

North American Marine Environmental Protection Association 2019

Community Impacts

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February 28, 2019

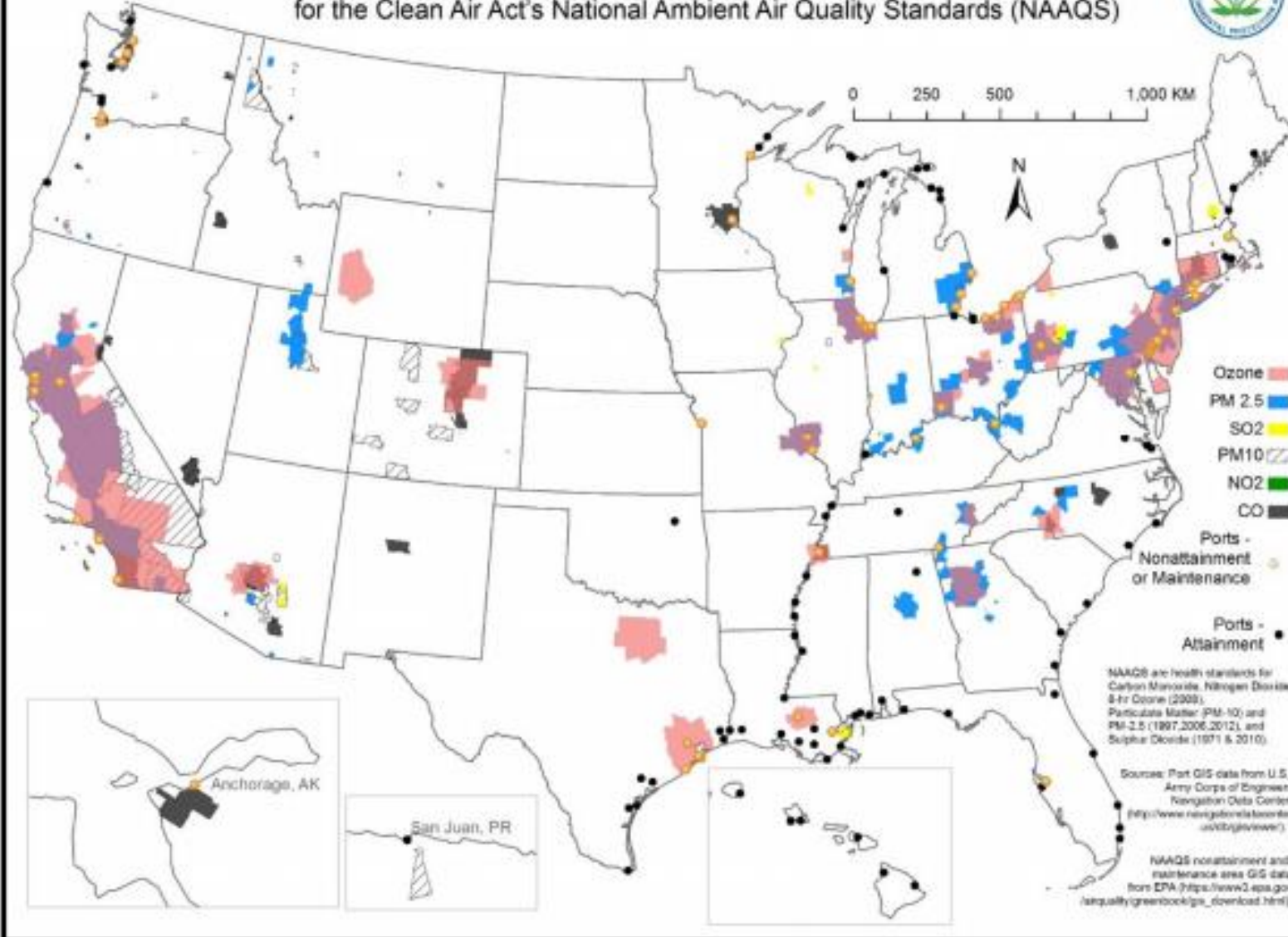


Environmental Defense Fund's mission is to preserve the natural systems on which all life depends. **EDF links science, economics, law and innovative private-sector partnerships.**

