Hidden Costs of Emissions

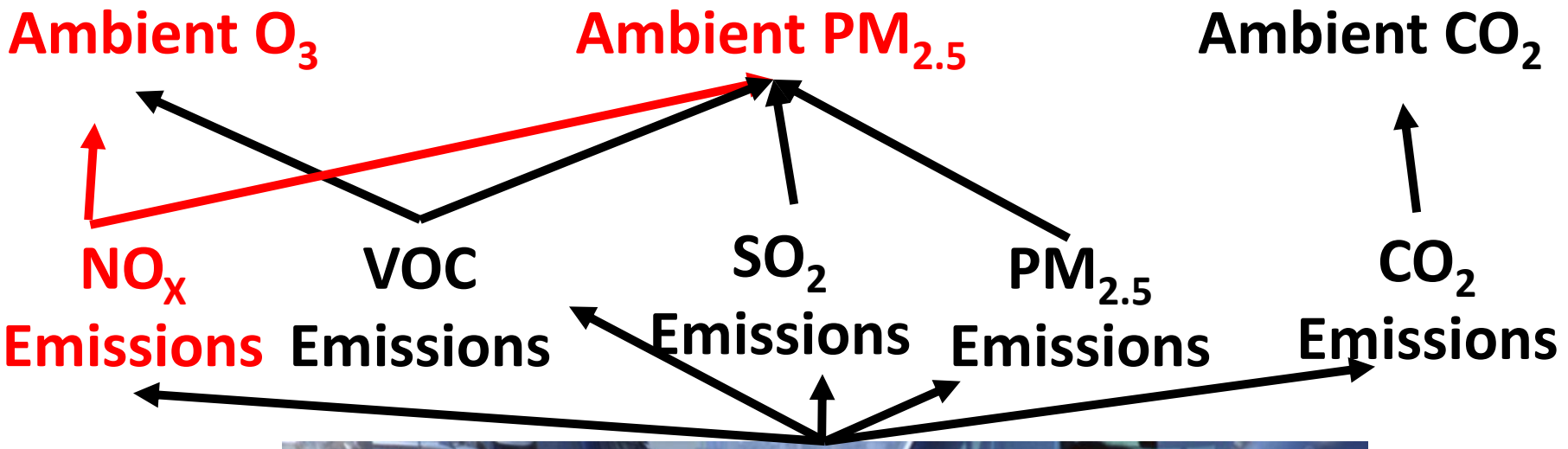
VW Mitigation Fund Web Meeting

June 26, 2017

Overview

- While settlement intended to mitigate hidden costs from NO_X emissions, it's important to get the full picture of the emissions impacts
- In particular, hidden costs of $PM_{2.5}$ and CO_2 are significantly higher than costs of NO_X emissions
- Strategic planning can help optimize social benefits of VW funding by targeting specific geographic areas and technologies

Vehicle Emissions



Quantified Costs – O_3 and $PM_{2.5}$

Health Endpoint	Ambient O_3	Ambient $PM_{2.5}$
Premature Mortality	Yes	Yes
Chronic Bronchitis	No	Yes
Nonfatal Heart Attacks	No	Yes
Respiratory Hospital Admissions	Yes	Yes
Cardiovascular Hospital Admissions	No	Yes
Asthma-Related ER Visits	Yes	Yes
Acute Bronchitis	No	Yes
Upper Respiratory Symptoms	No	Yes
Lower Respiratory Symptoms	No	Yes
Asthma Exacerbations	Yes	Yes
School Loss Days	Yes	No
Work Loss Days	No	Yes
Minor Restricted Activity Days	Yes	Yes

