

Opportunities
for
Reducing Emissions
from
Border Drayage Trucks
in
the Paso del Norte Region

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Border Affairs

Overview

Paso Del Norte Air Basin

Border Drayage Operation

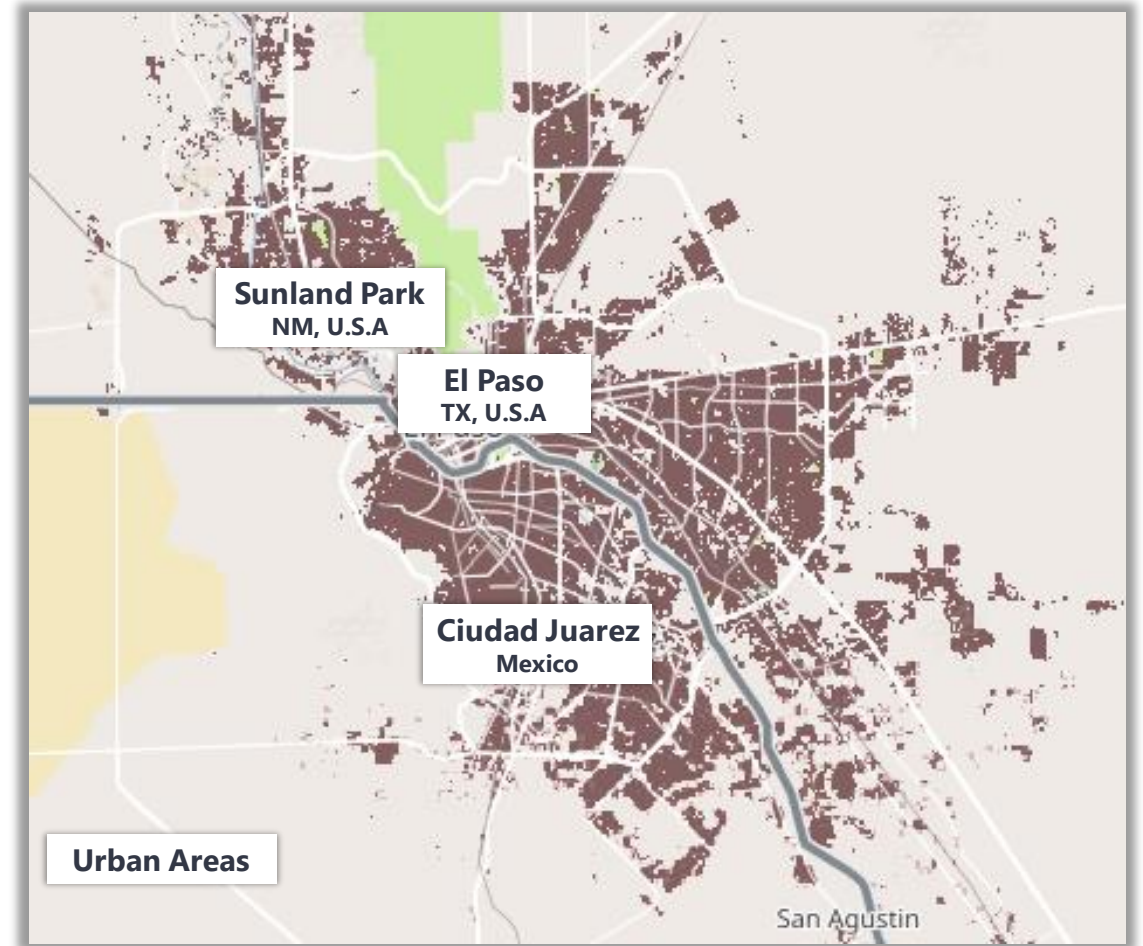
Emissions Impact of Border Drayage Trucks

Emission Reduction Strategies & Programs

Opportunities for Reducing Emissions

Paso Del Norte Region

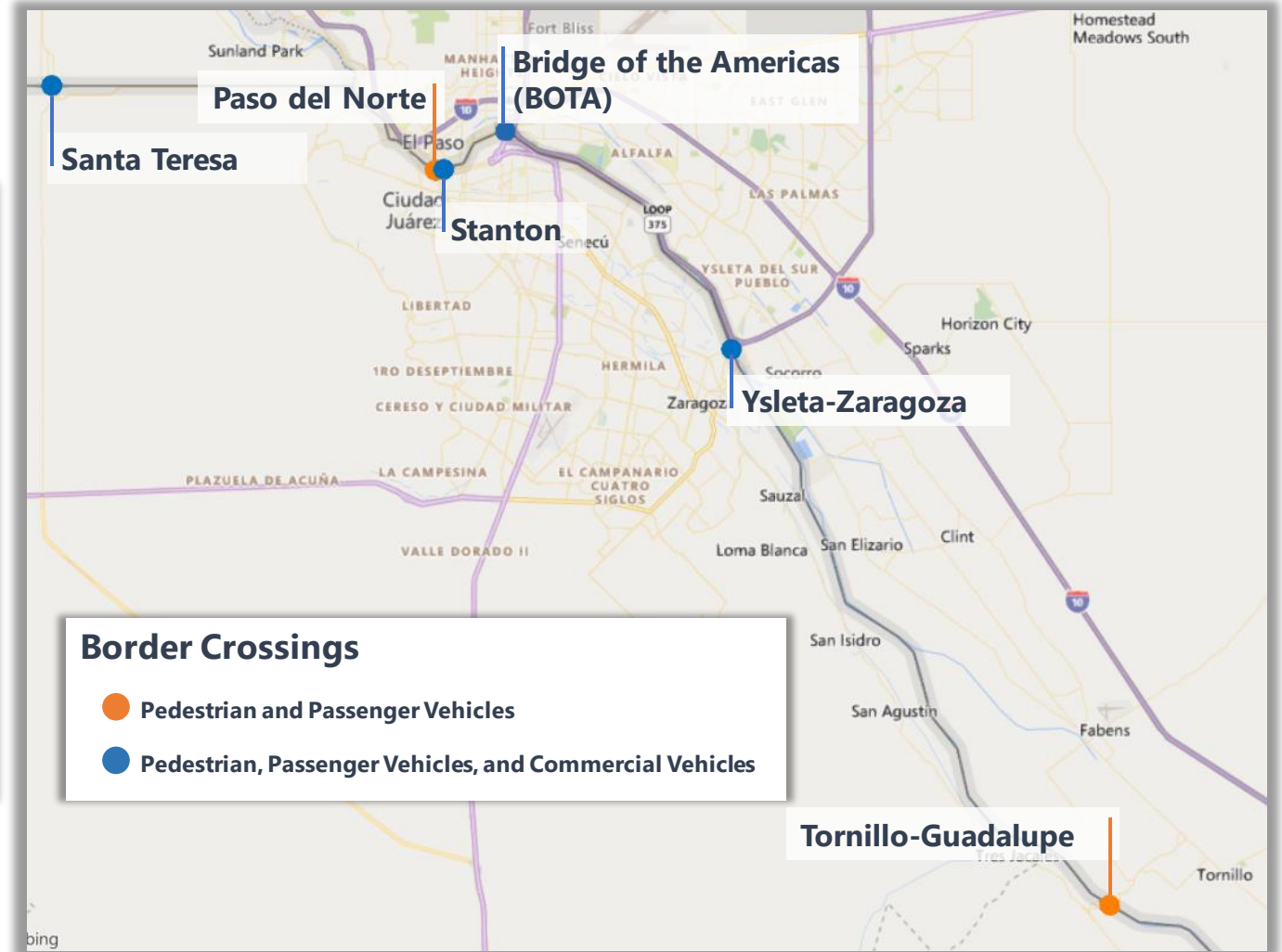
- **Texas, New Mexico, Chihuahua**
 - Multi-jurisdictional control
- **Population Over 2.5 Million**
- **Major Cities**
 - Cd. Juarez, Chihuahua
 - El Paso, TX
 - Las Cruces and Sunland Park, NM
- **6 International Border Crossings**