Engagement
with Ports

- Port of Charleston
- Georgia Ports Authority
- Virginia Ports Authority
- Port Houston
- Northwest Seaport Alliance
- Port of Oakland
- Prince Rupert Port Authority
- Port Freeport
- Port of New York/New Jersey
- Port of Baltimore
- Port of Los Angeles
- Port of Long Beach
- Port of Jacksonville
- Port of New Orleans

Ports in Areas Designated Nonattainment or Maintenance for the Clean Air Act's National Ambient Air Quality Standards (NAAQS)

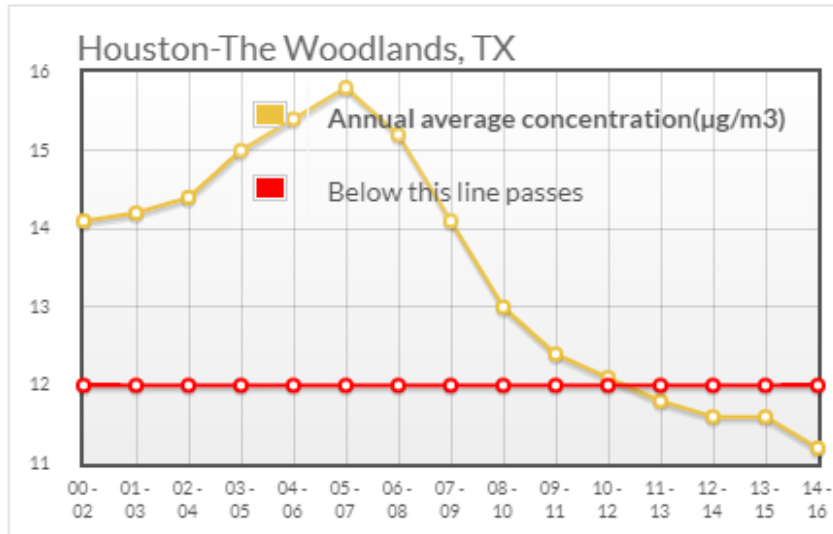


Houston Among Most Polluted US Metropolitan Areas in 2018

- Rank 11th for high ozone days
- Rank 15th for annual particle pollution
- Rank 56th for 24-hr particle pollution