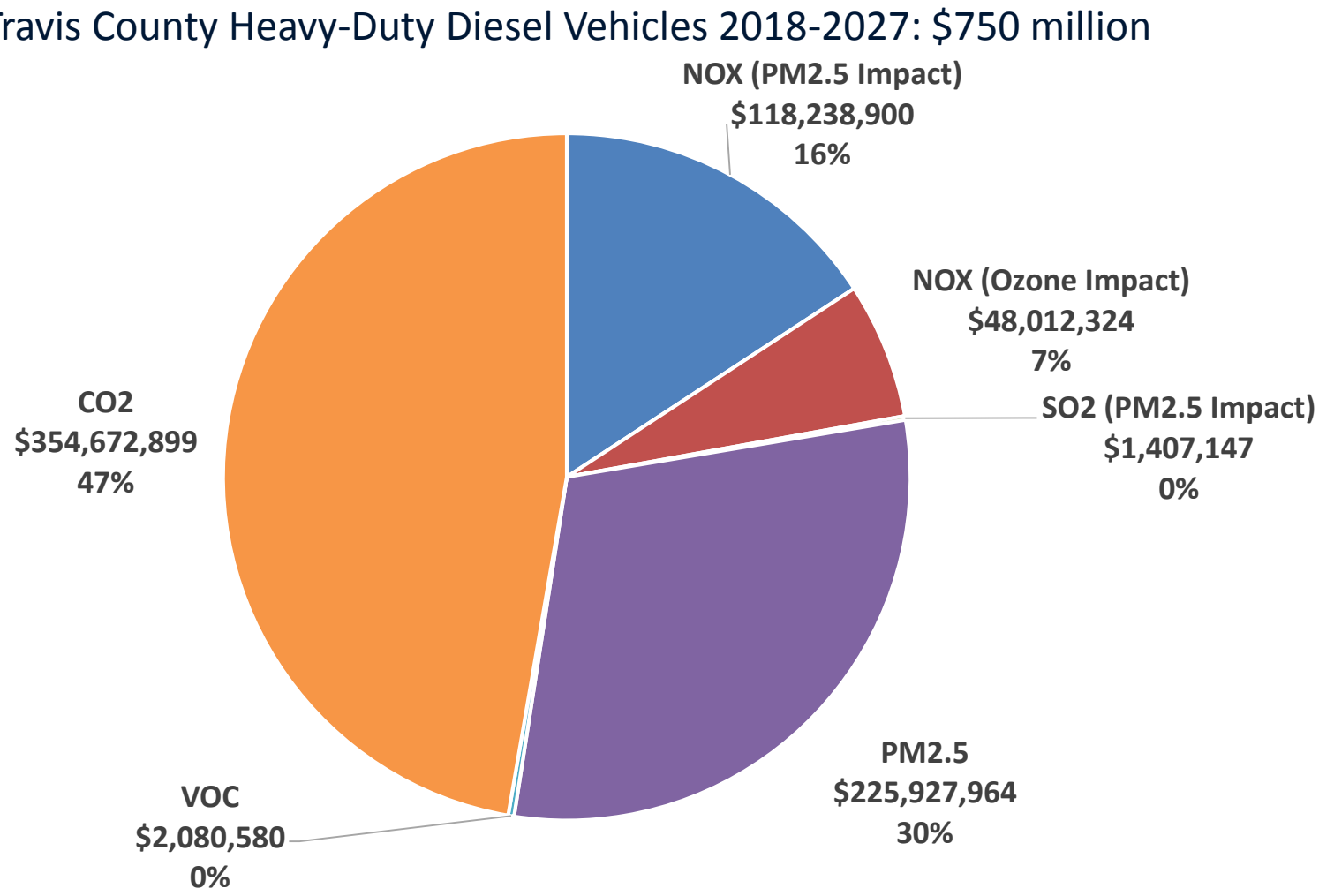
Social Costs of CO_2

- Impacts on agriculture and forestry
- Impacts on coastal areas
- Other vulnerable market sectors (mainly energy)
- Human health (based on climate-related diseases)
- Non-market amenities (such as recreation)
- Human settlements
- Ecosystems
- Water

Hidden Costs of Emissions Nation-Wide

- NO_X: $13,721-$24,601 per ton
  - $5,534 per ton for O_3 impacts
  - $8,188 - $19,067 per ton for $PM_{2.5}$ impacts
- $PM_{2.5}$: $403,781 - $908,507 per ton
- SO_2: $21,311 - $48,229 per ton for $PM_{2.5}$ impacts
- VOC: $3,364 per ton for $PM_{2.5}$ impacts
- CO_2: $44.38 per ton

