



# **Eight-County Houston-Galveston-Brazoria (HGB) Area Ozone Modeling Emissions Inventories**

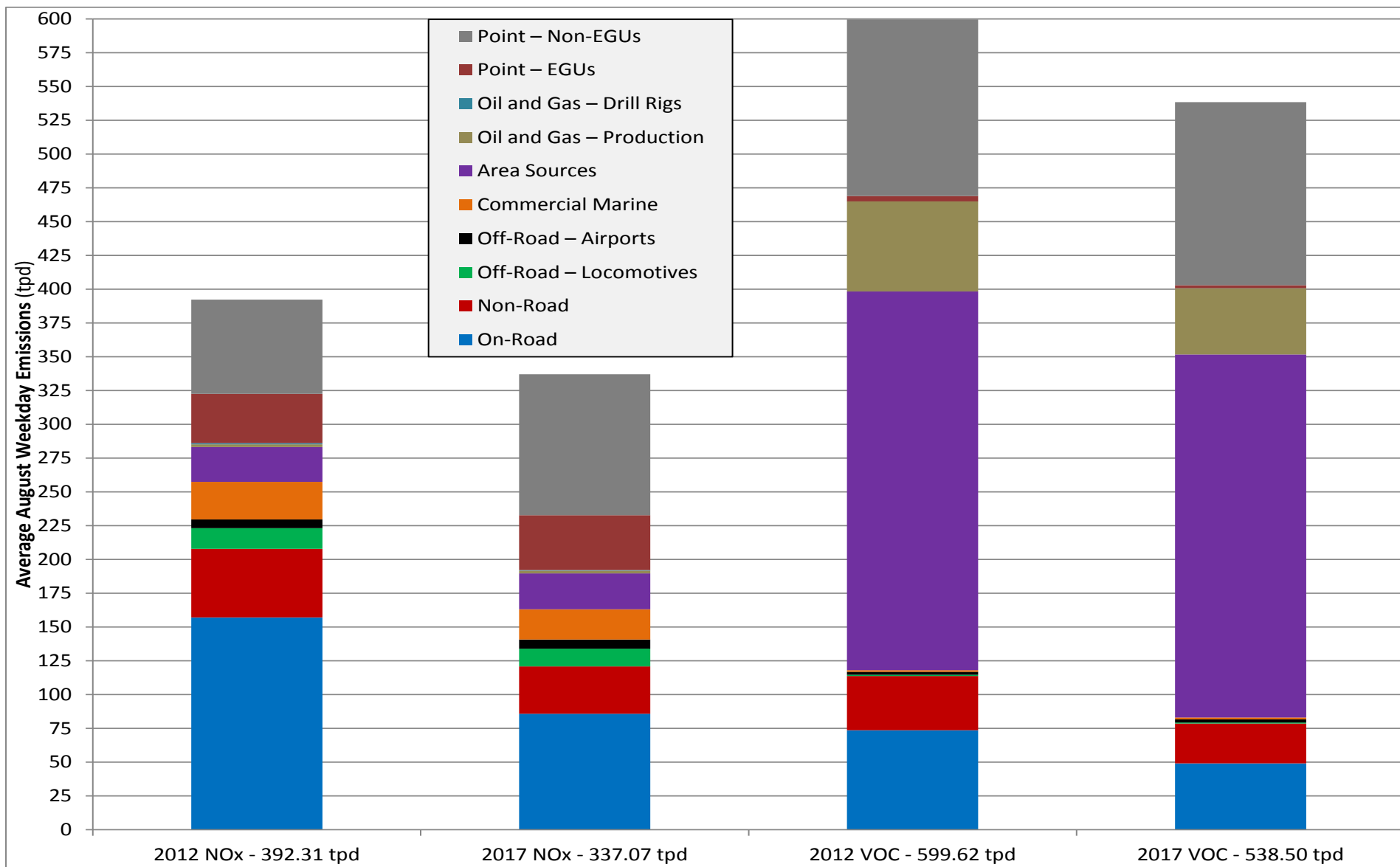
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July 26, 2016