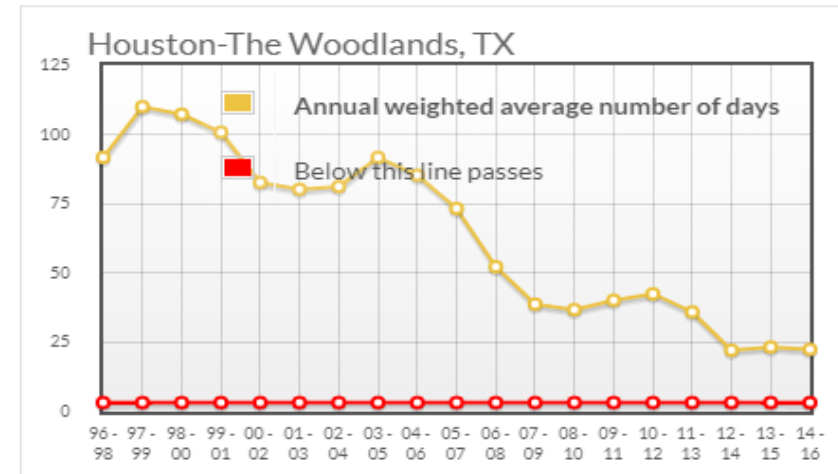
Annual Particle Pollution

Change since 2000: $-2.9 \mu\text{g}/\text{m}^3$



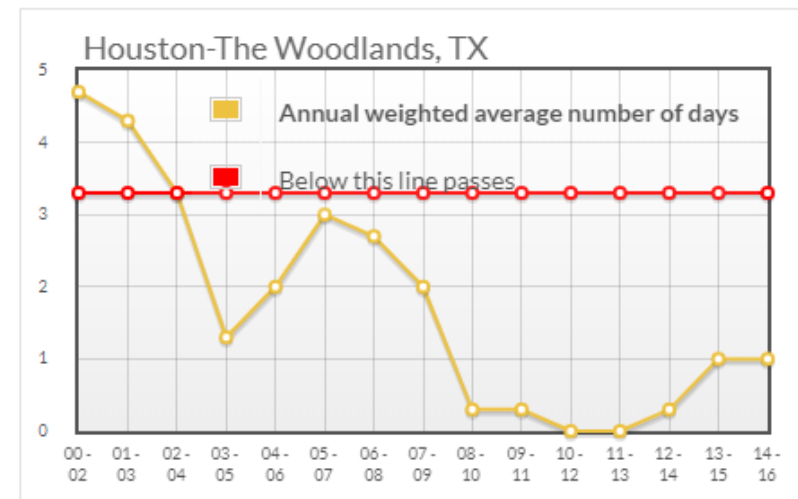
High Ozone Days

Change since 1996: 69.2 fewer days this year



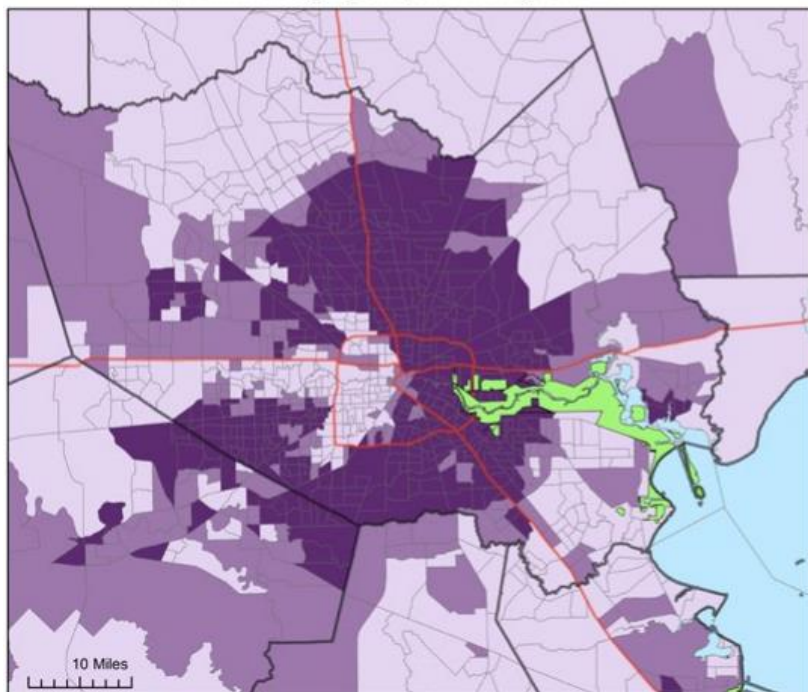
24 hr Particle Pollution

Change since 2000: 3.7 fewer days this year

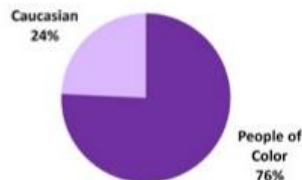


Port of Houston and People of Color Population by Census Tract

2010 Demographic Profile 1 - Shapefile Format
<https://www.census.gov/geo/maps-data/data/tiger-data.html>

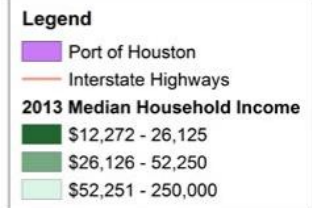
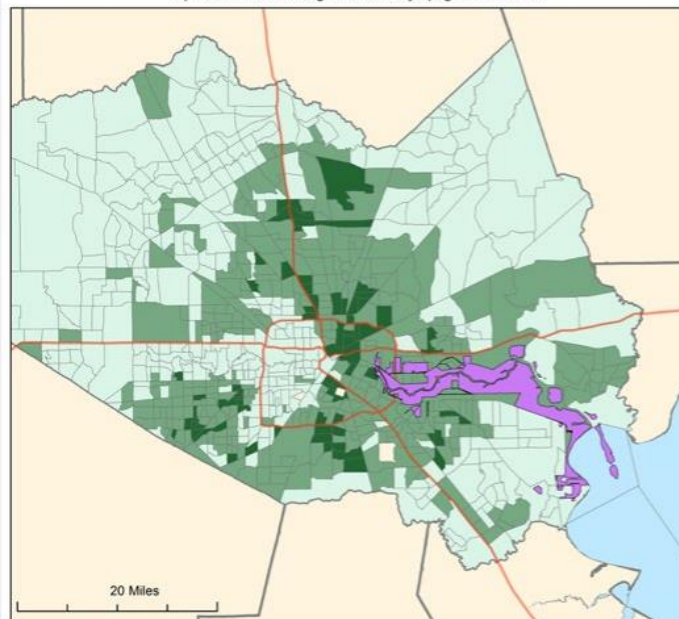


