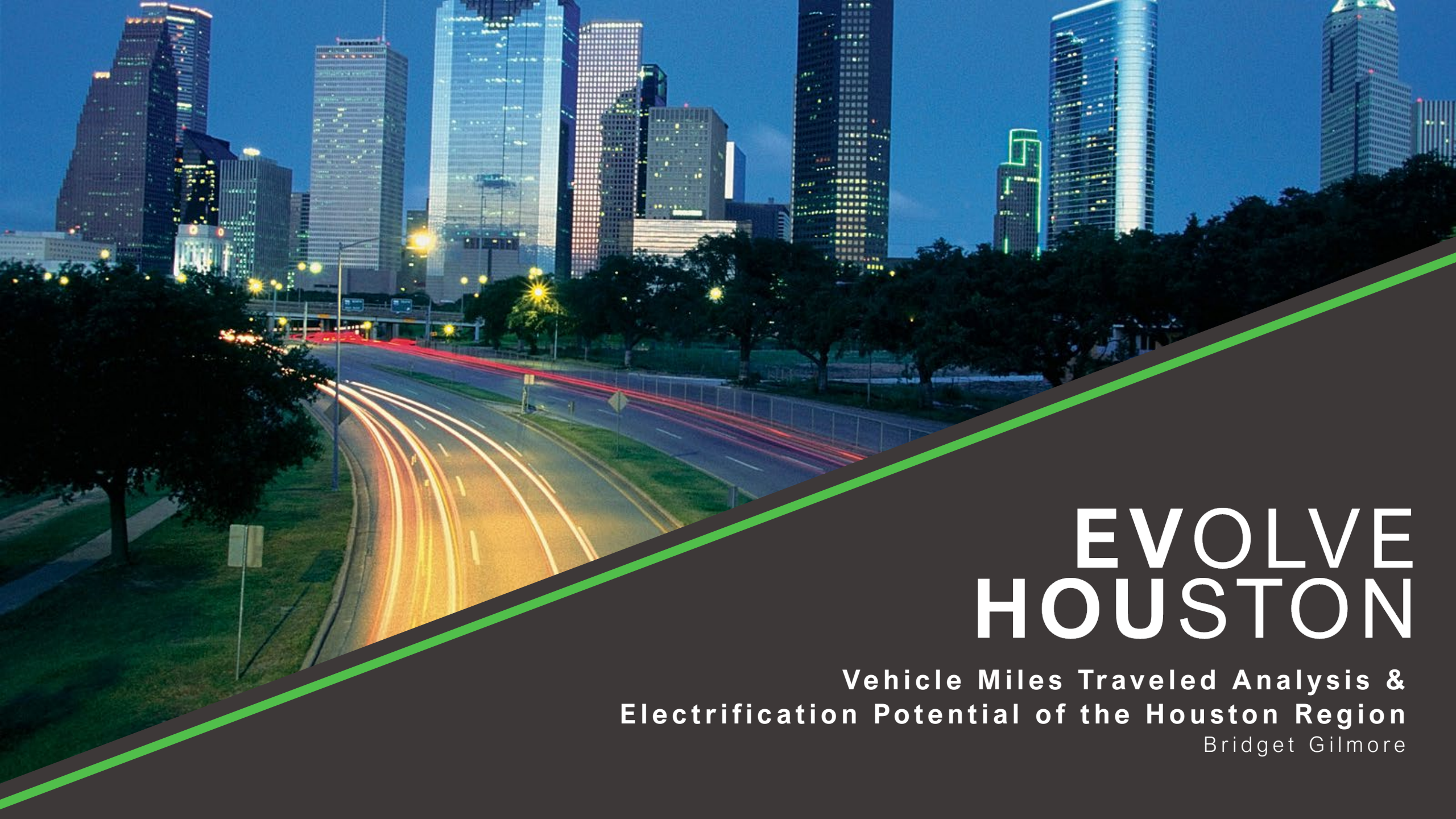


EVOLVE HOUSTON

Vehicle Miles Traveled Analysis & Electrification Potential of the Houston Region

Bridget Gilmore

EVOLVE HOUSTON

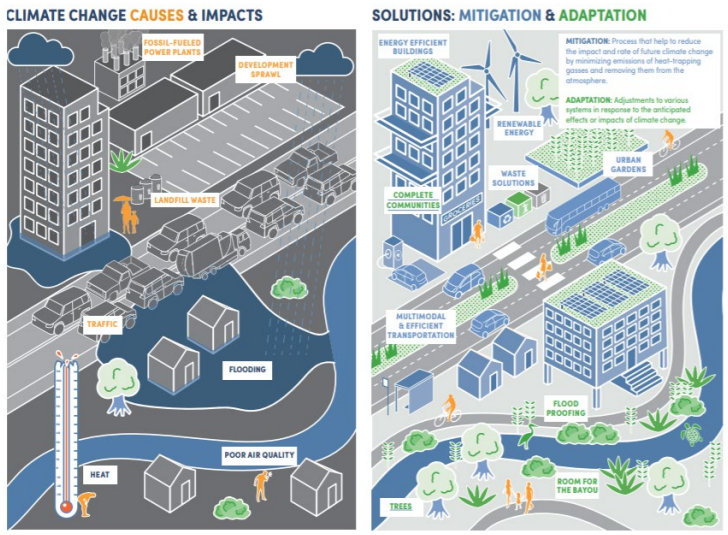
CenterPoint Energy

UNIVERSITY of HOUSTON

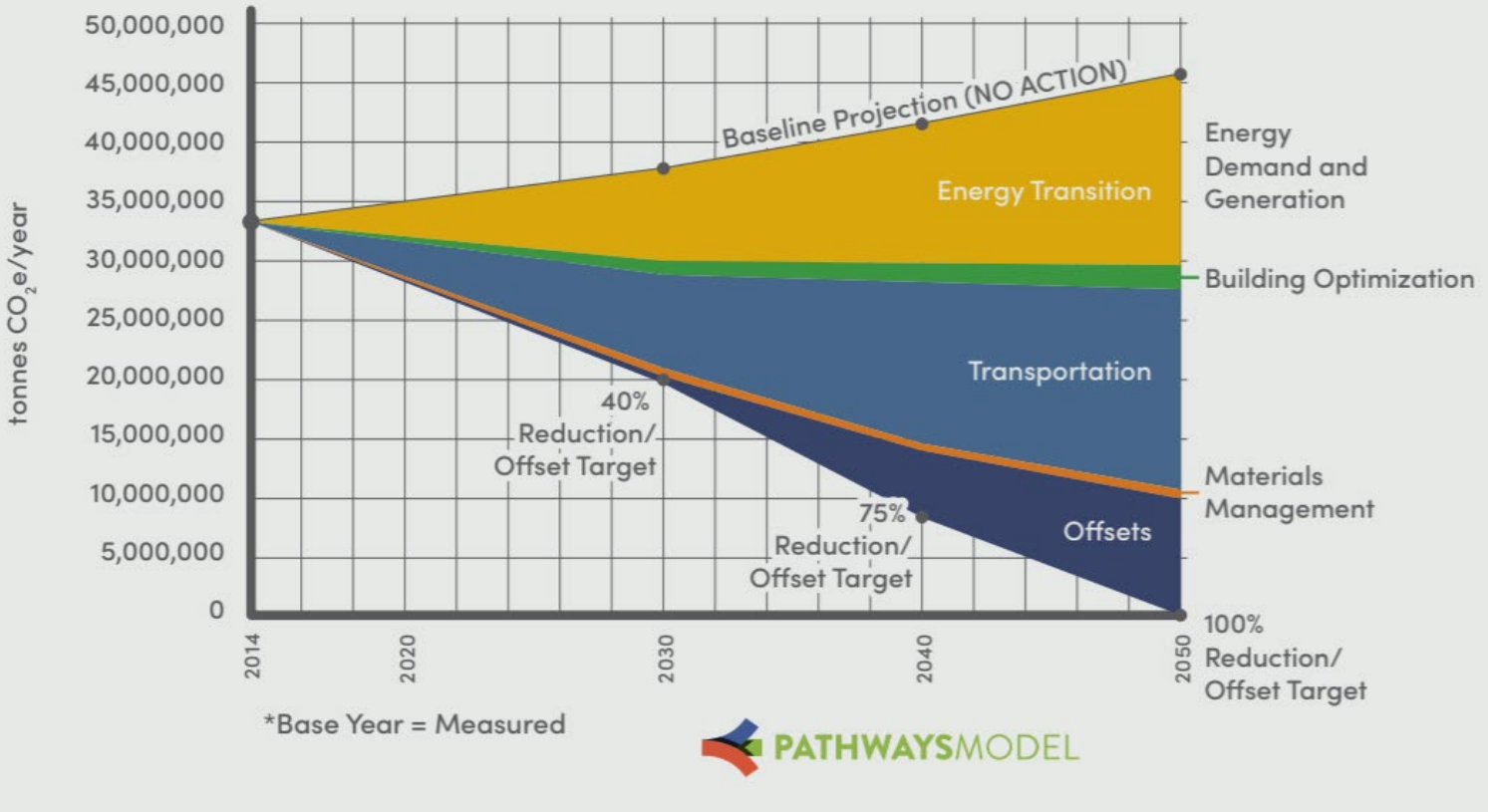
nrg

CONTENTS

Transportation and Climate



Source: Resilient Houston

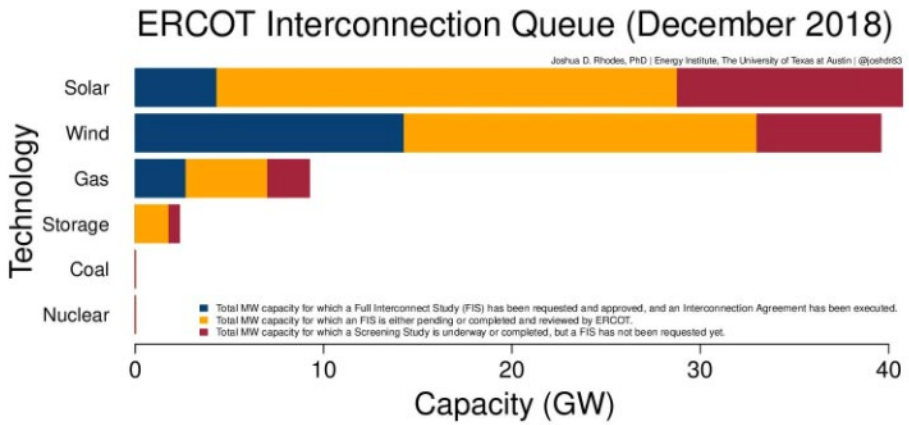


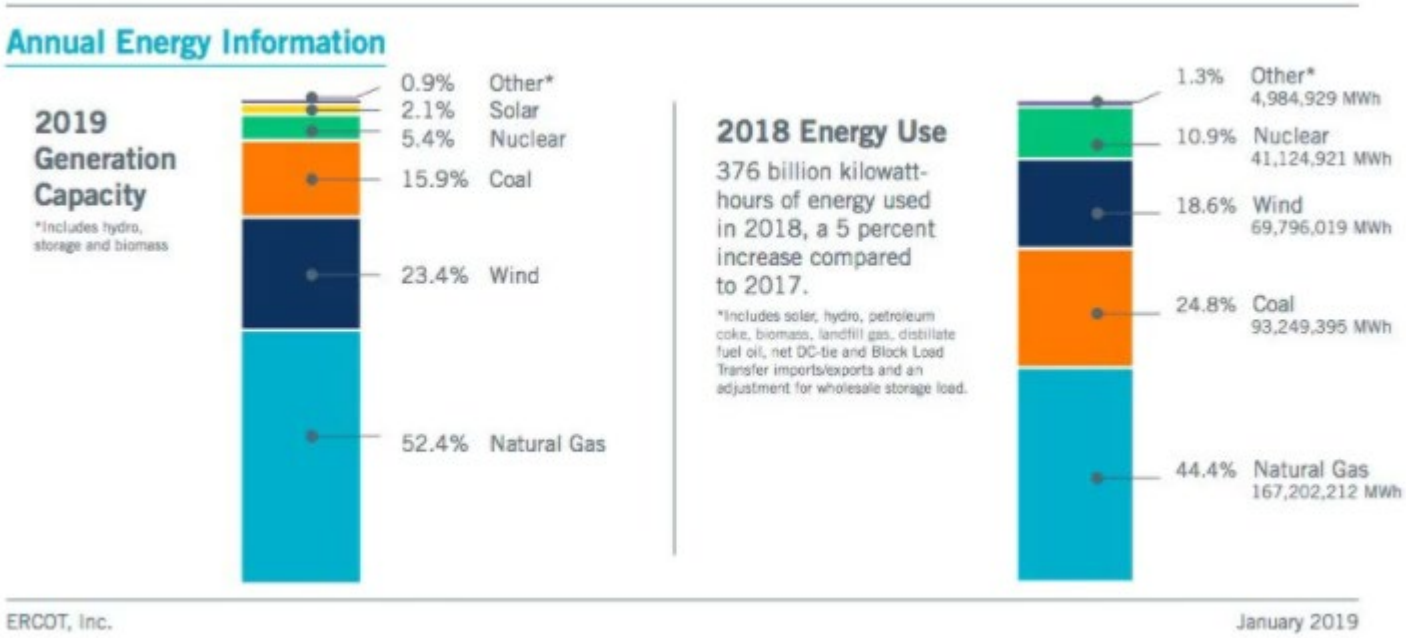
Texas Fuel Mix

Texas Grid Operator Reports Fuel Mix Is Now 30% Carbon-Free

The latest data from ERCOT shows wind generation set new records in 2018—and lots of solar in the pipeline.