Border Crossings in Paso Del Norte

Commercial Crossings

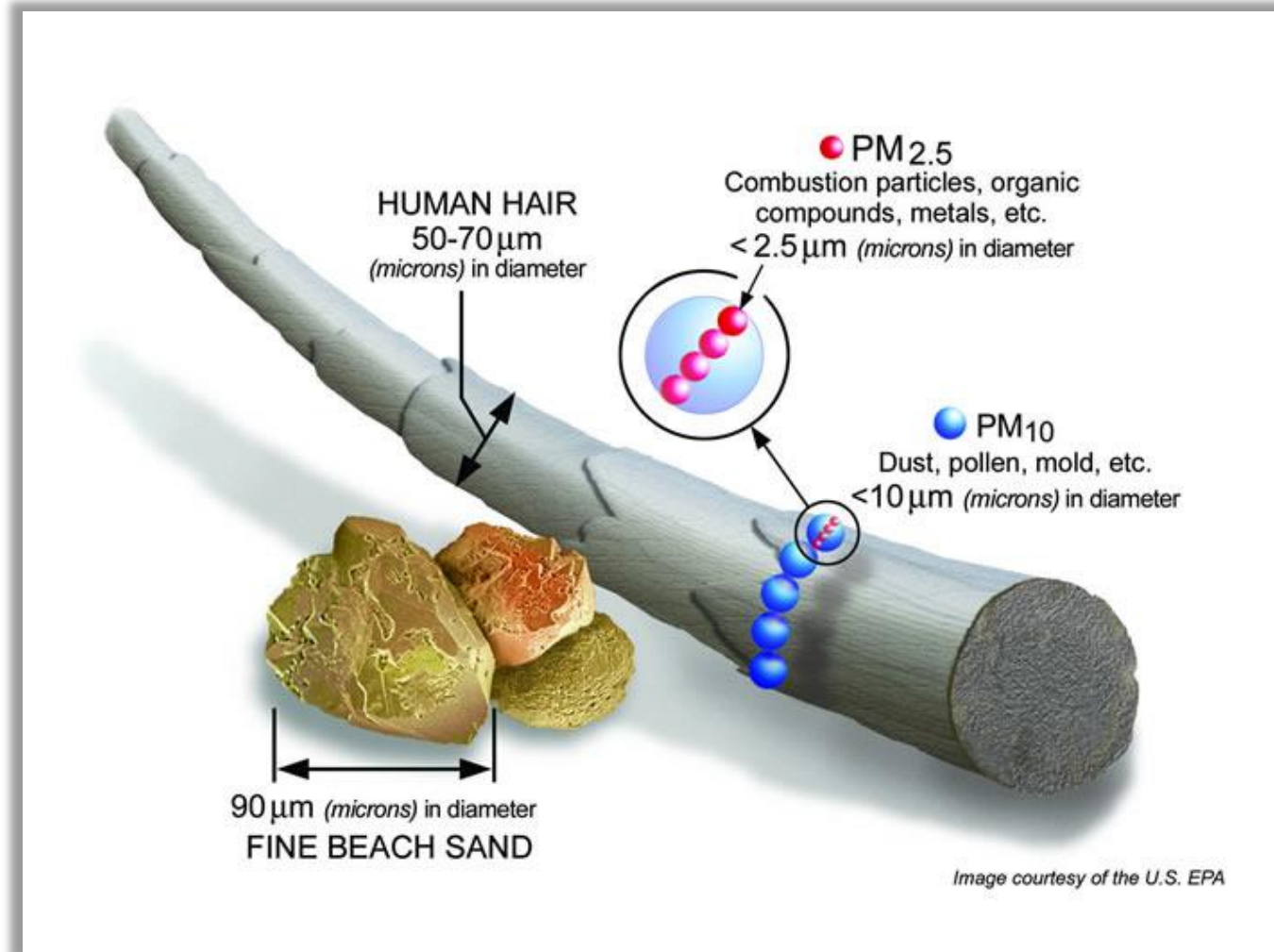
- Bridge of the Americas
- Ysleta-Zaragoza
- Santa Teresa
- Stanton



