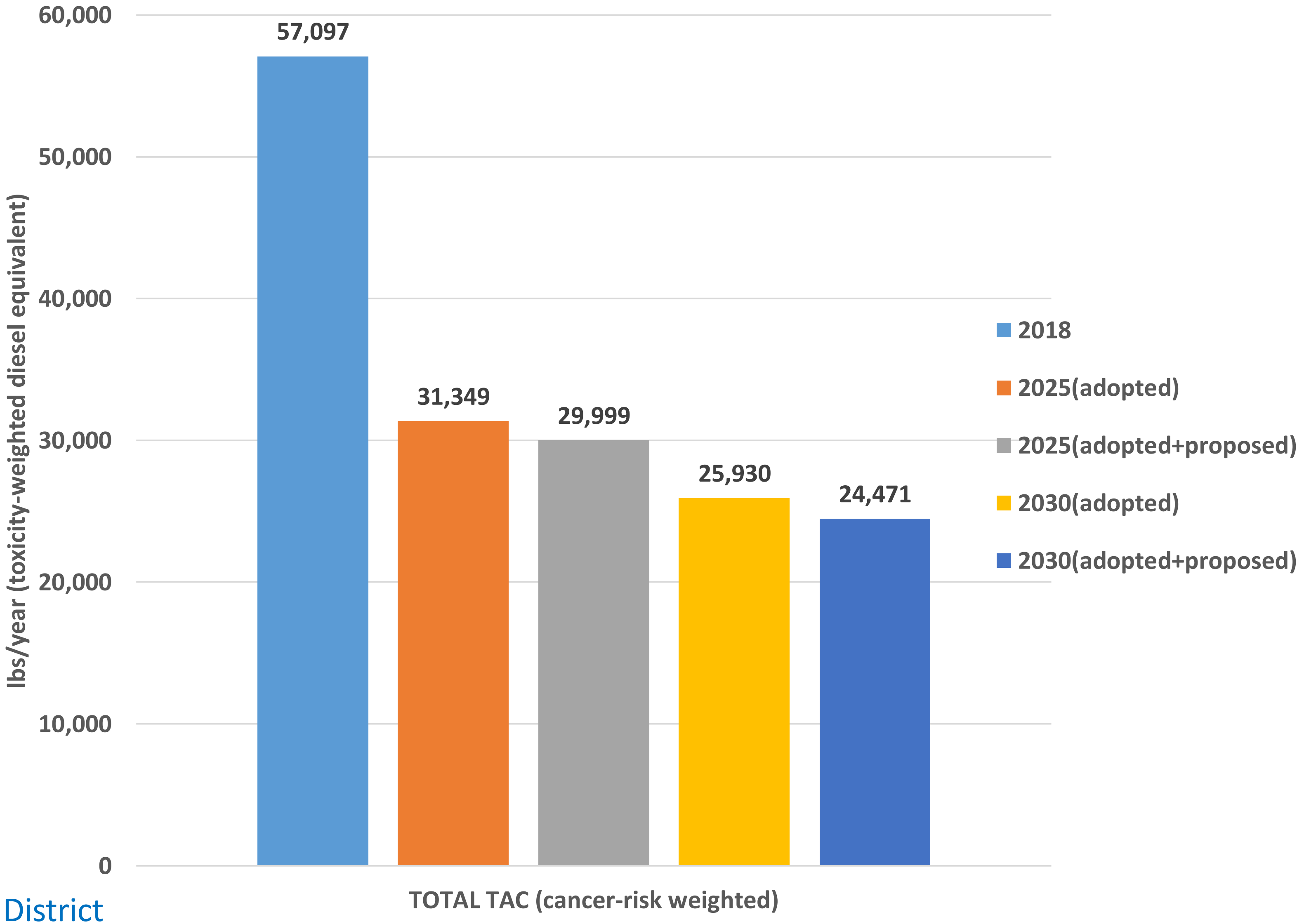
Effect of Proposed Regulations on TAC Emissions in ECV



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Summary for ECV

- Total toxicity-weighted TACs emissions are expected to decline in future years
- Heavy-duty trucks is the largest source of TAC emissions in the base year, and farm equipment becomes the largest source of TAC emissions in future years
- Diesel PM is the largest contributor to TAC emissions
- Diesel PM declines substantially in future years, but it remains the largest contributor to toxic emissions in the future