JEFF ST. JOHN | JANUARY 23, 2019





Transportation and Climate

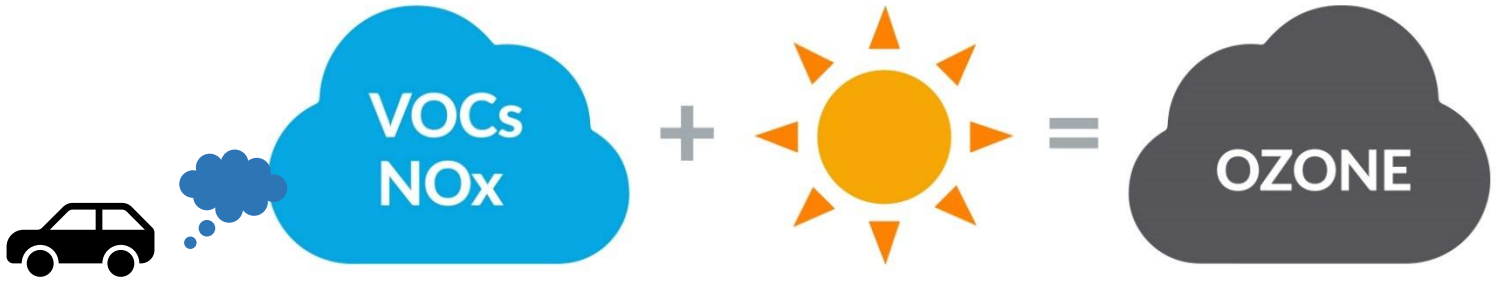
TRANSPORTATION	TARGET
Goal 1: Shift regional fleet to electric and low-emission vehicles.	1 Convert non-emergency, light-duty municipal fleet to 100% EV by 2030.
Goal 2: Reduce vehicle miles traveled (VMT) per capita.	2 Reduce VMT per capita 20% by 2050.
Goal 3: Provide equitable and safe mobility choices.	3 Zero traffic-related fatalities and serious injuries on Houston streets by 2030. 500 miles of high-comfort bike lanes by 2025.

MAYOR'S OFFICE PRESS RELEASE

City of Houston's Office of Sustainability Seeking Input on Strategy to Make Electric Vehicles More Accessible

July 13, 2020

Transportation and Climate



HGB Area: Attainment Status by Pollutant

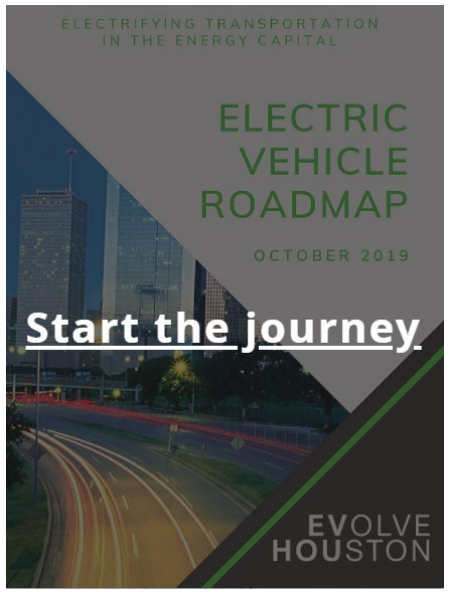
Pollutant	Primary NAAQS	Averaging Period	Designation	Counties	Attainment Deadline
Ozone (O_3)*	0.070 ppm (2015 standard)	8-hour	Marginal Nonattainment	Brazoria, Chambers, Fort Bend, Galveston, Harris, Montgomery	August 3, 2021
	0.075 ppm (2008 standard)	8-hour	Serious Nonattainment	Brazoria, Chambers, Fort Bend, Galveston, Harris, Liberty, Montgomery, Waller	July 20, 2021

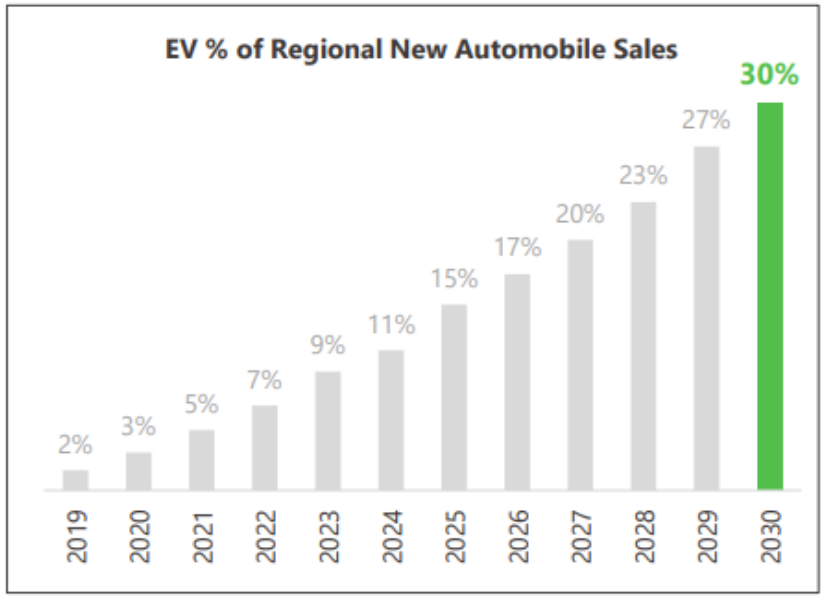
EVH Electric Vehicle Roadmap

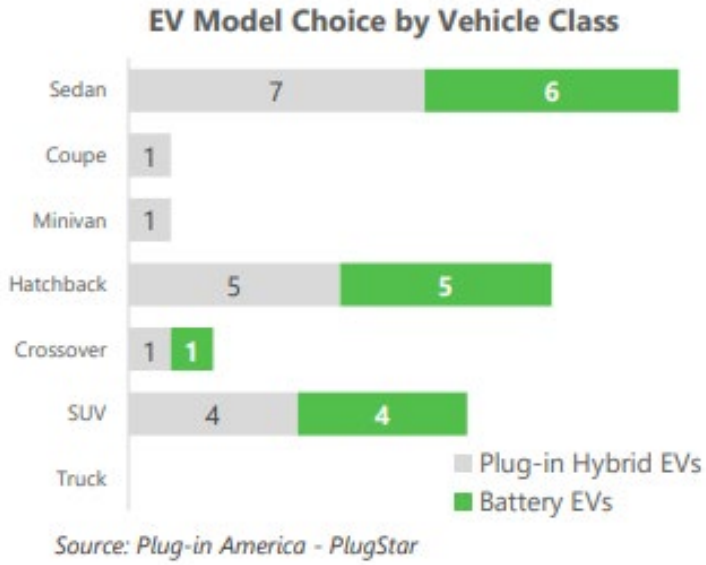
EV Adoption Goal

30% by 2030

Inspired by a vision, motivated by a responsibility.







Project Rationale & Overview

EV Adoption Goal

30% by 2030

EVH identified significant electric truck market opportunity in the Houston region.

- ❑ Pick-up trucks are leading in new car sales, specifically the Ford F-150 and Chevy Silverado
- ❑ Pick-up trucks make up a significant portion of commercial fleets in addition to being popular for personal consumer use

EVH analyzed publicly available vehicle miles traveled data to learn the associated emissions of conventional passenger trucks.

Methodology Overview

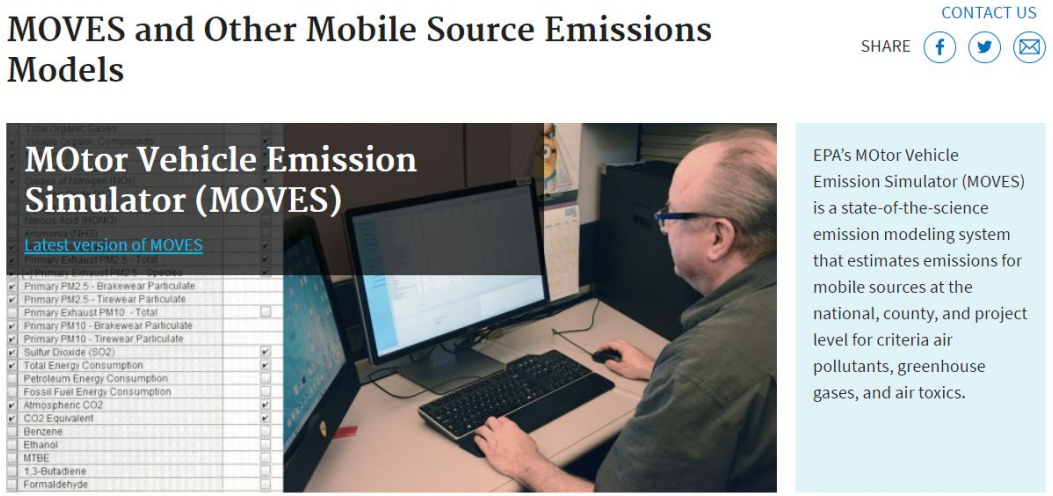
Used EPA/FHWA 2017 VMT data, released January 2020

- ❑ Utilized for the National Emissions Inventory (NEI)
- ❑ Vehicle classes based on MOVES criteria

United States Environmental Protection Agency

U.S. Department of Transportation
Federal Highway Administration

The public release of the full 2020 NEI is expected to be March 31, 2023.