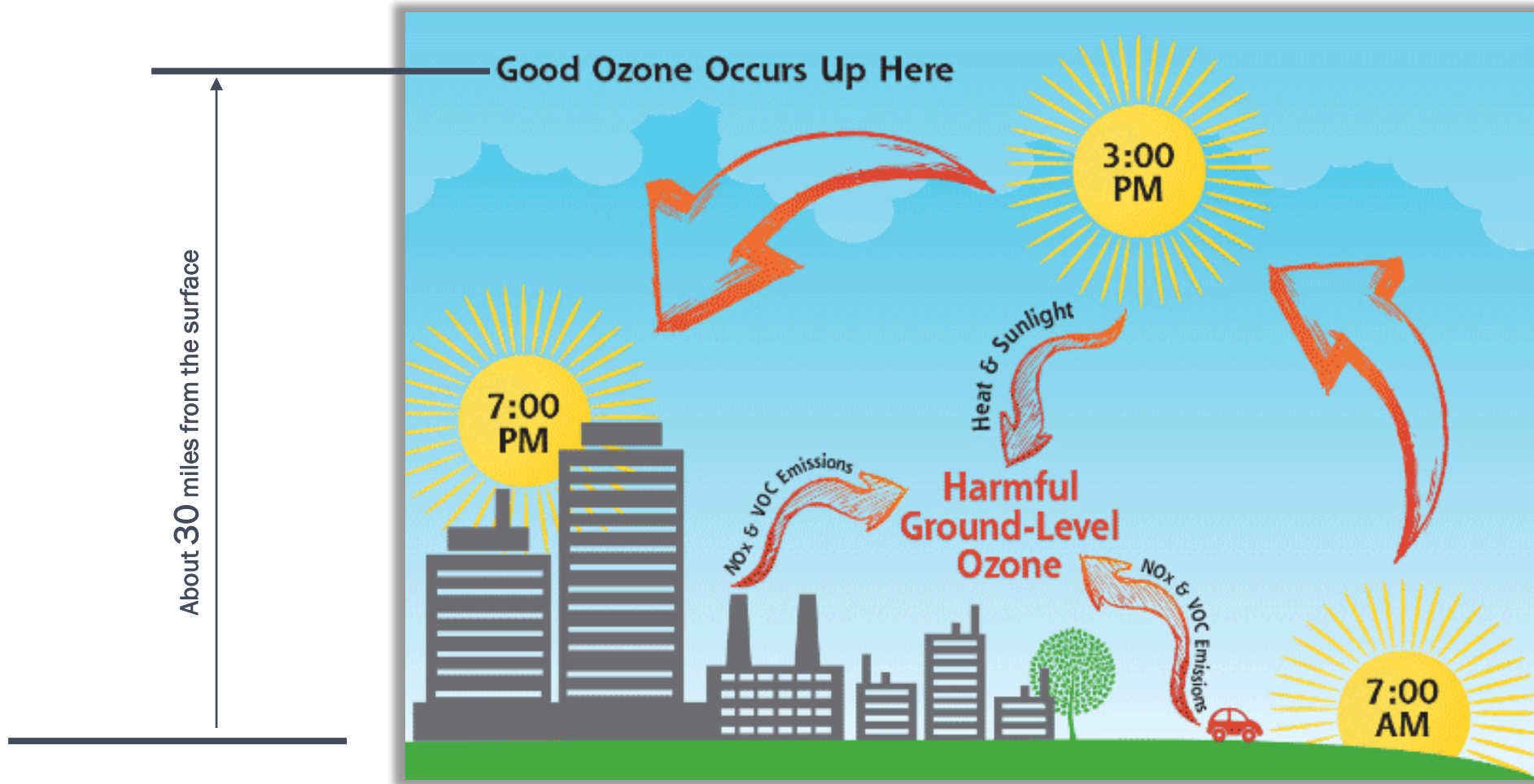
Paso Del Norte Air Basin

- **Shared Environment**
 - Air pollution moves in both directions – regardless of origin
 - Air pollution affects everyone in the region
- **Surrounded by Mountains**
 - Restricted movement of air
 - Pollutants trapped in the region
- **Air Pollution Risk**
 - Particulate Matter (PM)
 - Ground-level Ozone (O₃)

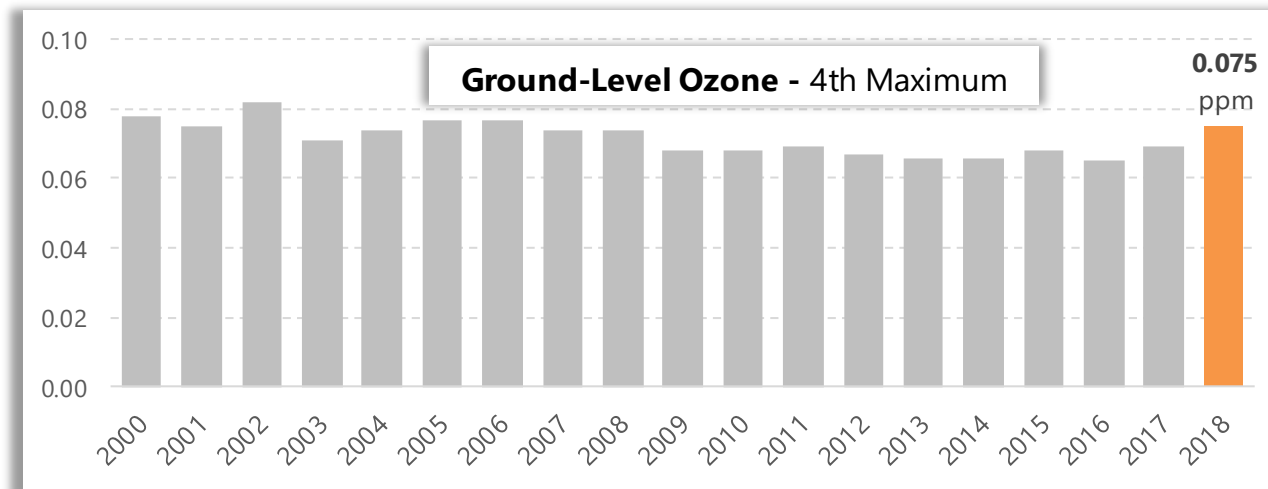
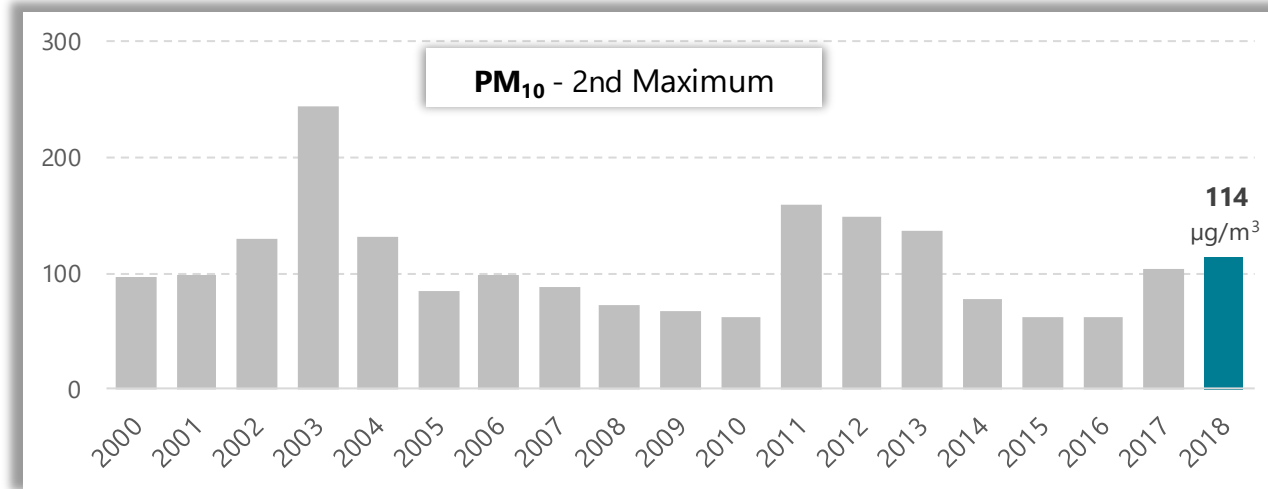
Particulate Matter (PM)



Ground-Level Ozone



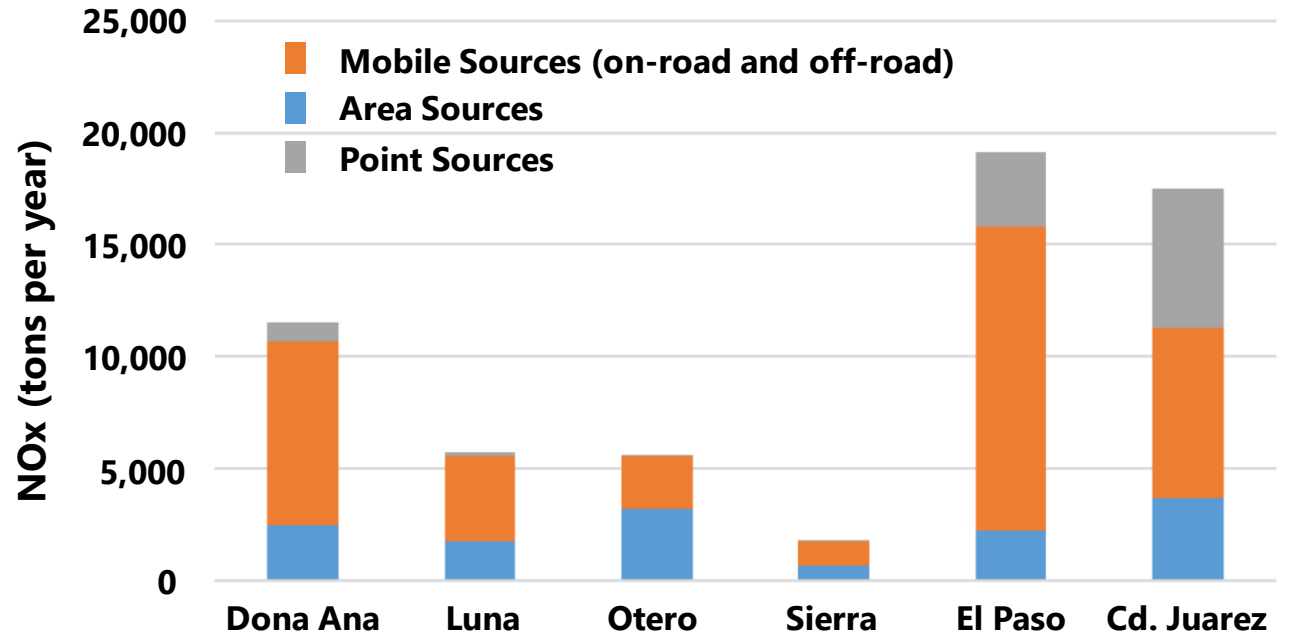
Air Quality Trends in Paso Del Norte Air Basin