# Changes in HGB Area NO<sub>x</sub> and VOC Emission Estimates by Source Category from 2012 to 2017





# 2012 Eight-County HGB Area Summary of Anthropogenic Emissions

HGB Area Source Category	NO <sub>x</sub> Emissions (tpd)	VOC Emissions (tpd)	CO Emissions (tpd)
On-Road	157.07	73.60	835.43
Non-Road	50.78	40.11	518.13
Off-Road – Locomotives	15.34	0.99	3.14
Off-Road – Airports	6.44	2.12	19.94
Commercial Marine	27.74	1.33	4.21
Area Sources	25.79	280.22	111.45
Oil and Gas – Production	2.09	66.60	2.78
Oil and Gas – Drill Rigs	0.81	0.06	0.26
Point – EGUs (August Average)	36.49	3.91	40.27
Point – Non-EGUs (August Average)	69.76	130.68	65.16
<b>Eight-County HGB Area Total</b>	<b>392.31</b>	<b>599.62</b>	<b>1,600.77</b>



# 2017 Eight-County HGB Area Summary of Anthropogenic Emissions

HGB Area Source Category	NO <sub>x</sub> Emissions (tpd)	VOC Emissions (tpd)	CO Emissions (tpd)
On-Road	85.87	49.08	653.17
Non-Road	34.97	29.57	475.47
Off-Road – Locomotives	13.08	0.73	3.26
Off-Road – Airports	6.84	2.24	21.32
Commercial Marine	22.41	1.37	4.41
Area Sources	26.58	268.74	113.99
Oil and Gas – Production	1.87	49.05	2.67
Oil and Gas – Drill Rigs	0.57	0.07	0.25
Point – EGUs (August Average)	40.54	2.16	48.10
Point – Non-EGUs (August Average)	104.34	135.49	65.23
Eight-County HGB Area Total	337.07	538.50	1,387.87



# 2012 Eight-County HGB Point Source NO<sub>x</sub> Emissions by Industrial Classification

Standard Industrial Classification (SIC)		Daily Average Point Source NO <sub>x</sub> Emissions by Month (tpd)				
Code	Description	May	June	July	August	September
2869	Industrial Organic Chemicals, Not Elsewhere Classified	33.88	33.88	33.88	33.88	33.88
<b>4911</b>	<b>Electric Services</b>	<b>22.84</b>	<b>27.66</b>	<b>26.58</b>	<b>32.81</b>	<b>21.80</b>
2911	Petroleum Refining	22.16	22.16	22.16	22.16	22.16
<b>2813</b>	<b>Industrial Gases</b>	<b>2.18</b>	<b>2.19</b>	<b>2.46</b>	<b>2.50</b>	<b>2.40</b>
<b>4931</b>	<b>Electric and Other Services Combined</b>	<b>2.45</b>	<b>2.21</b>	<b>2.36</b>	<b>2.39</b>	<b>2.22</b>
1321	Natural Gas Liquids	1.78	1.78	1.78	1.78	1.78
1311	Crude Petroleum and Natural Gas	1.30	1.30	1.30	1.30	1.30
2819	Industrial Inorganic Chemicals	1.08	1.08	1.08	1.08	1.08
2821	Plastic Materials and Resins	1.05	1.05	1.05	1.05	1.05
2865	Cyclic Organic Crudes and Intermediates, Organic Dyes	1.03	1.03	1.03	1.03	1.03
<b>4961</b>	<b>Steam and Air Conditioning Supply</b>	<b>0.78</b>	<b>0.83</b>	<b>0.85</b>	<b>0.79</b>	<b>0.85</b>
2812	Alkalies and Chlorine	0.56	0.56	0.56	0.56	0.56
4953	Refuse Systems	0.42	0.42	0.42	0.42	0.42
4226	Special Warehousing and Storage	0.38	0.38	0.38	0.38	0.38
4922	Natural Gas Transmission	0.38	0.38	0.38	0.38	0.38
3462	Iron and Steel Forgings	0.37	0.37	0.37	0.37	0.37
2095	Roasted Coffee	0.28	0.28	0.28	0.28	0.28
4952	Sewerage Systems	0.25	0.25	0.25	0.25	0.25
2873	Nitrogenous Fertilizers	0.20	0.20	0.20	0.20	0.20
Remaining 70 SICs Below 0.2 NO <sub>x</sub> tpd		2.64	2.64	2.64	2.64	2.64
Grand Total (89 SICs among 515 Facilities)		96.02	100.65	100.01	106.25	95.02