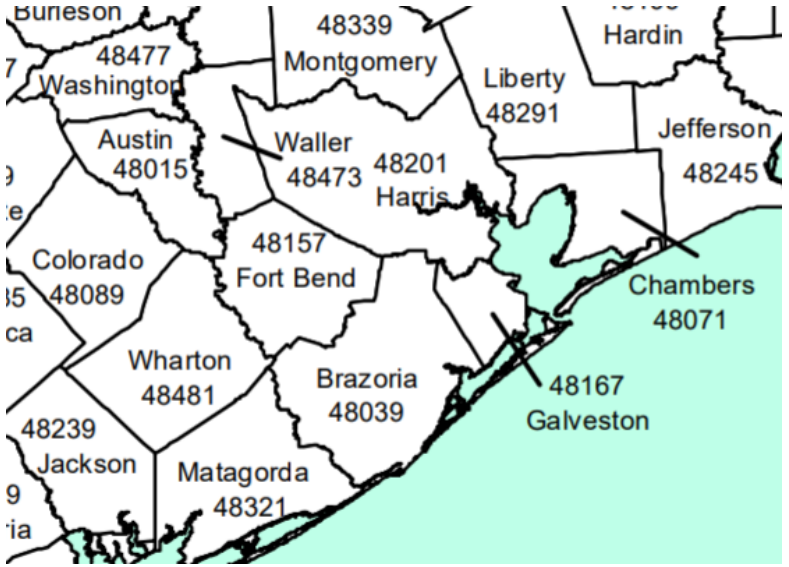


Methodology Overview

Used EPA/FHWA 2017 VMT data

- ❑ Utilized for the National Emissions Inventory (NEI)
- ❑ Vehicle classes based on MOVES criteria

Refined to Public Health Region 6 Using FIPS



Methodology Overview

Used EPA/FHWA 2017 VMT data

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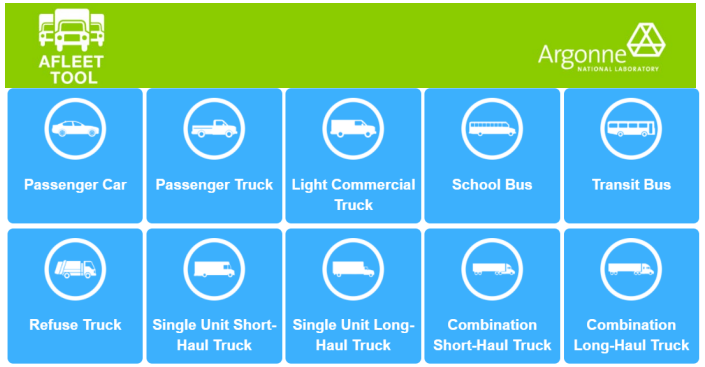
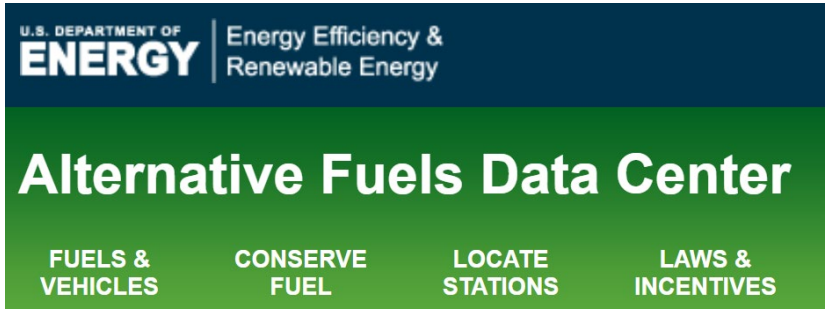


Refined to Public Health Region 6 Using FIPS

Used AFLEET assumptions primarily for MPGGE

- ❑ Supplemented with Alternative Fuels Data Center assumptions



Methodology Overview

Used EPA/FHWA 2017 VMT data

- ❑ Utilized for the National Emissions Inventory (NEI)
- ❑ Vehicle classes based on MOVES criteria

Refined to Public Health Region 6 Using FIPS

Emissions factor example:

Fuel Type	kg CO_2 per unit	Unit
Diesel Fuel	10.21	gallon

Used AFLEET assumptions primarily for MPGGE

- ❑ Supplemented with Alternative Fuels Data Center assumptions

Analyzed carbon dioxide (CO_2), nitrogen oxides (NO_x), methane (CH_4), and fine particulate matter ($PM_{2.5}$)

- ❑ Used EPA Emissions Factors, updated March 2018

Methodology Overview

Used EPA/FHWA 2017 VMT data

- ❑ Utilized for the National Emissions Inventory (NEI)
- ❑ Vehicle classes based on MOVES criteria

Refined to Public Health Region 6 Using FIPS

Used AFLEET assumptions primarily for MPGGE

- ❑ Supplemented with Alternative Fuels Data Center assumptions

Analyzed carbon dioxide (CO_2), nitrous oxide (NO_x), methane (CH_4), and fine particulate matter ($PM_{2.5}$)

- ❑ Used EPA Emissions Factors, updated March 2018

Presented data to Texas Transportation Institute and Houston Advanced Research Center for verification

Scope

Public Health Area 6 Definition

TX code 48xxx

Houston is in Public Health Region 6

County Number	County Name	FIPS code	Public Health Region	Health Service Region
8	Austin	48015	6	6/5S
20	Brazoria	48039	6	6/5S
36	Chambers	48071	6	6/5S
45	Colorado	48089	6	6/5S
79	Fort Bend	48155	6	6/5S
84	Galveston	48167	6	6/5S
101	Harris	48201	6	6/5S
146	Liberty	48291	6	6/5S
161	Matagorda	48321	6	6/5S
170	Montgomery	48339	6	6/5S
236	Walker	48471	6	6/5S
237	Waller	48473	6	6/5S
241	Wharton	48481	6	6/5S

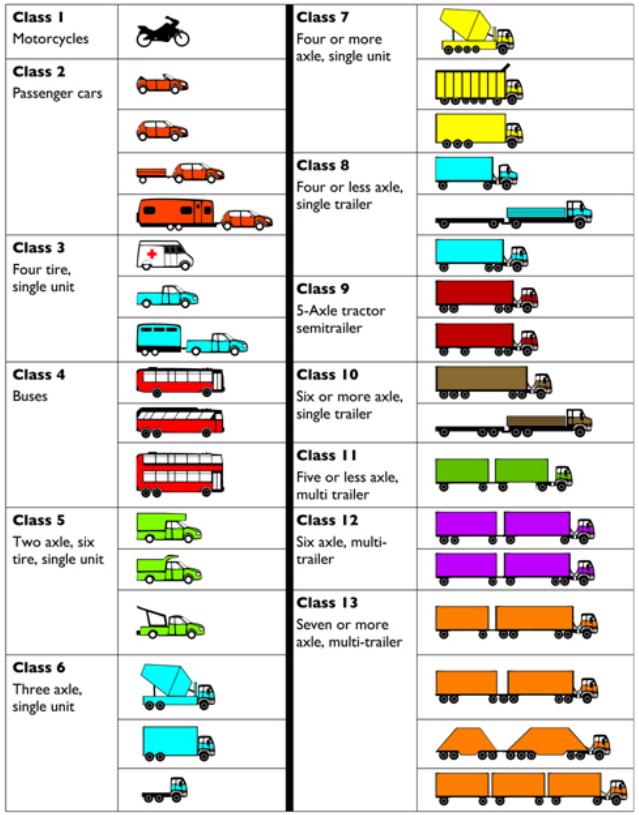
https://dshs.texas.gov/chs/info/info_txco.shtm

Light-Duty Vehicle Classification

Example Classification:

21 Passenger Car
31 Passenger Truck
32 Light Commercial Truck

Light-duty trucks

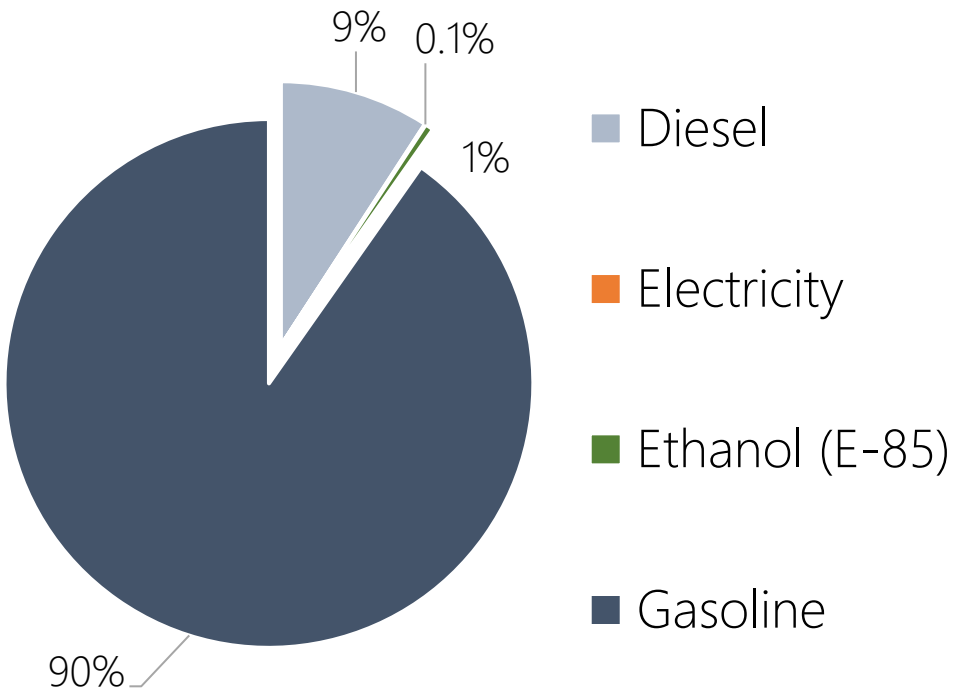


Many SUVs and minivans are considered light duty trucks due to overall Gross Vehicle Weight Rating (GVWR)