Limitations and Uncertainties

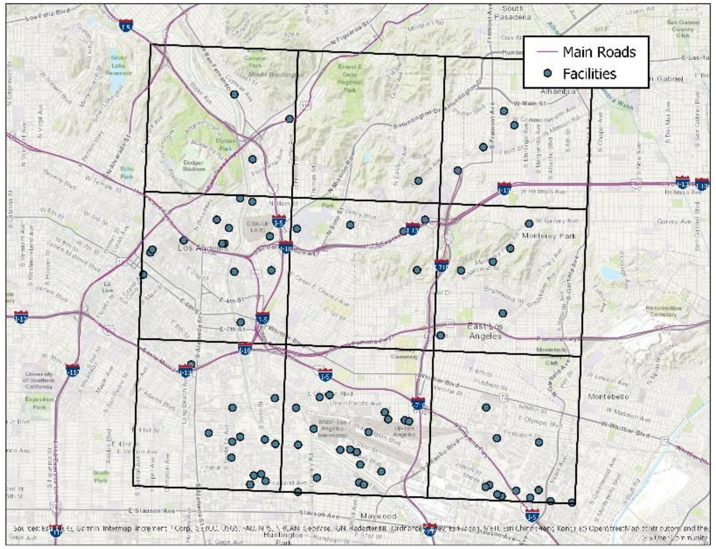
- Emissions inventory does not account for transport
  - Additional source attribution techniques will be used in the future (e.g. MATES V, community monitoring)
- Grid resolution impacts the accuracy of data within a community
- Area and off-road categories rely on generic spatial surrogates to assign emissions at a specific location. This allocation might not reflect the precise locations of these emissions within a community
- Uncertainties in chemical speciation profiles used in VOC, PM and air toxics

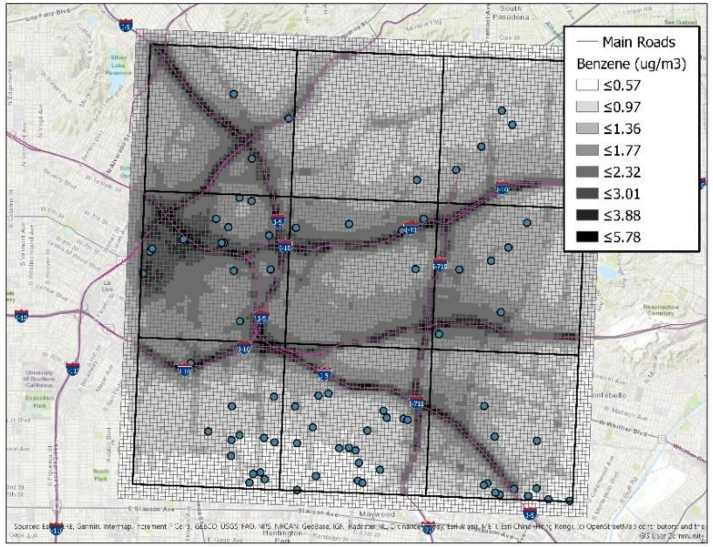
Updates to Emissions Inventory and Air Quality Modeling

- Available datasets:
  - MATES IV (2012-2013)
  - 2016 AQMP
  - 2020 SIP revisions
  - AB617 2018-designated and 2019-designated community inventories
- Upcoming updates
  - MATES V expected availability in 2021
  - 2022 AQMP, with major revisions in emissions and modeling methodologies

Neighborhood Scale Modeling

- Goals:
  - Develop modeling tools to estimate exposure at neighborhood scale
    - Hybrid approach using regional air quality models and high-resolution dispersion models
  - Identify contribution of regional transport, area and off-road mobile sources
  - Potential use in identifying hot spots
  - Analysis and integration of community monitoring data
- Ongoing work:
  - Developing the modeling capabilities
  - Modeling 5 major TACs from on-road sources, large facilities
  - Considering large emitters such as railyards
- Preliminary results expected in 2021





Overall Summary

- On-road and off-road sources dominate air pollutant and toxic air contaminant emissions in both Year 2 communities
- Diesel PM is the dominant TAC in the two communities
- On-road Diesel PM is expected to decline significantly, but overall, Diesel PM continues to be the most prevalent TAC in the future
  - Off-road equipment is projected to become the largest emitter in SELA by 2025 and beyond
  - Farm equipment is projected to become the largest emitter in ECV by 2025 and beyond

Questions

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