Mobile sources

(on-road vehicles and off-road equipment)

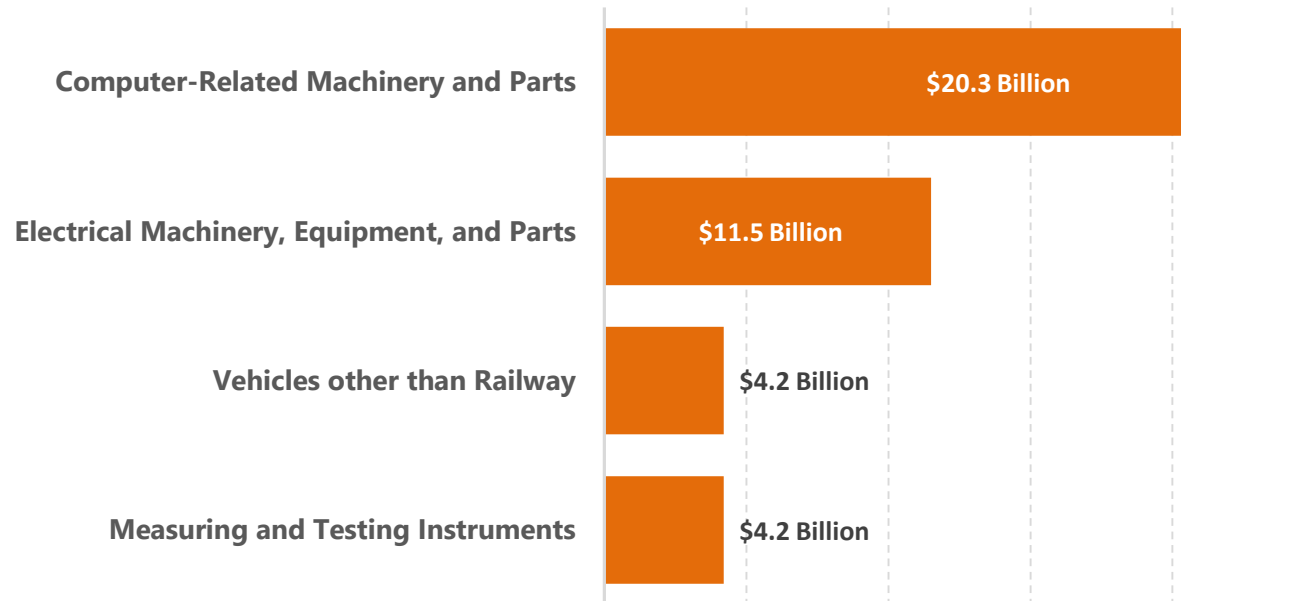
Largest share
of **NOx** emissions
in the **Paso del Norte** region