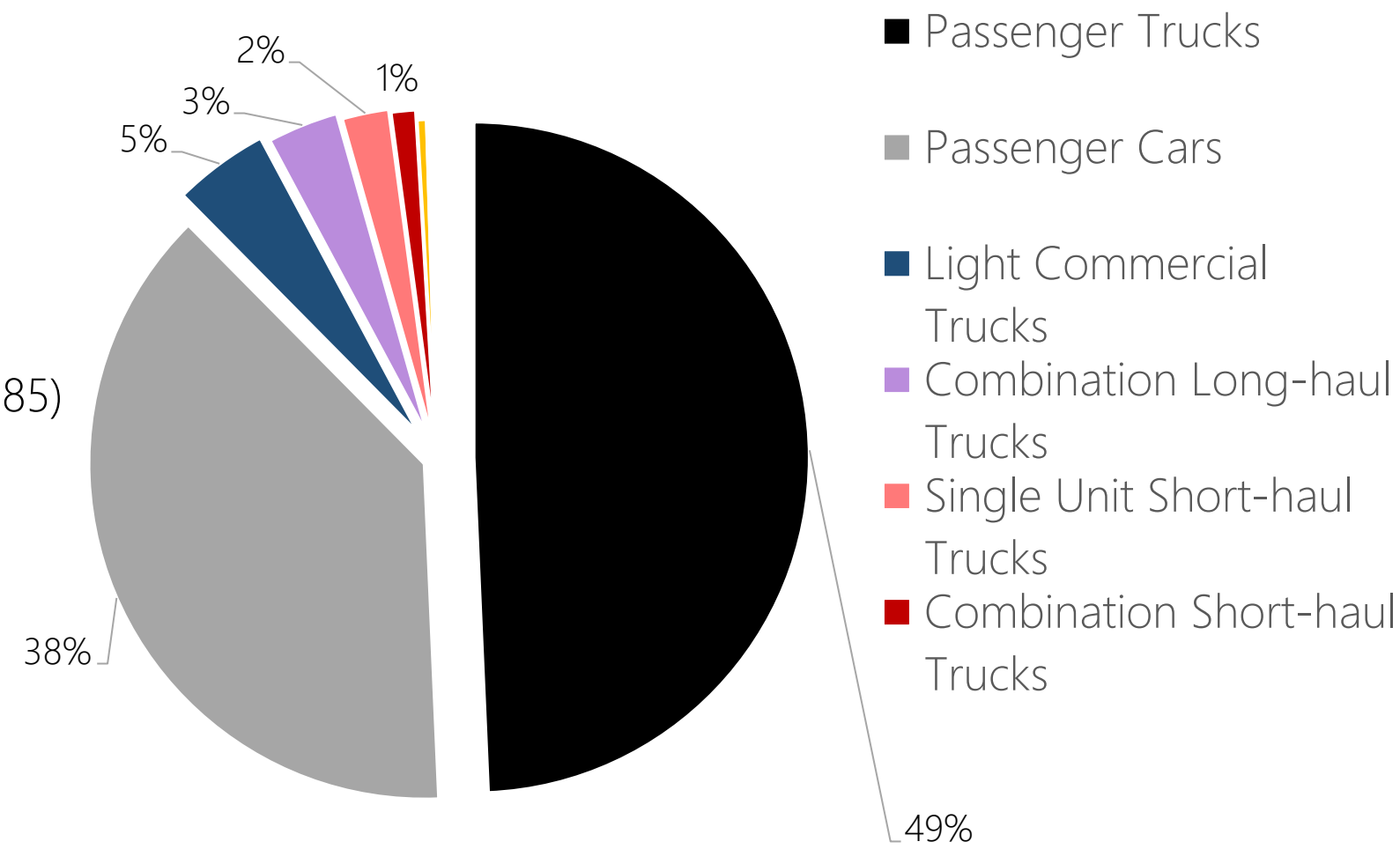
VEHICLE MILES TRAVELED BREAKDOWN

VMT by Fuel and Vehicle Type

Houston 2017 VMT breakdown by fuel type



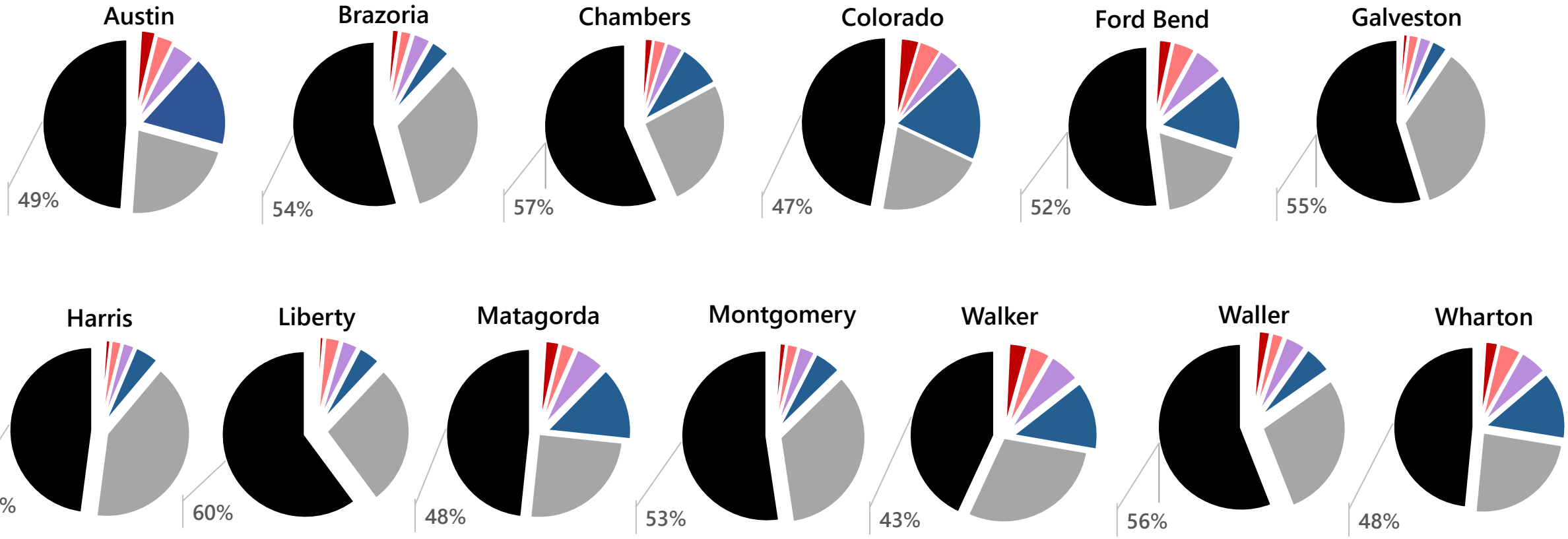
Houston Region 2017 VMT by Vehicle Type



Public Health Region 6 VMT by Vehicle Type and County

Key:

- Passenger Trucks
- Light Commercial Trucks
- Combination Short-Haul Trucks
- Passenger Cars
- Single Unit Short-Haul Trucks
- Combination Long-Haul Trucks

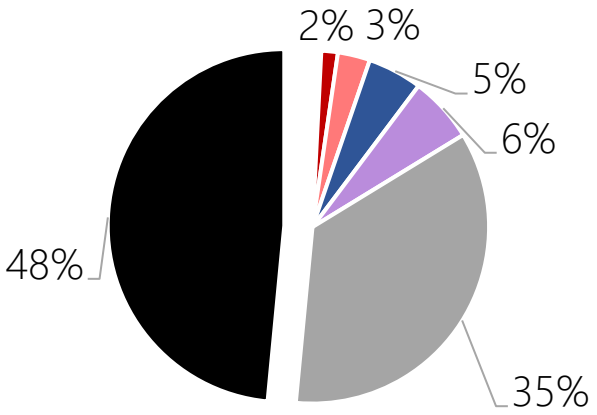


Major TX Regions VMT by Vehicle Type

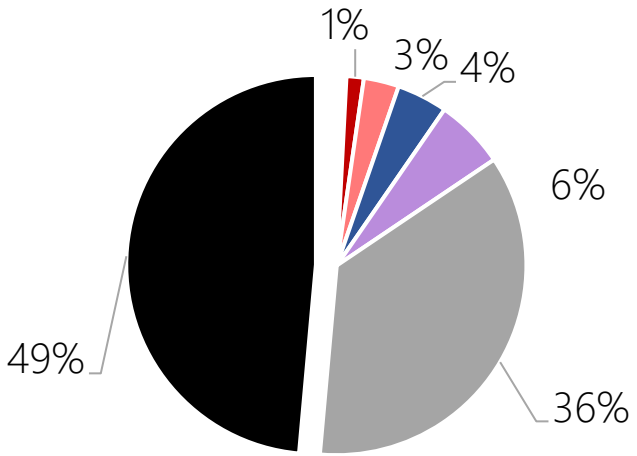
Key:

- Passenger Trucks
- Light Commercial Trucks
- Combination Short-Haul Trucks
- Passenger Cars
- Single Unit Short-Haul Trucks
- Combination Long-Haul Trucks