Hidden Costs of Heavy-Duty Diesel Vehicles Emissions

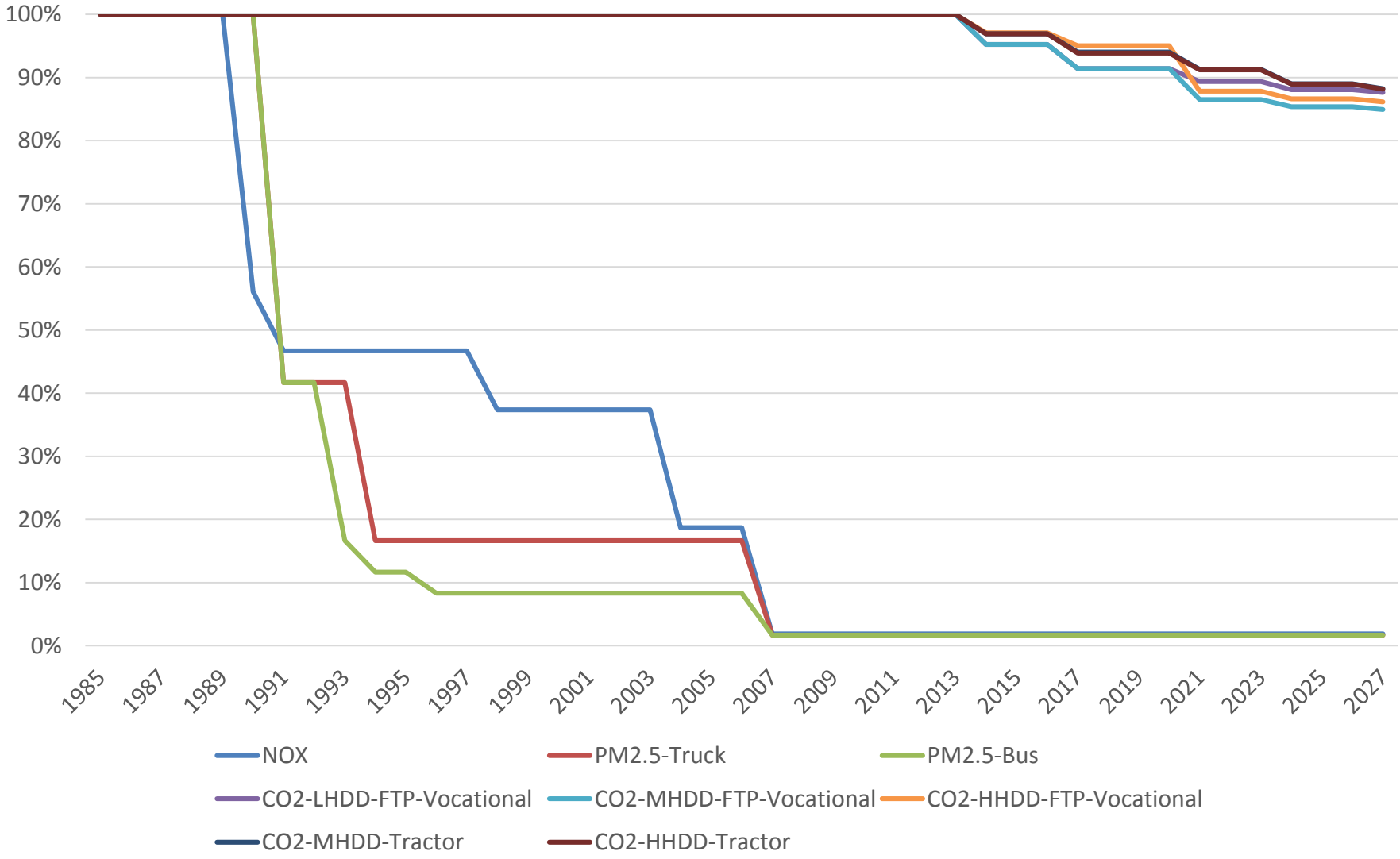


Benefits of Early Replacement

Example: Replace 2006 Diesel Class 8 Short-Haul Combination Truck with 2018 Diesel Truck in Travis County – total emission reduction benefit: $178K in reduced hidden costs

Statistic	NO_X	$PM_{2.5}$	HC	CO	CO_2
Baseline	2.393	0.180	0.165	0.697	420.7
Reduction	2.135	0.175	0.148	0.624	42.0
% Reduction	89.2%	97.1%	89.6%	89.5%	10.0%
Benefit Per Ton Reduction	$19,161	$769,019	$3,364	Unquantified	$44
Hidden Cost	$45,853	$138,423	$555	Unquantified	$18,669
Total Benefit of Reduction	$40,909	$134,578	$498	Unquantified	$1,864
Remaining Hidden Cost	$4,944	$3,845	$57	Unquantified	$16,805