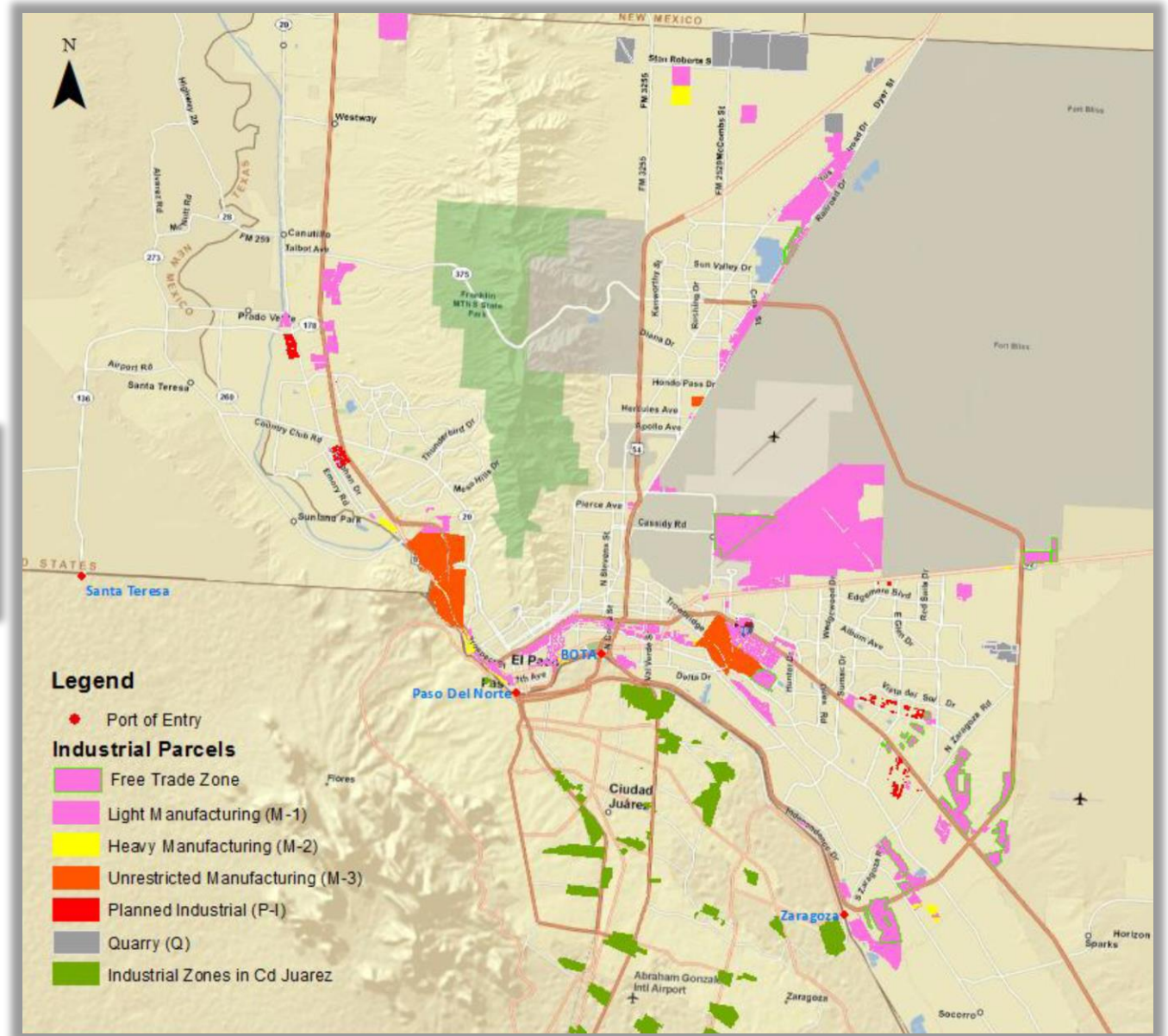
Trade Activity in Paso Del Norte

2018

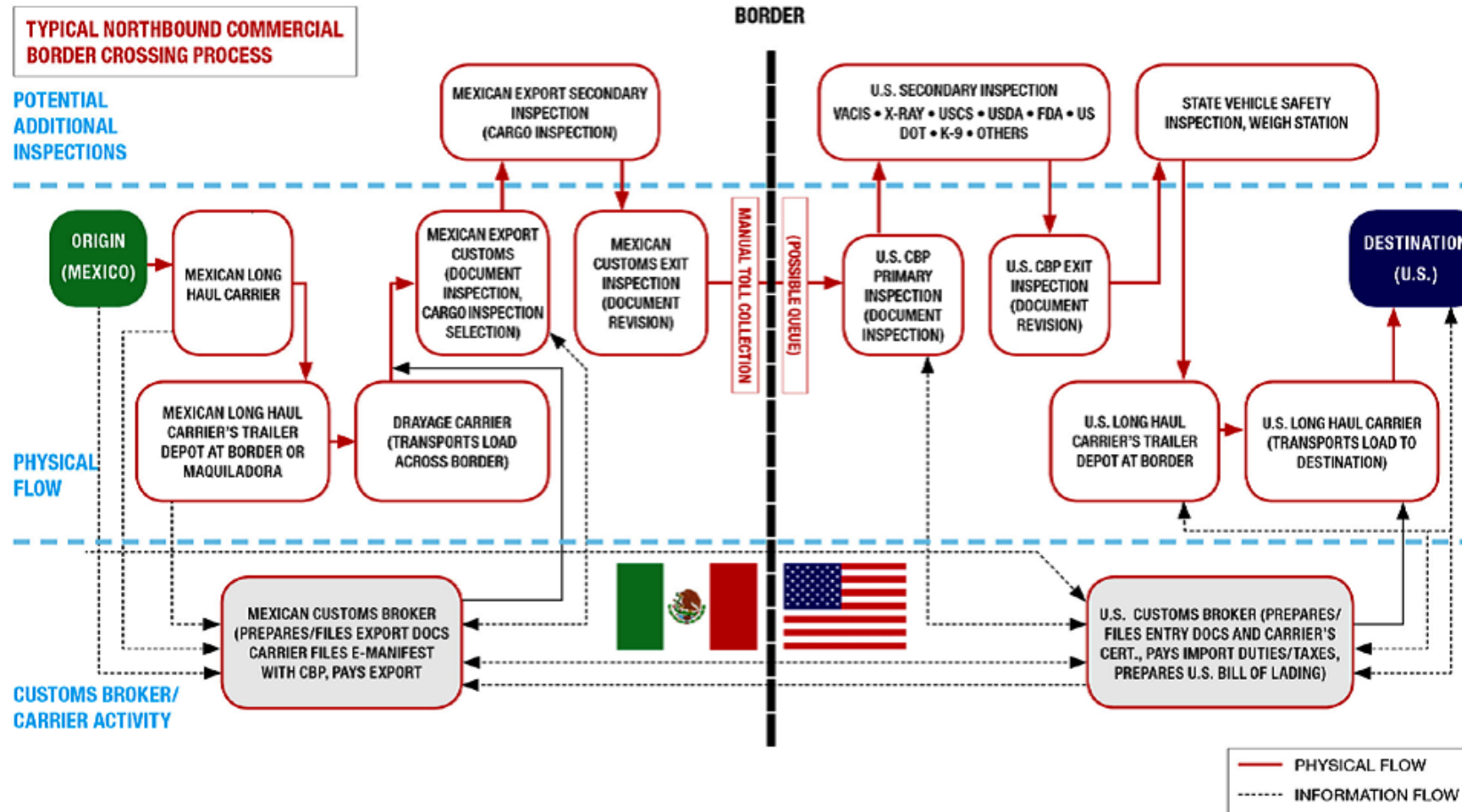
- 17% of US-Mexico trade
- 4.2 million tons
- Value: \$48.9 Billion
- 928,169 truck entered U.S.
 - 30% not laden



Potential Freight Generators in the Paso Del Norte Region

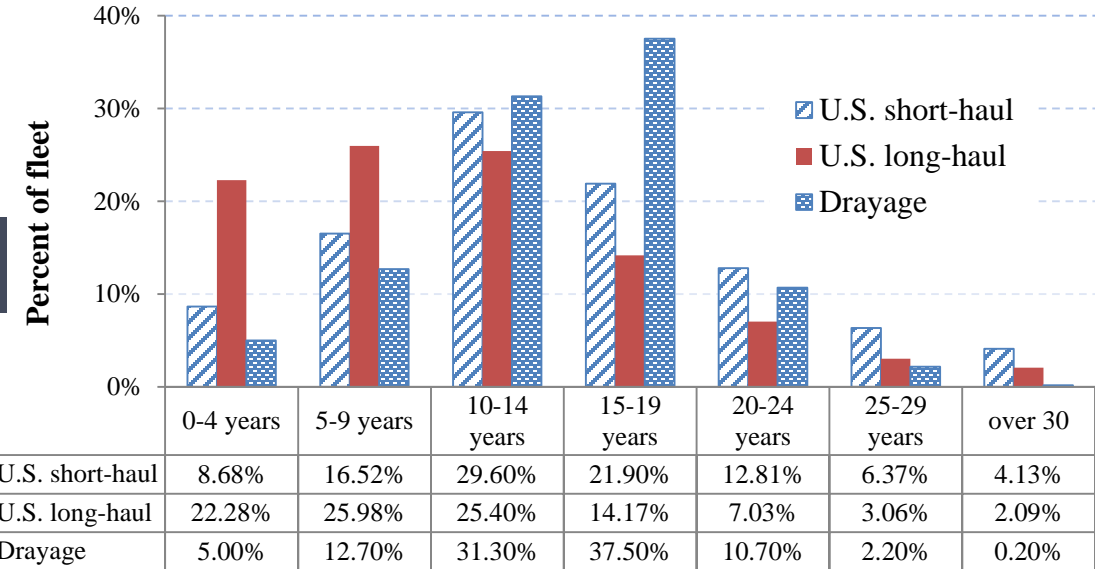
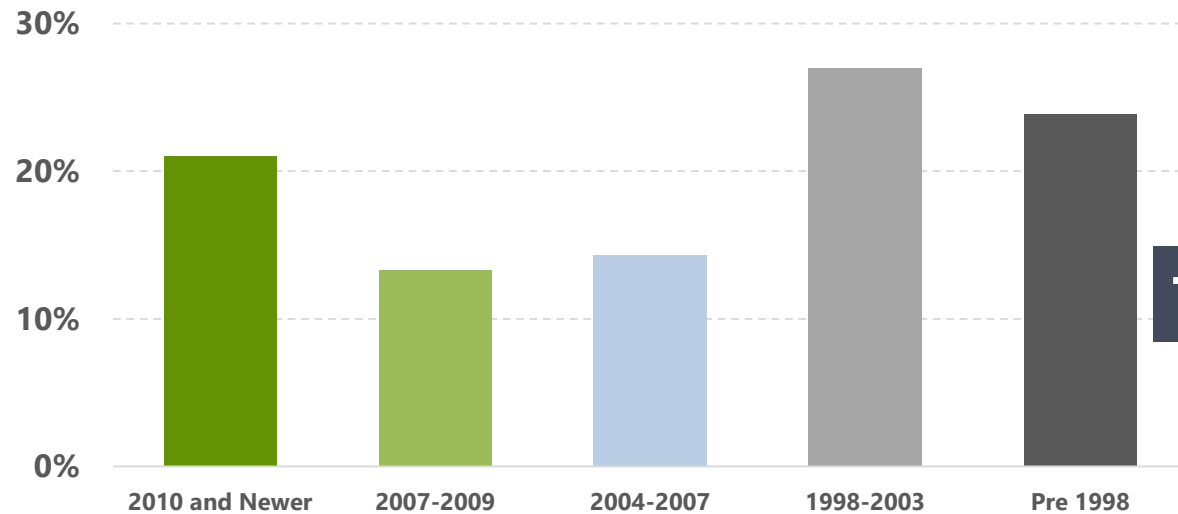