Population Within 2 Miles of the Port of Houston

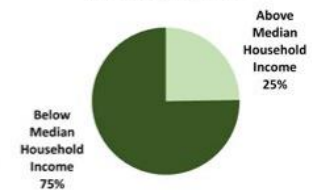


Port of Houston and 2013 Median Household Income by Census Tract

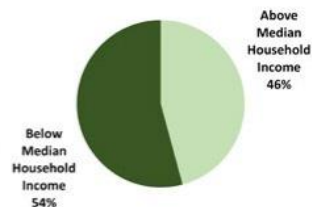
Table B19013: Median Household Income in the past 12 Months (2013 inflation-adjusted dollars)
 2009-2013 American Community Survey 5-Year Estimates
 \$52,250 is the 2013 U.S. Median Household Income
<http://factfinder.census.gov/faces/nav/jsf/pages/index.xhtml>



Census Tracts Within 2 Miles of the Port of Houston



Census Tracts in Harris County

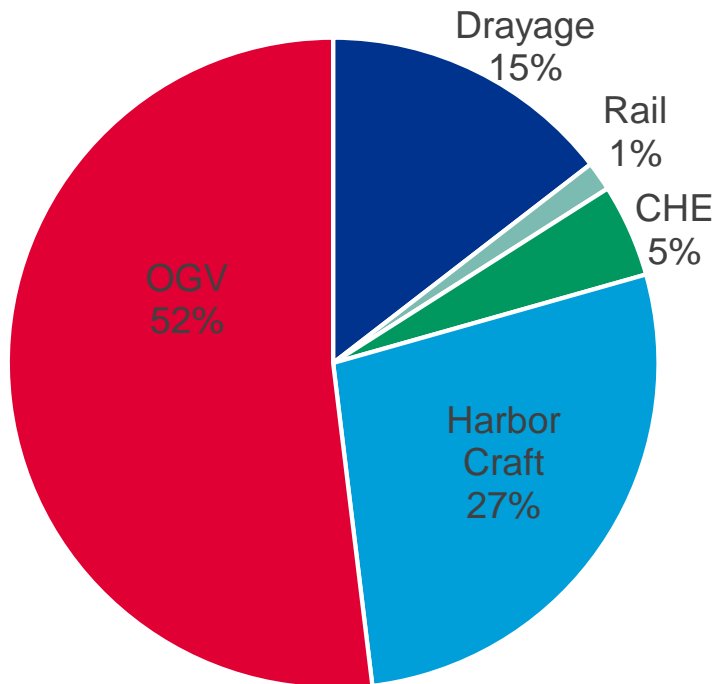


Health Implications of Diesel Engines

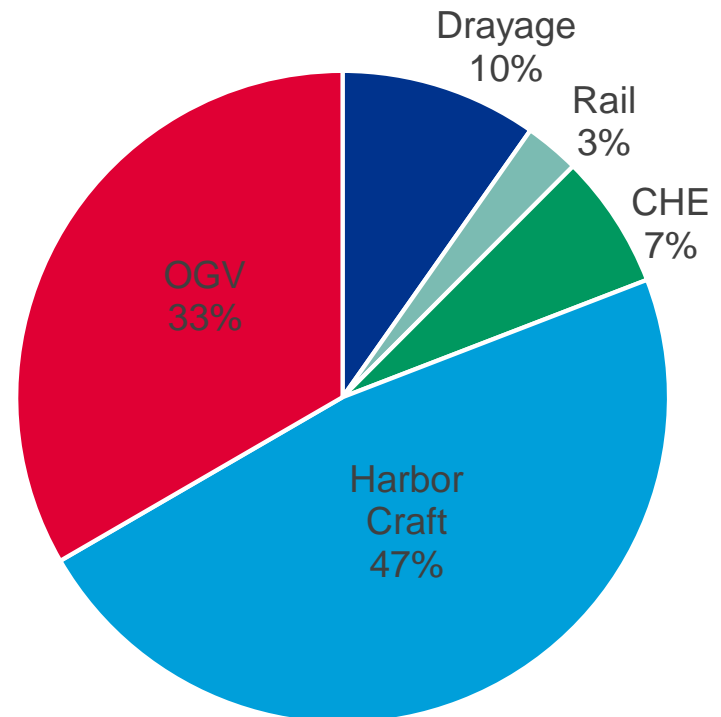
Exposure to:	Potential Health Effects
Particulate Matter	<ul style="list-style-type: none">• Respiratory illness and asthma• Cardiovascular disease• Heart attacks• Strokes• Premature death• Birth defects, low birth weights and premature birth• Cancer
Oxides of Nitrogen	<ul style="list-style-type: none">• Inflammation of the airways• Exacerbation of allergies• Asthma
Ozone (smog)	<ul style="list-style-type: none">• Decreased lung function• Respiratory illness and asthma• Premature death• Chronic respiratory illnesses (e.g., emphysema and bronchitis)

Marine Vessels A Primary Source of Port Emissions

PM2.5 2011 Emissions



NOx 2011 Emissions



Commercial Marine Vessel Emissions in the Houston Ship Channel, 2015

Pollutant	2015 Emissions (Tons)
CH ₄	11
CO	5,212
CO ₂	1,762,848
N ₂ O	83
NH ₃	6
NO _x	39,295
PM ₁₀	1,543
PM _{2.5}	1,431
SO ₂	2,056
VOC	1,385