# 2017 Eight-County HGB Point Source NO<sub>x</sub> Emissions by Industrial Classification

Standard Industrial Classification (SIC)		Daily Average Point Source NO <sub>x</sub> Emissions by Month (tpd)				
Code	Description	May	June	July	August	September
2869	Industrial Organic Chemicals, Not Elsewhere Classified	53.89	53.89	53.89	53.89	53.89
<b>4911</b>	<b>Electric Services</b>	<b>25.35</b>	<b>30.61</b>	<b>37.30</b>	<b>38.24</b>	<b>32.30</b>
2911	Petroleum Refining	30.33	30.33	30.33	30.33	30.33
<b>2813</b>	<b>Industrial Gases</b>	<b>2.76</b>	<b>2.85</b>	<b>3.15</b>	<b>3.31</b>	<b>2.87</b>
1321	Natural Gas Liquids	2.89	2.89	2.89	2.89	2.89
<b>4931</b>	<b>Electric and Other Services Combined</b>	<b>2.65</b>	<b>2.89</b>	<b>2.81</b>	<b>2.86</b>	<b>2.82</b>
<b>4961</b>	<b>Steam and Air Conditioning Supply</b>	<b>1.70</b>	<b>1.68</b>	<b>2.15</b>	<b>2.54</b>	<b>3.28</b>
2821	Plastic Materials and Resins	1.27	1.27	1.27	1.27	1.27
2819	Industrial Inorganic Chemicals	1.17	1.17	1.17	1.17	1.17
2865	Cyclic Organic Crudes and Intermediates, Organic Dyes	1.13	1.13	1.13	1.13	1.13
2812	Alkalies and Chlorine	1.13	1.13	1.13	1.13	1.13
1311	Crude Petroleum and Natural Gas	0.91	0.91	0.91	0.91	0.91
4226	Special Warehousing and Storage	0.59	0.59	0.59	0.59	0.59
3462	Iron and Steel Forgings	0.47	0.47	0.47	0.47	0.47
4953	Refuse Systems	0.39	0.39	0.39	0.39	0.39
4922	Natural Gas Transmission	0.35	0.35	0.35	0.35	0.35
4952	Sewerage Systems	0.29	0.29	0.29	0.29	0.29
5171	Petroleum Bulk Stations and Terminals	0.21	0.21	0.21	0.21	0.21
Remaining 71 SICs Below 0.2 NO <sub>x</sub> tpd		2.91	2.91	2.91	2.91	2.91
Grand Total (89 SICs among 492 Facilities)		130.38	135.94	143.33	144.88	139.18