Border Drayage Operation



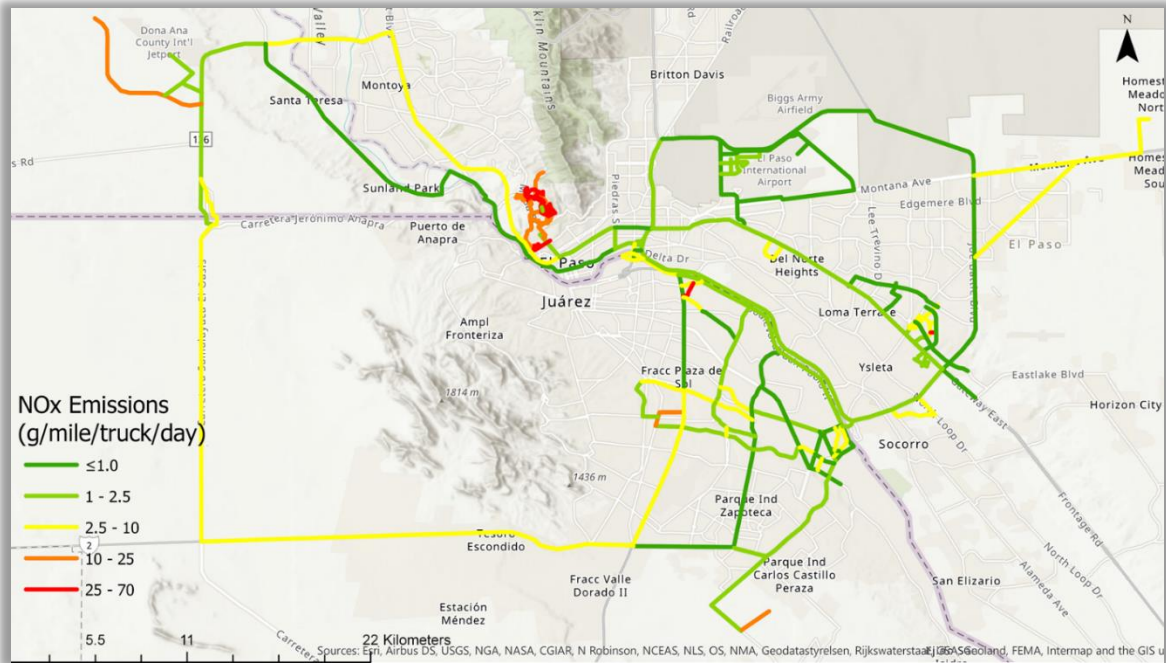
Border Drayage Trucks

Trucks Age - TTI 2012 – Paso del Norte



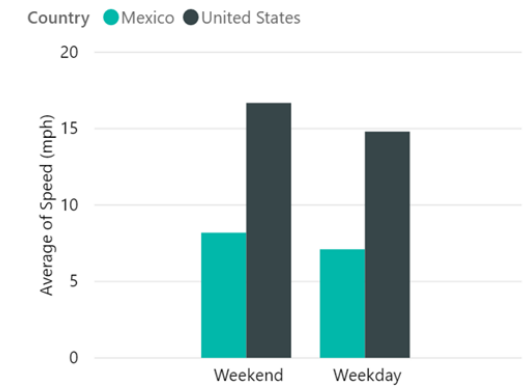
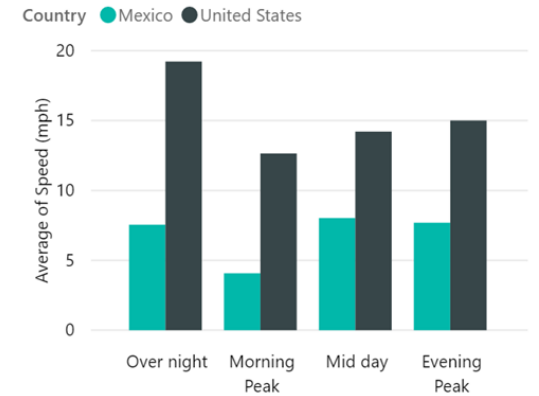
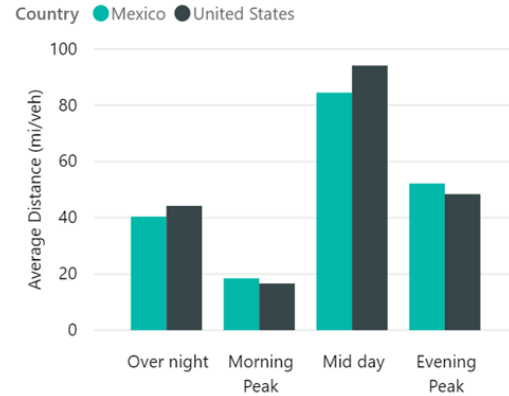
Trucks Age - 2018 – Nogales, AZ

Border Drayage Trips



NOx Emissions at Paso Del Norte Region (g/mi/truck/day)