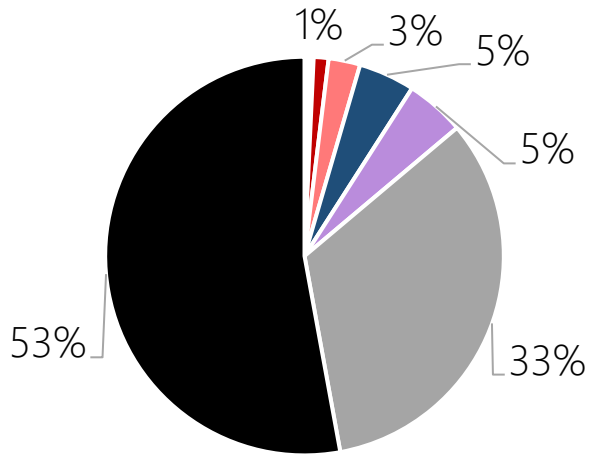
San Antonio Region



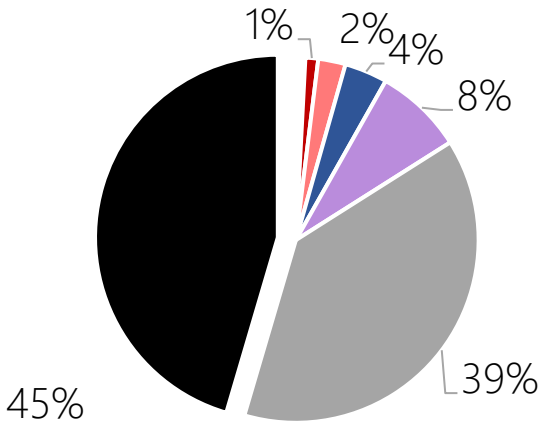
Austin Region



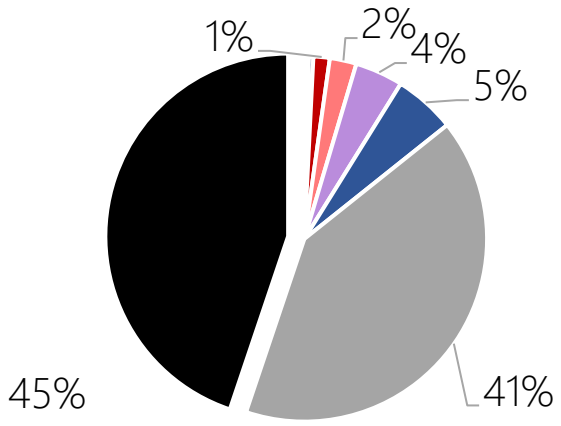
Laredo Region



El Paso Region

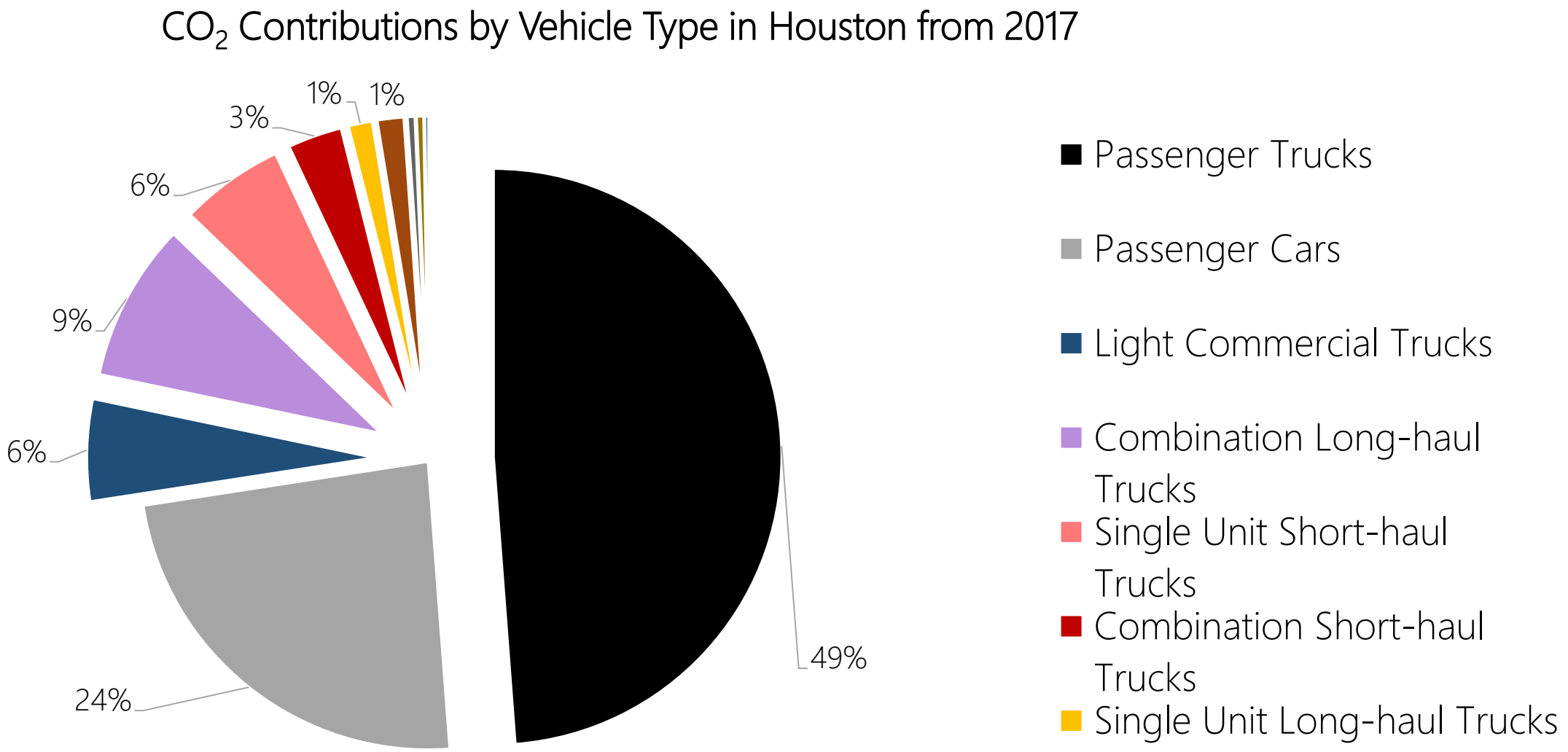


Dallas Region

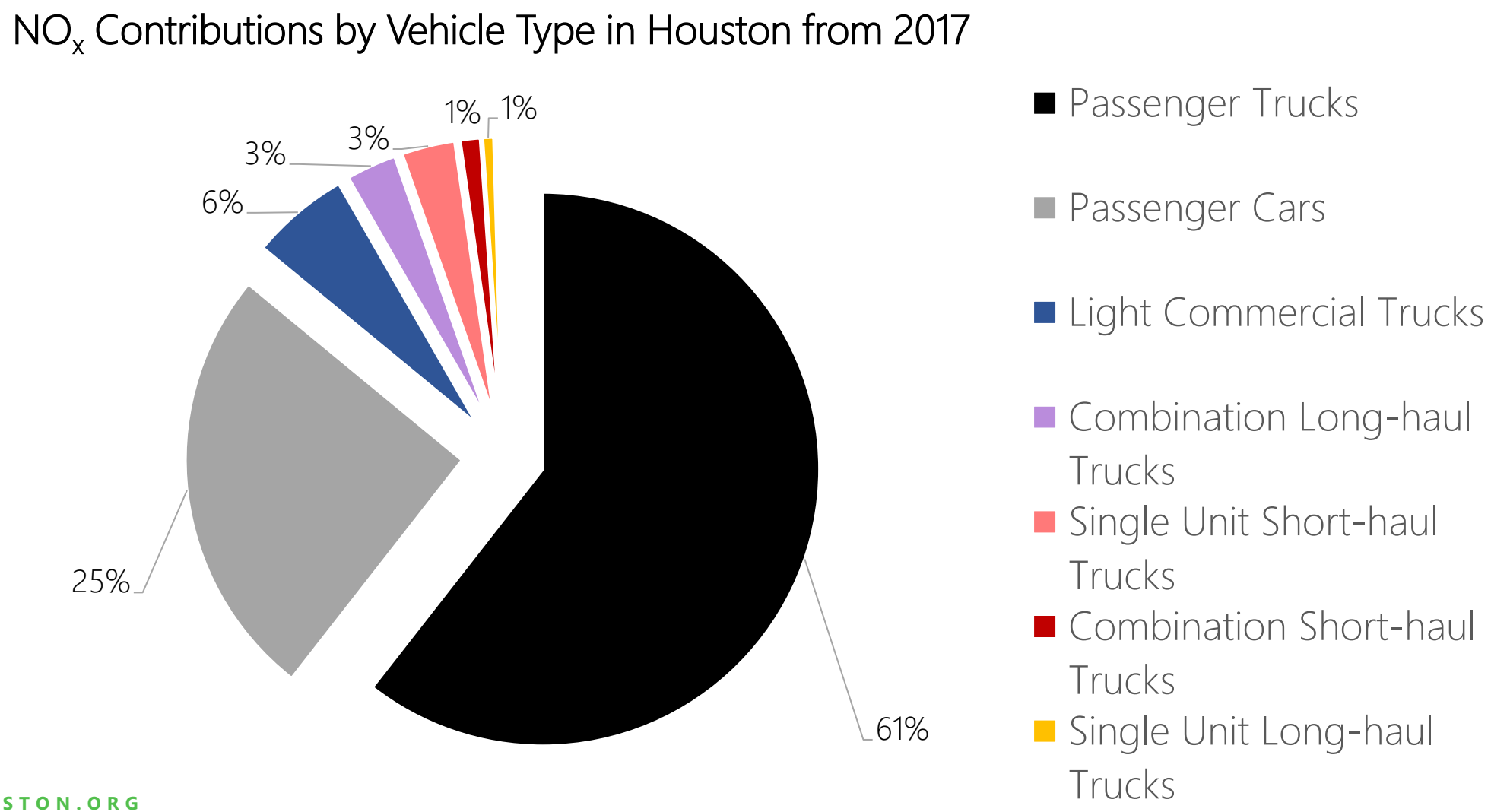


EMISSIONS CALCULATIONS

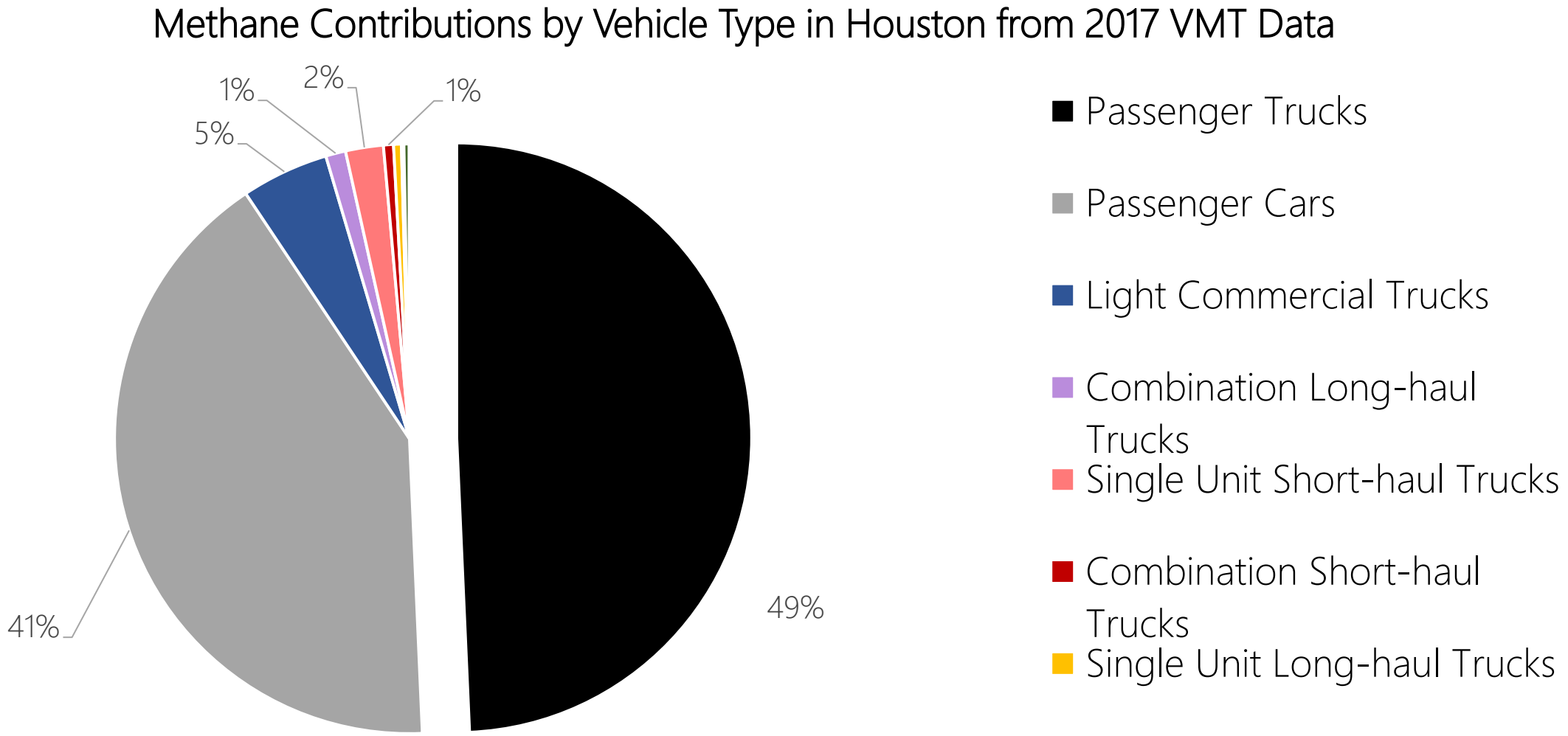
Carbon Dioxide



Nitrogen Oxides

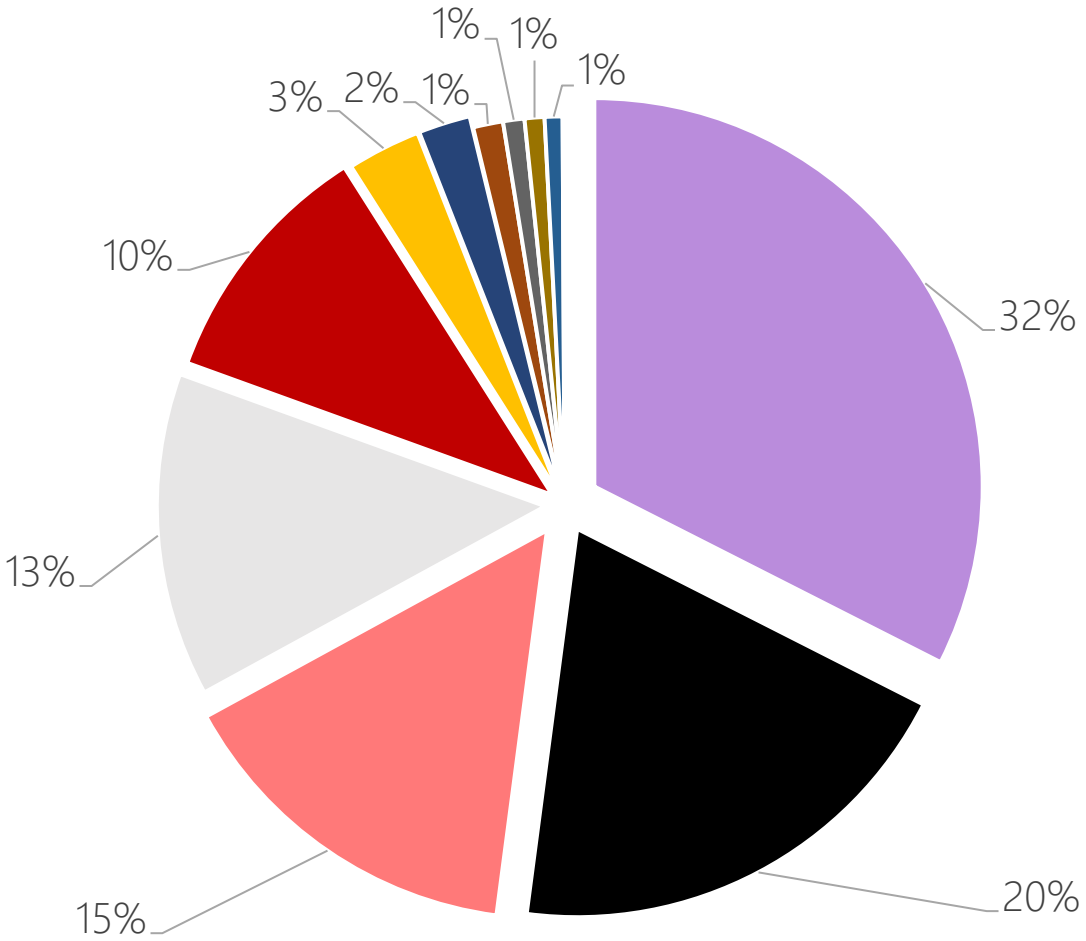


Methane


Methane Contributions by Vehicle Type in Houston from 2017 VMT Data
1%
2%
1%
5%
41%
49%
Passenger Trucks
Passenger Cars
Light Commercial Trucks
Combination Long-haul Trucks
Single Unit Short-haul Trucks
Combination Short-haul Trucks
Single Unit Long-haul Trucks

Particulate Matter (2.5)