HDDV Emission Standards



Emission Reduction Benefits Vary by Location

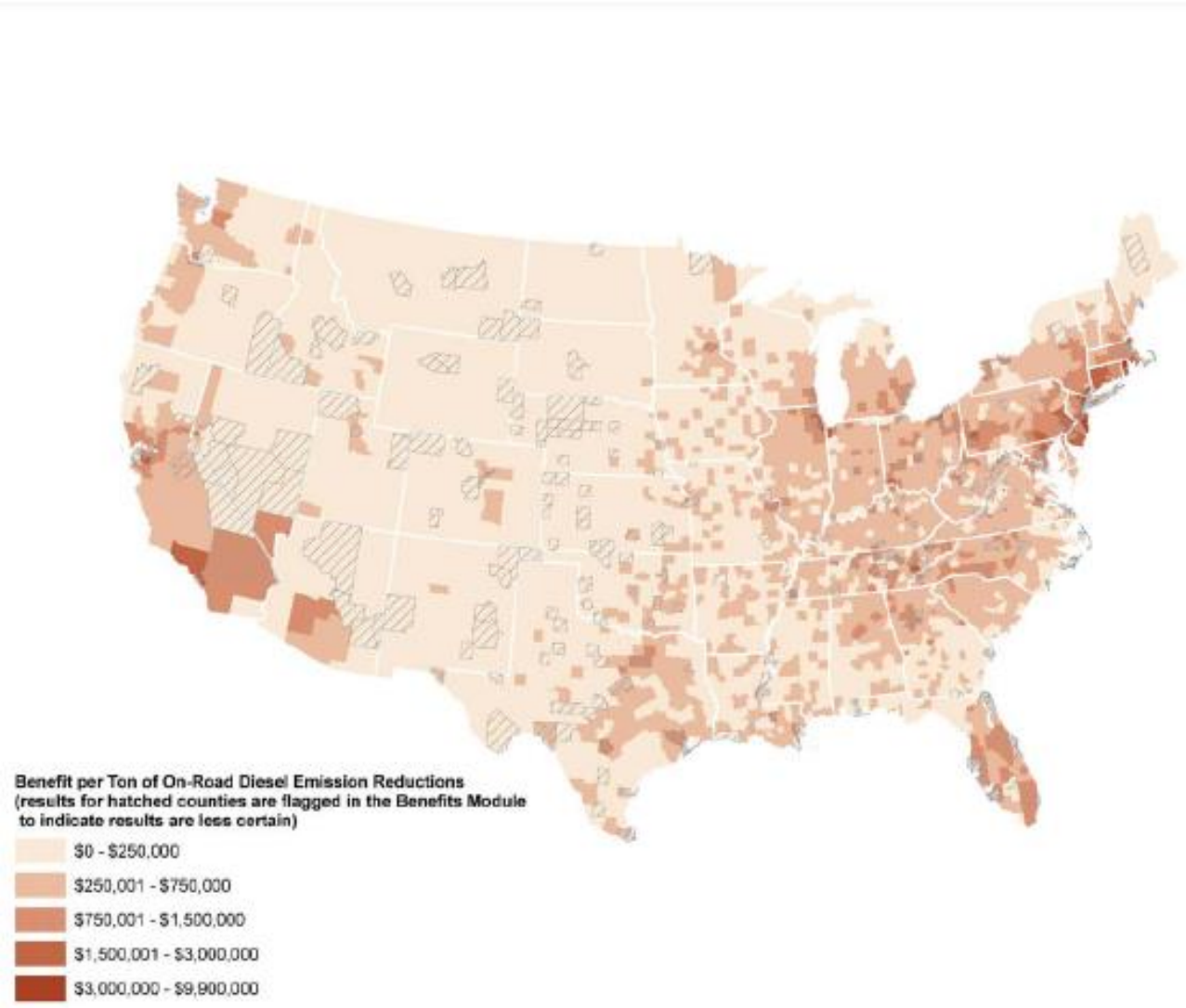


Figure 3: Distribution of County-Level Benefit-per-Ton of Diesel PM Emission Reductions: On-road Sources (Laden et al. mortality estimate, 2006$)

Summary

- Roughly $20K/ton of NO_X reductions would represent a “break-even” reimbursement rate, not considering other emissions pollutants
- Using social cost/ton of emissions for $PM_{2.5}$ and CO_2 can also be helpful in guiding purchasing/match decisions for vehicles
- While diesel-diesel projects can achieve 95-98% reductions in NO_X and $PM_{2.5}$, they could only achieve 12-15% reduction in CO_2

Thank You

Andrew Hoekzema

CAPCOG Director of Regional Services

ahoekzema@capcog.org

(512) 916-6043