Average Trip Distance and speed of Drayage Trucks by Time of Day



Average Trip Distance and speed of Drayage Trucks by Day Type

Emission Reduction Strategies for Diesel Trucks

Fuel Technologies

- Fuel additives
- biodiesel

Vehicle Technologies

Vehicle Replacement Or Retrofit

- Exhaust Gas Aftertreatment
- Alternative fuel
 - Natural gas
 - Electric

Operational Strategies

- Driver Education
- Reduced Border Crossing Time
- Improved Freight Logistics

Vehicle Technologies

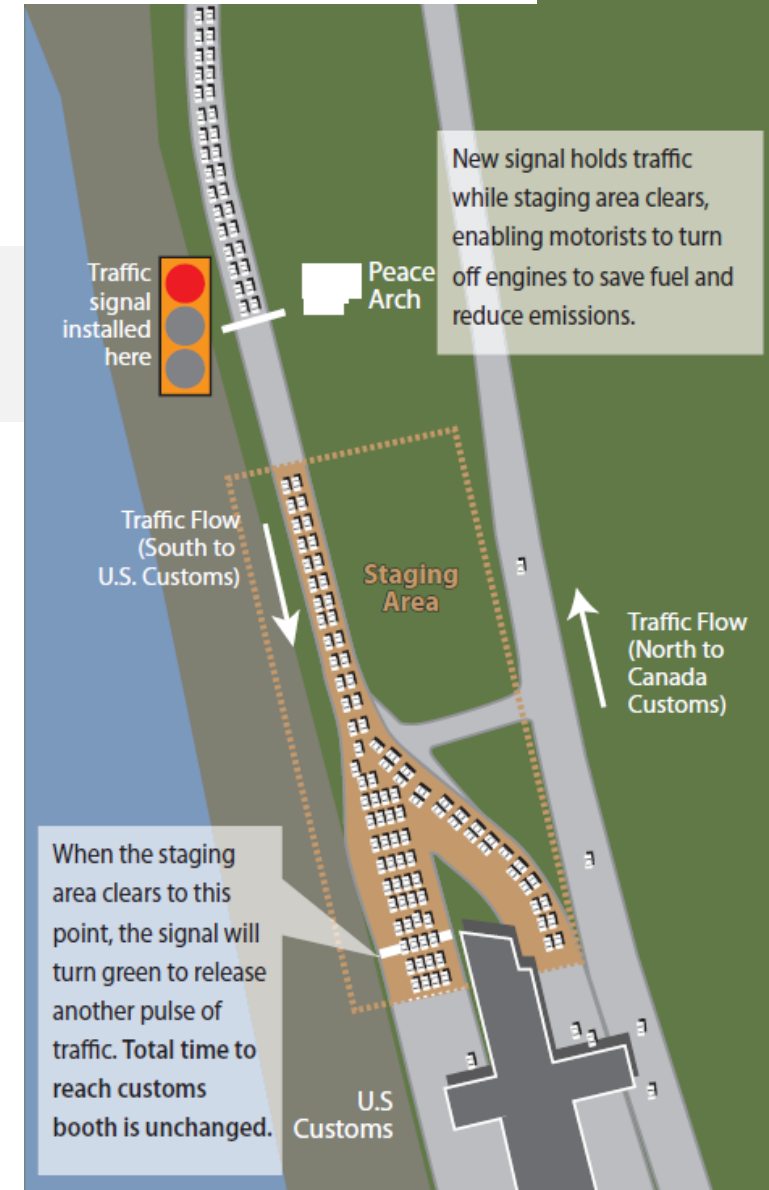
Description		Reduced Pollutant	Applicability to Border Drayage
Engine and Powertrain			
Improved Combustion	Systems for low-temperature, highly premixed combustion	All	Replacement or Retrofit
Alternative Fuels -- CNG & LNG	Natural gas in both compressed and liquified forms give similar fuel economy to diesel and lower emissions	PM, NOx	Replacement
Alternative Fuels -- Electric & Fuel Cell	All electric trucks or hybrid tucks are more energy efficient than fossil fuels and produce substantially less emissions	All	Replacement
Engine Friction Reduction	Improved mechanical efficiency of internal combustion engines by 10%.	All	Replacement or Retrofit
Automated Transmission	Advanced automated manual can shift as quickly as the best driver	All	Replacement
Emission Reduction Devices			
Diesel Oxidation Catalyst (DOC)	An exhaust after-treatment technology that breaks down hydrocarbons and CO emissions by oxidizing them into carbon dioxide and water	CO, PM, HC/VOC	Replacement or Retrofit
Diesel Particulate Filters (DPF)	Filters installed on truck exhaust systems to filter out diesel PM	PM	Replacement or Retrofit
Exhaust Gas Recirculation (EGR)	A portion of an engine's exhaust gas is returned to its combustion chambers via the inlet system; substantially reduces NOx emissions	NOx	Replacement or Retrofit
Selective Catalytic Reduction (SCR)	Chemically processes NOx in the exhaust gas into nitrogen and water vapor; SCR is the most effective technology for reducing NOx from diesel engines	NOx	Replacement or Retrofit
Other Vehicle and Trailer Technologies			
Aerodynamic Improvement	Most technologies to reduce the aerodynamic drag involve, narrowing the trailer-tractor gap, adding skirts, and reducing tail winds.	All	Replacement or Retrofit
Idle Reduction Technologies	Two types – Behavioral strategies with driver training and incentives, and use of auxiliary power units.	All	Retrofit
Lower Rolling Resistance (LRR) Tires	LRR tires can reduce up to 15 percent by reducing the rolling resistance	All	Retrofit

Key Emission Reduction Strategies

Border Crossing Idle Reduction

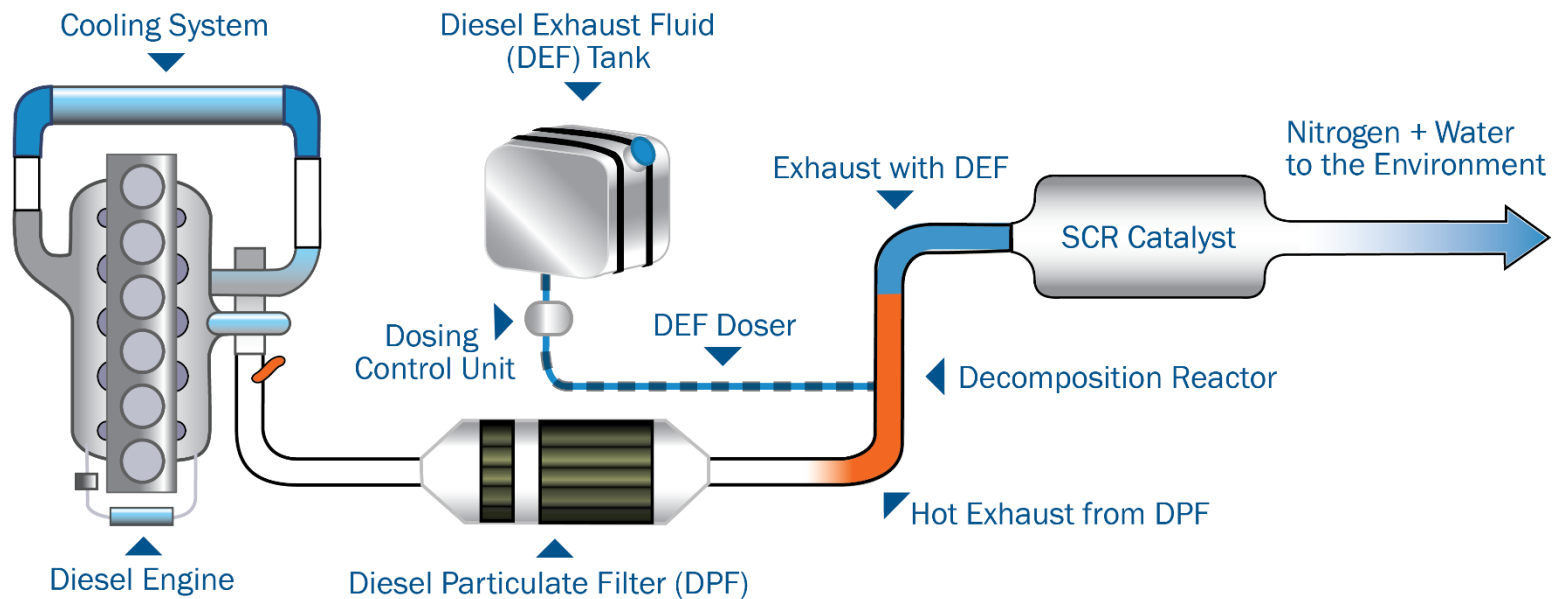
- Batching Vehicles
- Reducing Creep-Idling