Particulate Matter (2.5) Contributions by Vehicle Type in Houston from 2017



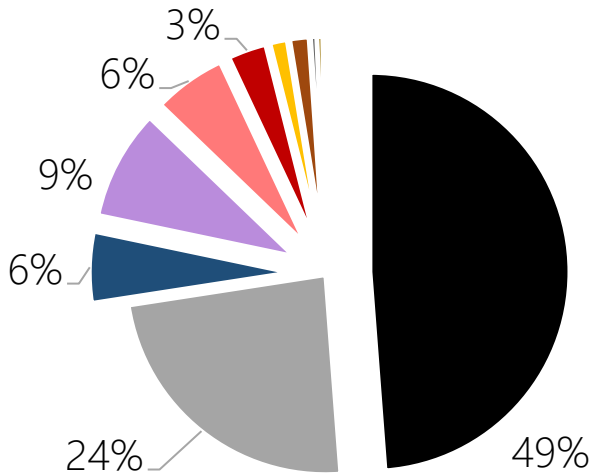
- Combination Long-haul Trucks
- Passenger Trucks
- Single Unit Short-haul Trucks
- Passenger Cars
- Combination Short-haul Trucks
- Single Unit Long-haul Trucks
- Light Commercial Trucks
- Refuse Trucks
- Transit Buses
- Intercity Buses
- School Buses

Emissions Contributions by Vehicle Type in Houston Region from 2017 VMT Data

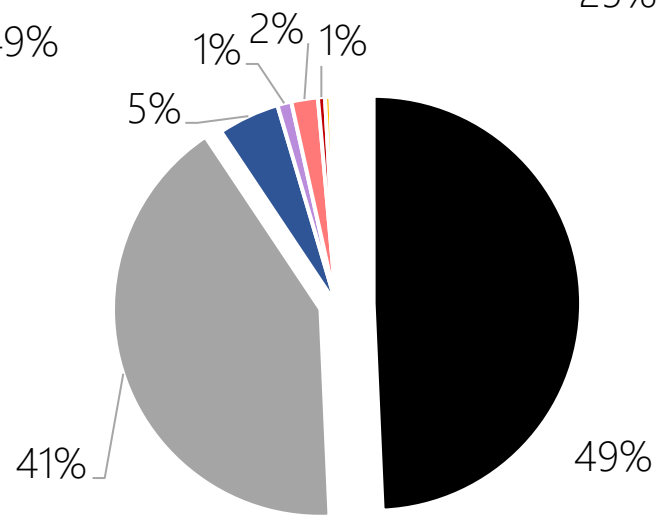
Key:

- Passenger Trucks
- Light Commercial Trucks
- Combination Short-Haul Trucks
- Passenger Cars
- Single Unit Short-Haul Trucks
- Combination Long-Haul Trucks

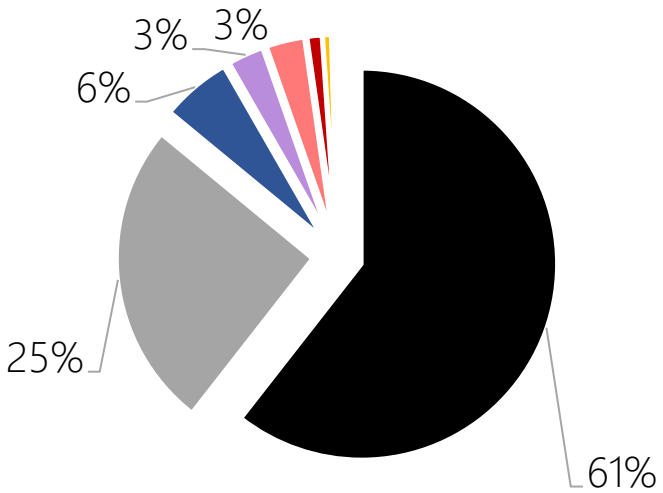
CO_2



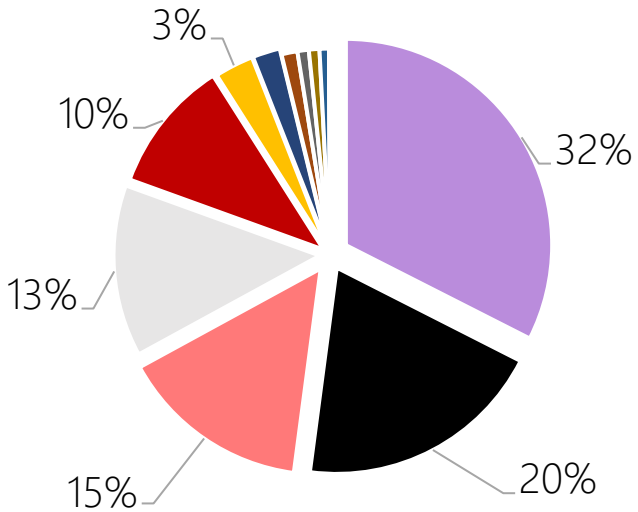
Methane



NO_x

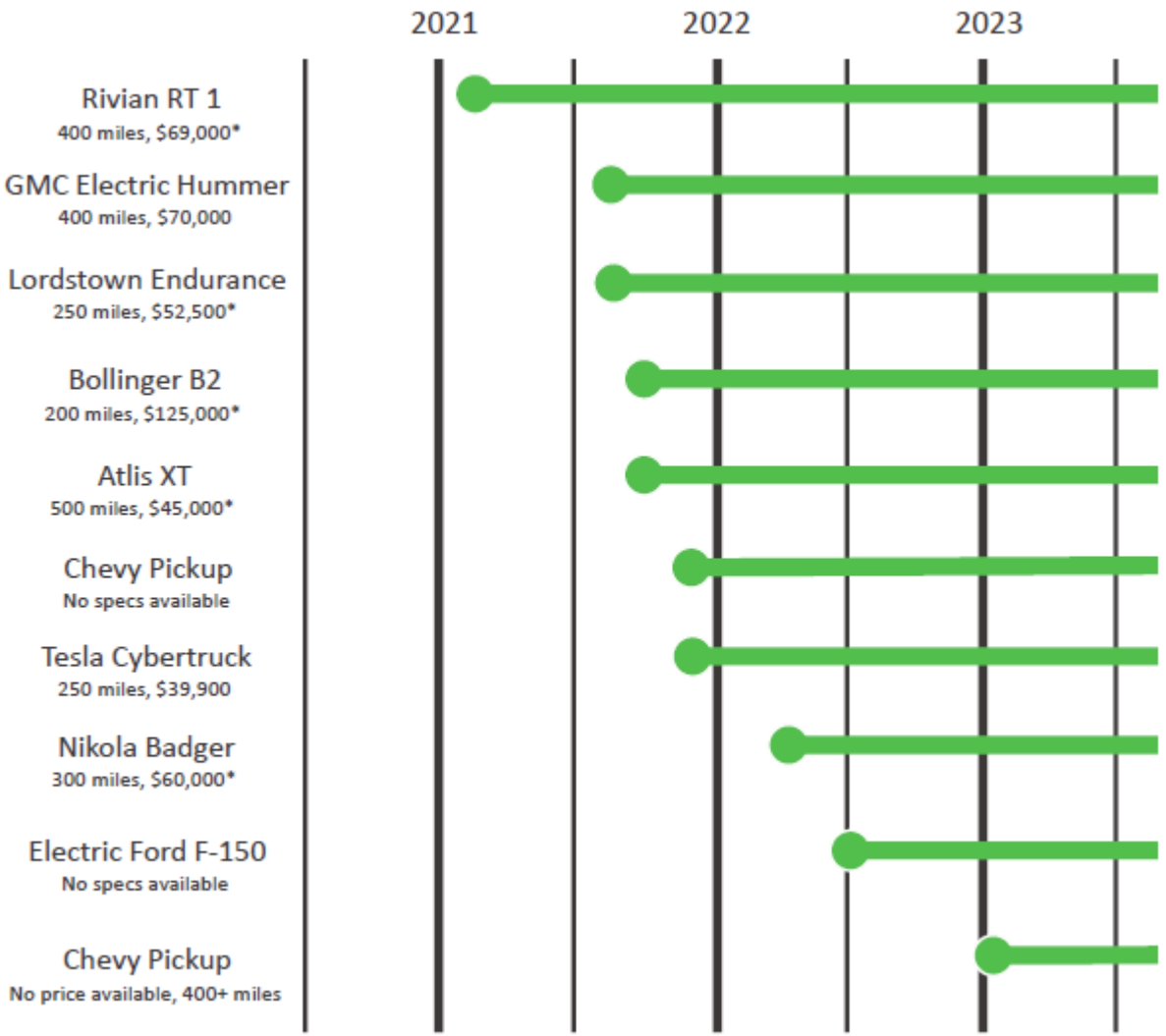


Particulate Matter

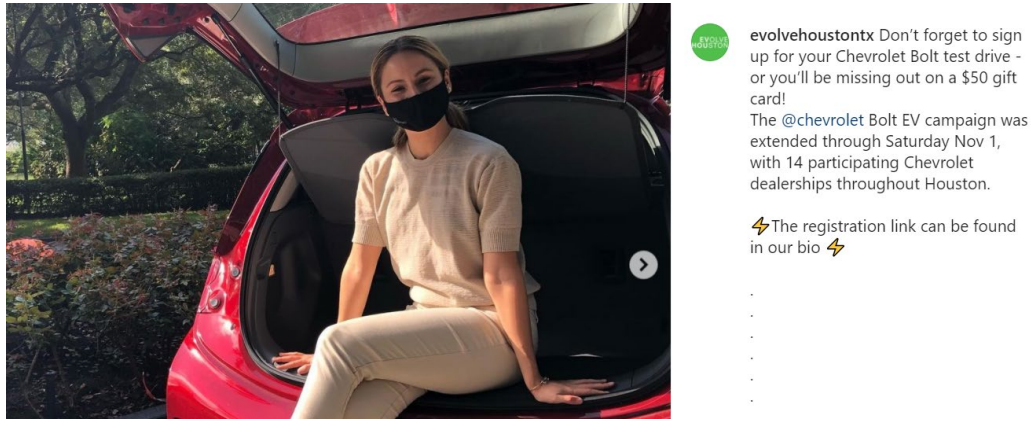


Implications and Applications

Future of Light-Duty Electric Trucks



Between 2021-2023, 10 electric light-duty truck models are forecasted to become available



evolvehoustontx Don't forget to sign up for your Chevrolet Bolt test drive - or you'll be missing out on a $50 gift card!
The @chevrolet Bolt EV campaign was extended through Saturday Nov 1, with 14 participating Chevrolet dealerships throughout Houston.

⚡The registration link can be found in our bio ⚡

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Lordstown Endurance Texas Debut

EVOLVE HOUSTON | LORDSTOWN

VIP TEXAS DEBUT FOR FLEET PROFESSIONALS 2021 LORDSTOWN ENDURANCE ELECTRIC PICKUP TRUCK

eIQ Mobility Fleet Studies

EVolve Houston is partnering with eIQ Mobility to complete fleet electrification studies on five major fleets within the Houston area

- ❑Historical fleet data informing least-cost equivalent EV models for existing fleet vehicles based on economic and logistical feasibility,

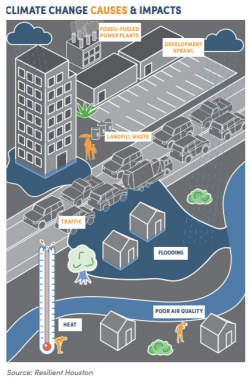
- ❑Harris County and the City of Houston studies underway – stay tuned!