Ship Emissions (tons) by Operating Mode in the Houston Ship Channel, 2015

Pollutant	Cruising	Hoteling	Maneuvering	Total
CO	1,933	2,268	1,011	5,212
CO2	704,060	735,025	323,763	1,762,848
NOX	14,871	18,582	5,842	39,295
PM10	462	877	205	1,543
PM2.5	434	806	192	1,431
SO2	278	1,662	117	2,056
VOC	494	628	263	1,385

Promising Solutions

Strategies		Example Potential
Reduce emissions	<ol style="list-style-type: none"> 1. Engine 2. Evaporative 3. Cleaner combustion (fuels) 	<ol style="list-style-type: none"> 1. Harborcraft: 10-40% ↓ PM & NOx 2. Empty Barge Movements/VOCs 3. ULSD in OGVs: 15-17% ↓ PM, LNG in OGVs: 1-15% ↓ PM, NOx & CO2
Reduce hoteling emissions	<ol style="list-style-type: none"> 1. OGV shorepower 2. OGV stack bonnet 3. Tug shorepower 	<ol style="list-style-type: none"> 1. Frequent callers: 60-90% ↓ CO2*, PM & NOx 2. Barge AMECS: 90-95% ↓ PM & NOx 3. IT&B Tugs: 0.1 tons/yr PM, 2.8 tons/yr NOx, 498 tons/yr CO2
Reduce transit emissions	<ol style="list-style-type: none"> 1. Unproductive transits 2. Vessel speed reduction 	<ol style="list-style-type: none"> 1. Houston Ship Channel: ↓ 2,000 tons NOx 2. Cruise to >12kts: >50% ↓ PM, NOx & CO2
Efficiencies & Incentives	<ol style="list-style-type: none"> 1. Shoreside 2. Waterside 	<ol style="list-style-type: none"> 1. Improved Load/Unload: 7% ↓ PM, NOx & CO2 2. Clean Vessel Incentives: <i>attract cleanest ships?</i>
Upgrading or replacing old engines	<ol style="list-style-type: none"> 1. Tier 4 engines 	<ol style="list-style-type: none"> 1. Tugs: 91% ↓ NOx emissions



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