Peace Arch Border Crossing



Key Emission Reduction Strategies

Selective Catalytic Reduction (SCR)

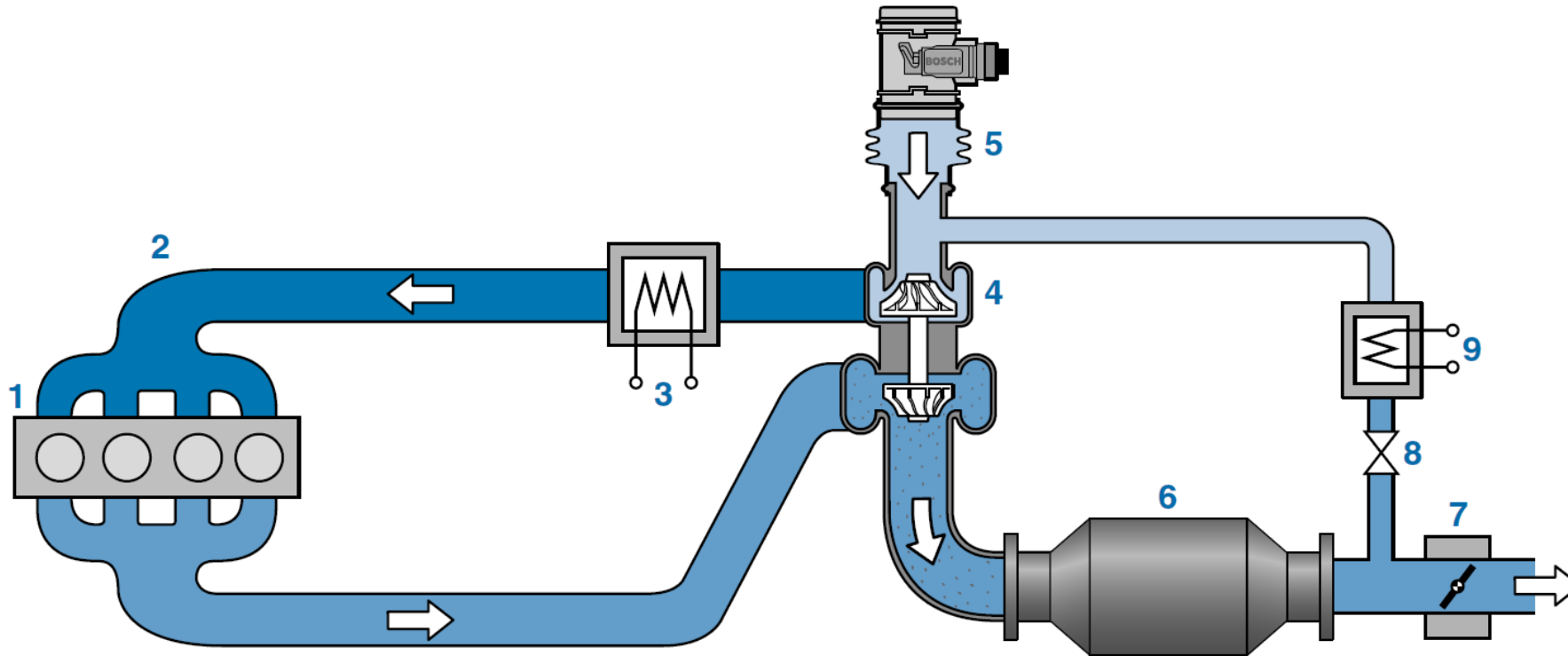


SCR requires exhaust temperatures **higher than 200°C (390°F)**

Mostly happening when trucks move at **medium to high speed**

Key Emission Reduction Strategies

Exhaust Gas Recirculation (EGR)



Key NO_x reduction technology for pre-2010* diesel trucks Doesn't need high temperatures

(* equivalent to current Mexican standard)

Key Emission Reduction Strategies

Battery Electric Trucks

- Current cost is substantially higher than diesel trucks
- Being tested at different ports
- Approximate Range 100 mi/charge
- Good fit for some border drayage operations
 - Concentrated activity
 - Limited amount of driving per day



Key Emission Reduction Strategies

Improved Freight Efficiency

REDUCE FREIGHT TRANSPORT DEMAND



- supply chain restructuring
- Standardized modules/boxes
- 3D printing
- Dematerialization
- Consumer behavior

OPTIMIZE FREIGHT TRANSPORT MODES



- Modal shift
- Multi-modal optimization
- Synchromodality

INCREASE ASSET UTILIZATION



- Load optimization
- Load consolidation and asset sharing
- Logistics centers and warehouse management

IMPROVE FLEET ENERGY EFFICIENCY



- Cleaner and efficient technologies
- Efficient vehicles and vessels
- Driving behavior
- Fleet operation
- Fleet maintenance

USDOT

Pilot projects of

Freight Advanced Traveler Information Systems (FRATIS) at **marine ports**

Emission Reduction Funding Programs for Diesel Trucks

TEXAS EMISSIONS REDUCTION PLAN (TERP)

- Grants and Rebates
- Diesel Emissions Reduction Incentive (DERI)
- Texas Natural Gas Vehicle Grants Program (TNGVGP)
- Alternative Fueling Facilities Program (AFFP)

Key Eligibility Criteria

- El Paso County
- Commitment to operate minimum 75 % of annual operation in eligible counties and designated roadways
- Replacement vehicle must be MY 2015 or newer

CLEAN DIESEL PROGRAM UNDER DERA ACT

- Competitive grants and rebates
- Clean diesel national grants -- administered by EPA
- Clean diesel state allocation

Key Eligibility Criteria

- Heavy-duty diesel trucks
- Operating in areas with poor air quality

Opportunities for Reducing NO_x from Border Drayage Trucks

SCR may not be best for border drayage

- Low-speeds and long periods of creep-idle
- High cost of SCR retrofit

Natural gas trucks

- Naturally lower NO_x and PM than diesel
- Don't need SCR and diesel particulate filters
- Challenges: higher initial cost and fueling stations

Driving Behavior / Eco Driving Training

- Cost effective
- Long-term impact unknown
- Requires periodic re-training
- Most effective if combined with incentive programs that benefit drivers

Funding programs' eligibility criteria

- U.S.-based vehicle registration and/or location-based usage requirements
- Limiting the application for bi-national border drayage
- Develop special eligibility criteria for drayage border trucks

Driving Behavior / Eco Driving Training

- Cost effective but long-term effectiveness unknown
- Requires periodic re-training
- Most effective if combined with incentive programs that benefit drivers

Improve border drayage operation

- Reduce border wait time
- Minimize empty miles: freight matching and asset sharing



Questions and Comments

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