EVH Grants Database

Estimated Benefits for Houston

UNIVERSITY of HOUSTON

Evaluation of the air quality impacts of clean combustion technologies, emissions controls and fleet electrification in the Houston Metropolitan Area for the year 2040



Source: Resilient Houston

With current projected growth and no additional emissions control strategies:

- ❑ Additional 122 deaths
- ❑ Additional 1200 asthma cases per year
- ❑ Additional 833 days of school loss

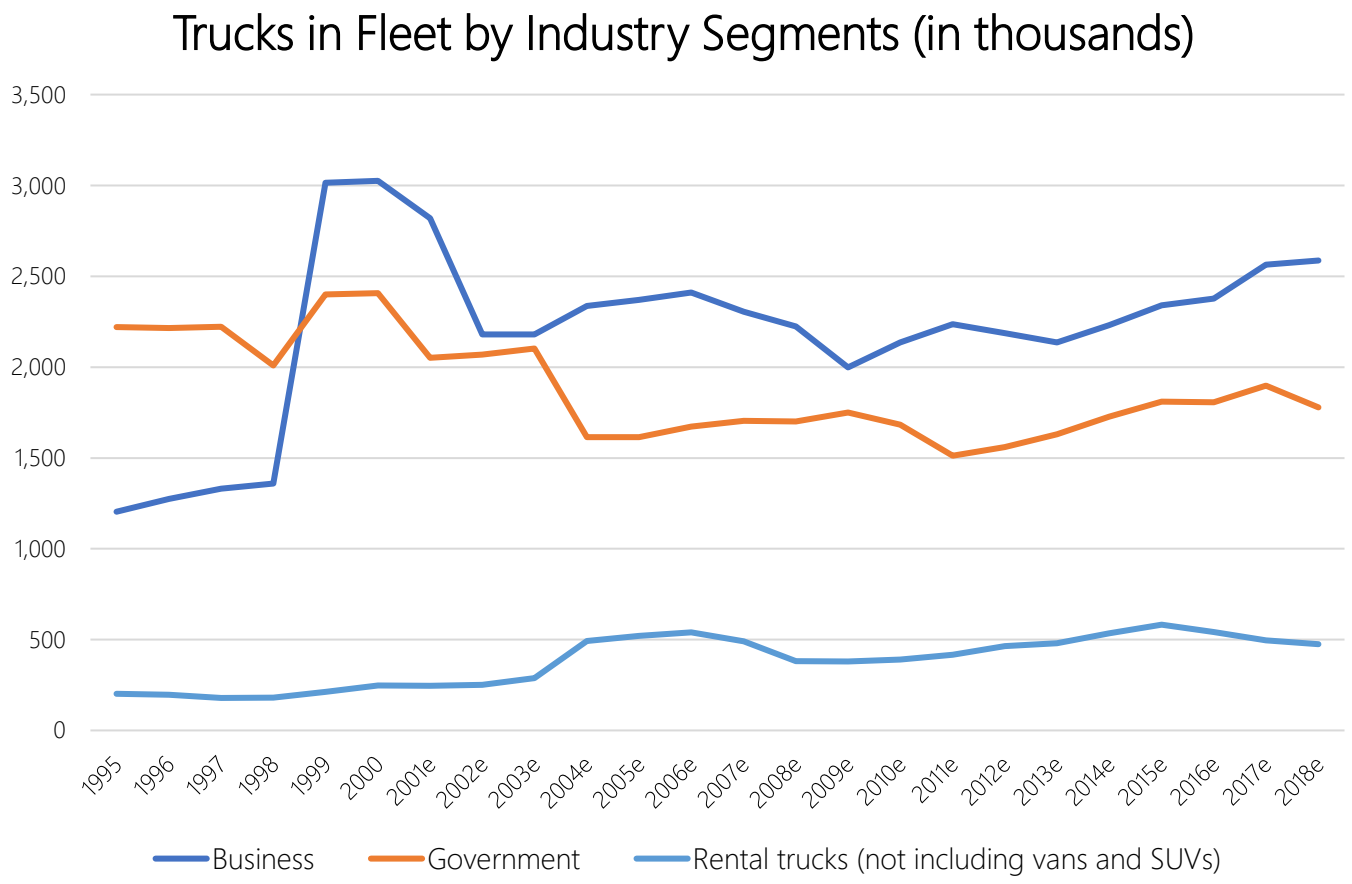
Under a fully electrified scenario:

- ❑ 90% reduction in emissions from 2013 levels
- ❑ 24,652 fewer annual asthma cases
- ❑ $152 million in benefits from prevented mortality from reduced exposure to ozone
- ❑ $1.99 billion in benefits from prevented mortality from reduced exposure to PM2.5
- ❑ Prevent over 18,000 school loss days

Thank You

Back Deck

Back Deck – Trucks by Segment



Implications & Applications

Recommended EVH Applications:

- ❑ Involve Research Committee to investigate vehicle type and sales data
- ❑ Supplement future funding, grant applications
- ❑ Support Policy Committee educational materials for legislators
- ❑ Utilize in regional charging infrastructure and fleet electrification planning
- ❑ Distribute materials to Marketing Committee to demonstrate thought-leadership

Next Steps:

- ❑ Produce final paper for fleet roundtable discussion summarizing VMT analysis and emissions calculations

Back Deck – Public Health Regions

Public Health Region 11	
Laredo	
County	*FIPS codes (4*
Aransas	007
Bee	025
Brooks	047
Cameron	061
Duval	131
Hidalgo	215
Jim Hogg	247
Jim Wells	249
Kenedy	261
Kleberg	273
Live Oak	297
McMullen	311
Nueces	355
Refugio	391
San Patricio	409
Starr	427
Webb	479
Willacy	489
Zapata	505

Public Health Region 10	
El Paso	
County	*FIPS codes*
Brewster	043
Culberson	109
El Paso	141
Hudspeth	229
Jeff Davis	243
Presidio	377

Public Health Region 3	
Dallas	
County	*FIPS codes*
Collin	085
Cooke	097
Dallas	113
Denton	121
Ellis	139
Erath	143
Fannin	147
Grayson	181
Hood	221
Hunt	231
Johnson	251
Kaufman	257
Navarro	349
Palo Pinto	363
Parker	367
Rockwall	397
Somervell	425
Tarrant	439
Wise	497

Public Health Region 8	
San Antonio	
County	*FIPS codes (*
Atascosa	013
Bandera	019
Bexar	029
Calhoun	057
Comal	091
DeWitt	123
Dimmit	127
Edwards	137
Frio	163
Gillespie	171
Goliad	175
Gonzales	177
Guadalupe	187
Jackson	239
Karnes	255
Kendall	259
Kerr	265
Kinney	271
La Salle	283
Lavaca	285
Maverick	323
Medina	325
Real	385
Uvalde	463
Val Verde	465
Victoria	469
Wilson	493
Zavala	507

Public Health Region 7	
Austin	
County	*FIPS codes (48 xxx)*
Bastrop	021
Bell	027
Blanco	031
Bosque	035
Brazos	041
Burleson	051
Burnet	053
Caldwell	055
Coryell	099
Falls	145
Fayette	149
Freestone	161
Grimes	185
Hamilton	193
Hays	209
Hill	217
Lampasas	281
Lee	287
Leon	289
Limestone	293
Llano	299
McLennan	309
Madison	313
Milam	331
Mills	333
Robertson	395
San Saba	411
Travis	453
Washington	477
Williamson	491

Back Deck – Carbon Dioxide

Total CO2 emissions contributions			
Vehicle Type	Total VMT	Total CO2 contribution (tons)	Percentage of CO2 contribution
Passenger Trucks	30,026,331,448	17,654,989	49%
Passenger Cars	23,305,729,421	8,598,448	24%
Light Commercial Trucks	2,797,076,118	2,071,872	6%
Combination Long-haul Trucks	2,088,071,662	3,219,234	9%
Single Unit Short-haul Trucks	1,374,779,949	2,109,672	6%
Combination Short-haul Trucks	724,913,199	1,104,866	3%
Single Unit Long-haul Trucks	281,570,276	485,404	1%
Refuse Trucks	81,539,041	540,226	1%
Transit Buses	57,085,691	156,702	0.43%
Intercity Buses	53,169,041	145,950	0.40%
School Buses	49,028,943	78,764	0.22%
Motorcycles	42,284,957	9,301	0.03%
Motor Homes	6,051,098	5,270	0.01%
Grand Total	60,887,630,845	36,180,697	100%

Back Deck – Nitrous Oxide

Nitrous Oxide		
Vehicle Type	NOx (tons)	Percentage NOx Contribution
Passenger Trucks	206.86	61%
Passenger Cars	86.80	25%
Light Commercial Trucks	19.59	6%
Combination Long-haul Trucks	10.02	3%
Single Unit Short-haul Trucks	10.62	3%
Combination Short-haul Trucks	3.98	1%
Single Unit Long-haul Trucks	2.18	1%
Refuse Trucks	0.40	0%
Transit Buses	0.27	0%
Intercity Buses	0.26	0%
School Buses	0.25	0%
Motorcycles	0.29	0%
Motor Homes	0.06	0%
Grand Total	341.60	100%

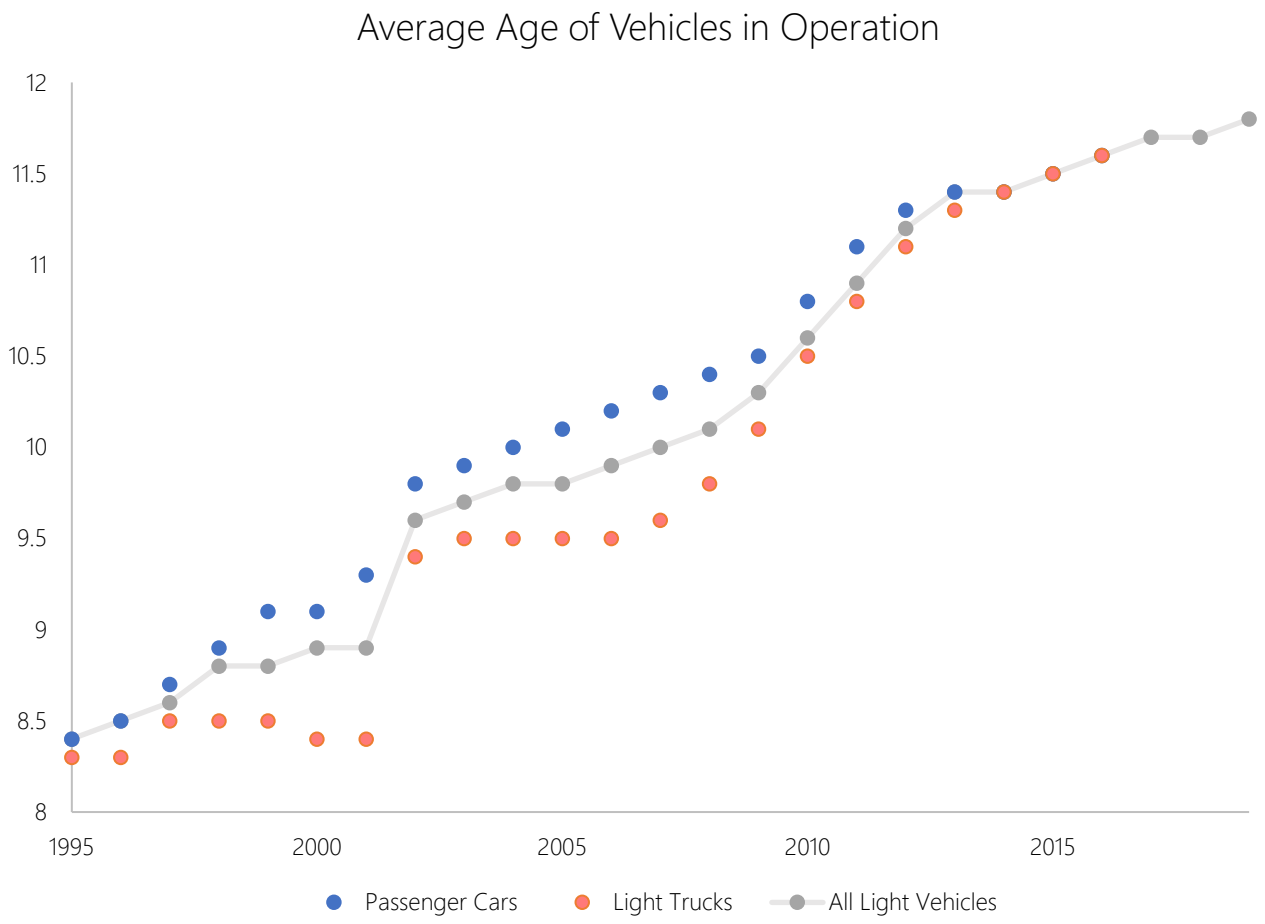
Back Deck – Methane

Methane		
Vehicle Type	CH4 (tons)	Percentage CH4 contribution
Passenger Trucks	481.00	49%
Passenger Cars	403.16	41%
Light Commercial Trucks	46.73	5%
Combination Long-haul Trucks	10.65	1%
Single Unit Short-haul Trucks	20.21	2%
Combination Short-haul Trucks	5.35	1%
Single Unit Long-haul Trucks	4.16	0%
Refuse Trucks	0.46	0%
Transit Buses	0.29	0%
Intercity Buses	0.27	0%
School Buses	0.29	0%
Motorcycles	2.84	0%
Motor Homes	0.13	0%
Grand Total	975.54	100%

Back Deck – Particulate Matter (2.5)

Fine Particulate Matter (2.5)		
Vehicle Type	PM2.5 (tons)	Percentage PM2.5 Contribution
Combination Long-haul Trucks	1,312.24	32%
Passenger Trucks	792.29	20%
Single Unit Short-haul Trucks	604.67	15%
Passenger Cars	544.87	13%
Combination Short-haul Trucks	423.10	10%
Single Unit Long-haul Trucks	123.45	3%
Light Commercial Trucks	87.45	2%
Refuse Trucks	50.47	1%
Transit Buses	35.88	1%
Intercity Buses	33.41	1%
School Buses	30.04	1%
Motor Homes	1.83	0%
Motorcycles	1.32	0%
Grand Total	4,041.02	100%

Back Deck – Average Vehicle Age



Back Deck – San Antonio VMT

San Antonio						
Row Labels	Diesel	Electricity	Ethanol (E-85) Capab	Gasoline	Grand Total	Percentage
Motor Homes	1,473,169			2,101,240	3,574,409	0%
Motorcycles				18,569,554	18,569,554	0%
School Buses	22,581,363			660,736	23,242,099	0%
Intercity Buses	25,478,770				25,478,770	0%
Transit Buses	27,012,408				27,012,408	0%
Refuse Trucks	47,209,129			822,835	48,031,964	0%
Single Unit Long-haul Trucks	56,693,355			29,595,823	86,289,178	0%
Combination Short-haul Trucks	405,540,894			35,732,165	441,273,059	2%
Single Unit Short-haul Trucks	566,342,716			295,087,904	861,430,620	3%
Light Commercial Trucks	118,874,228	75,140	13,732,287	1,322,049,845	1,454,731,500	5%
Combination Long-haul Trucks	1,750,593,398				1,750,593,398	6%
Passenger Cars	61,791,982	8,978,272	22,616,230	10,175,487,340	10,268,873,825	35%
Passenger Trucks	679,688,999	1,011,021	117,566,259	13,331,789,594	14,130,055,873	48%
Grand Total	3,763,280,412	10,064,433	153,914,776	25,211,897,035	29,139,156,657	100%

Back Deck – Austin VMT

Austin						
Row Labels	Diesel	Electricity	Ethanol (E-85) Capab	Gasoline	Grand Total	Percentage
Motor Homes	1,866,540			2,662,321	4,528,861	0%
Motorcycles				23,682,350	23,682,350	0%
School Buses	29,546,452			864,536	30,410,987	0%
Intercity Buses	33,034,004				33,034,004	0%
Transit Buses	35,593,704				35,593,704	0%
Refuse Trucks	59,908,421			1,044,178	60,952,599	0%
Single Unit Long-haul Trucks	69,591,830			36,329,258	105,921,088	0%
Combination Short-haul Trucks	487,801,447			43,776,401	531,577,848	1%
Single Unit Short-haul Trucks	717,004,151			364,748,439	1,081,752,590	3%
Light Commercial Trucks	129,610,279	285,788	13,571,933	1,411,511,818	1,554,979,818	4%
Combination Long-haul Trucks	2,142,091,193				2,142,091,193	6%
Passenger Cars	101,565,500	38,094,682	27,357,395	12,739,429,382	12,906,446,959	36%
Passenger Trucks	904,206,181	3,670,416	138,051,019	16,442,164,872	17,488,092,488	49%
Grand Total	4,711,819,701	42,050,885	178,980,347	31,066,213,555	35,999,064,489	100%

Back Deck – El Paso VMT

El Paso						
Row Labels	Diesel	Electricity	Ethanol (E-85) Capab	Gasoline	Grand Total	Percentage
Motor Homes	364,887			520,453	885,339	0%
Motorcycles				5,183,144	5,183,144	0%
School Buses	6,202,760			181,494	6,384,255	0%
Intercity Buses	6,882,003				6,882,003	0%
Transit Buses	7,387,799				7,387,799	0%
Refuse Trucks	11,841,456			206,392	12,047,848	0%
Single Unit Long-haul Trucks	16,976,892			8,862,504	25,839,396	0%
Combination Short-haul Trucks	81,232,028			7,051,407	88,283,435	1%
Single Unit Short-haul Trucks	126,956,971			61,674,532	188,631,503	2%
Light Commercial Trucks	17,283,370		2,302,347	275,812,316	295,398,033	4%
Combination Long-haul Trucks	610,284,851				610,284,851	8%
Passenger Cars	11,122,775	1,019,330	5,741,116	2,981,871,963	2,999,755,184	39%
Passenger Trucks	115,023,949	79,339	26,500,784	3,396,889,328	3,538,493,400	45%
Grand Total	1,011,559,743	1,098,669	34,544,248	6,738,253,531	7,785,456,191	100%

Back Deck – Dallas VMT

Dallas						
Row Labels	Diesel	Electricity	Ethanol (E-85) Capab	Gasoline	Grand Total	Percentage
Motor Homes	3,112,251			4,439,129	7,551,380	0%
School Buses	40,357,350			1,180,865	41,538,215	0%
Intercity Buses	44,286,097				44,286,097	0%
Transit Buses	48,689,141				48,689,141	0%
Motorcycles				51,376,433	51,376,433	0%
Refuse Trucks	99,807,279			1,739,598	101,546,877	0%
Single Unit Long-haul Trucks	186,342,332			97,276,917	283,619,249	0%
Combination Short-haul Trucks	972,035,098			88,045,159	1,060,080,257	1%
Single Unit Short-haul Trucks	1,144,431,985			585,123,301	1,729,555,286	2%
Combination Long-haul Trucks	3,113,747,739				3,113,747,739	4%
Light Commercial Trucks	225,795,860	1,055,592	33,199,345	3,721,406,165	3,981,456,962	5%
Passenger Cars	138,905,506	61,195,182	58,072,037	29,684,191,578	29,942,364,304	41%
Passenger Trucks	1,189,893,363	5,857,546	253,446,610	31,384,563,555	32,833,761,074	45%
Grand Total	7,207,404,002	68,108,320	344,717,992	65,619,342,700	73,239,573,015	100%

Back Deck – Laredo VMT

Laredo Region						
Row Labels	Diesel	Electricity	Ethanol (E-85) Capable	Gasoline	Grand Total	Percentage
Motor Homes	809,511			1,154,638	1,964,149	0.0%
Motorcycles				12,406,167	12,406,167	0.1%
School Buses	13,941,295			407,925	14,349,220	0.1%
Intercity Buses	15,546,532				15,546,532	0.1%
Transit Buses	16,719,989				16,719,989	0.1%
Refuse Trucks	25,880,287			451,082	26,331,369	0.1%
Single Unit Long-haul Trucks	33,849,869			17,670,762	51,520,631	0.3%
Combination Short-haul Trucks	209,751,906			18,085,583	227,837,490	1.2%
Single Unit Short-haul Trucks	316,210,023			169,338,938	485,548,961	2.6%
Light Commercial Trucks	85,403,953	20,394	8,214,279	769,449,984	863,088,610	4.6%
Combination Long-haul Trucks	907,292,930				907,292,930	4.8%
Passenger Cars	28,641,488	1,707,185	17,313,431	6,238,250,595	6,285,912,700	33.2%
Passenger Trucks	391,830,601	104,770	84,393,353	9,520,268,330	9,996,597,053	52.9%
Grand Total	2,045,878,384	1,832,349	109,921,063	16,747,484,005	18,905,115,800	100%

Back Deck – Diesel Assumptions

Diesel Assumptions

Vehicle Type	Vehicle Year	CH_4 Factor (g / mile)	N_2O Factor (g / mile)
Diesel Passenger Cars	1996-present	0.0005	0.0010
Diesel Light-Duty Trucks	1996-present	0.0010	0.0015
Diesel Medium- and Heavy-Duty Vehicles	1960-present	0.0051	0.0048

https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf

Fuel Type	kg CO_2 per unit	Unit
Diesel Fuel	10.21	gallon

https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf

Average miles per gallon (mpg) diesel	AFLEET assumptions	
Passenger Trucks	19.7	
Passenger Cars	31.4	
Light Commercial Trucks	15.6	
Combination Long-haul Trucks	7.3	
Single Unit Short-haul Trucks	7.4	
Combination Short-haul Trucks	7.4	
Single Unit Long-haul Trucks	6.6	
Refuse Trucks	1.7	
Transit Buses	4.1	
Intercity Buses	4.1	
School Buses	7.00	https://afdc.energy.gov/data/
Motorcycles	49.7	
Motor Homes	9	https://www.camperguide.org/average-rv-tank-size/

Back Deck – Gasoline Assumptions

Gasoline Assumptions		
Average miles per gallon (mpg) diesel	AFLEET assumptions for MPGGE	Other Sources Besides AFLEET
Passenger Trucks	16.4	
Passenger Cars	26.2	
Light Commercial Trucks	13	
Combination Long-haul Trucks	6.1	
Single Unit Short-haul Trucks	6.2	
Combination Short-haul Trucks	6.2	
Single Unit Long-haul Trucks	5.5	
Refuse Trucks	1.4	
Transit Buses	3.4	
Intercity Buses	3.4	
School Buses	6.20	https://afdc.energy.gov/data/
Motorcycles	44	
Motor Homes	16	https://www.camperguide.org/average-rv-tank-size/
	https://afleet-web.es.anl.gov/afleet/	

Vehicle Type	Year	CH_4 Factor (g / mile)	N_2O Factor (g / mile)
Gasoline Passenger Cars	2009-present	0.0173	0.0036
Gasoline Light-Duty Trucks (Vans, Pickup Trucks, SUVs)	2008-present	0.0163	0.0066
Gasoline Heavy-Duty Vehicles	2008-present	0.0333	0.0134
Gasoline Motorcycles	1996-present	0.0672	0.0069
	https://www.epa.gov/sites/production/files/2018-03/documents/emission-factors_mar_2018_0.pdf		

Back Deck – Ethanol-85 Assumptions

Ethanol-85 Assumptions		
	AFLEET assumptions for MPGGE	
passenger car	26.2	
passenger truck	16.4	
light commercial truck	13	
	https://afleet-web.es.anl.gov/afleet/	
Fuel Type	kg CO_2 per	Unit
85% ethanol, 15% gasoline	6.20	gallon

Back Deck – Electricity Assumptions

Electricity Calculations/Assumptions

Based on EIA calculator

126 MJ/gallon of gasoline
3.6 MJ/kWh
35 kWh/gallon

kWh/mi ≈ 35 ÷ MPGe

	Calculated kWh/mile	AFLEET assumptions for MPGGE
	kWh/mile	MPGGE
passenger car	0.486111111	72
passenger truck	0.79006772	44.3
light commercial truck	1.038575668	33.7

https://afleet-web.es.anl.gov/afleet/

	Total Output Emission Factors			Non-Baseload Emission Factors		
eGRID Subregion	CO_2 Factor (lb / MWh)	CH_4 Factor (lb / MWh)	N_2O Factor (lb /	CO_2 Factor (lb / MWh)	CH_4 Factor (lb /	N_2O Factor (lb / MWh)
ERCT (ERCOT All)	1,009.2	0.076	0.011	1,402.8	0.108	0.015