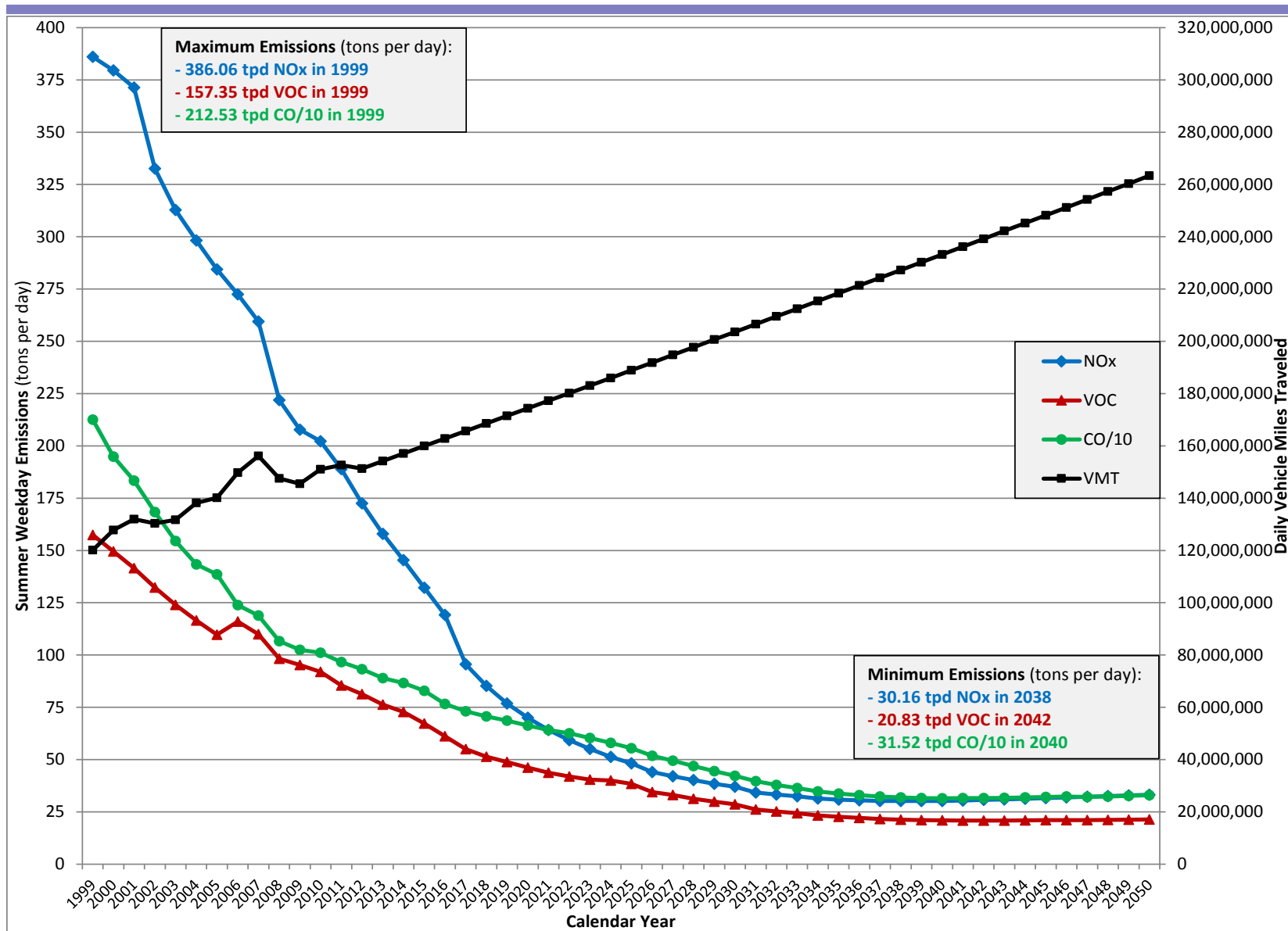
# Eight-County HGB Area Airport Emission Estimates for 2012 and 2017

<b>HGB Area Airport</b>	<b>2012 NO<sub>x</sub> Emissions (tpd)</b>	<b>2012 VOC Emissions (tpd)</b>	<b>2012 CO Emissions (tpd)</b>
George Bush Intercontinental (IAH)	4.69	1.24	8.58
William P. Hobby (HOU)	1.48	0.41	2.44
Other (268 Airports)	0.27	0.47	8.92
270-Airport Total	6.44	2.12	19.94

<b>HGB Area Airport</b>	<b>2017 NO<sub>x</sub> Emissions (tpd)</b>	<b>2017 VOC Emissions (tpd)</b>	<b>2017 CO Emissions (tpd)</b>
George Bush Intercontinental (IAH)	4.93	1.30	9.04
William P. Hobby (HOU)	1.63	0.45	2.70
Other (268 Airports)	0.28	0.49	9.58
270-Airport Total	6.84	2.24	21.32



# MOVES2014 Eight-County HGB Area On-Road Emission Trends from 1999-2050

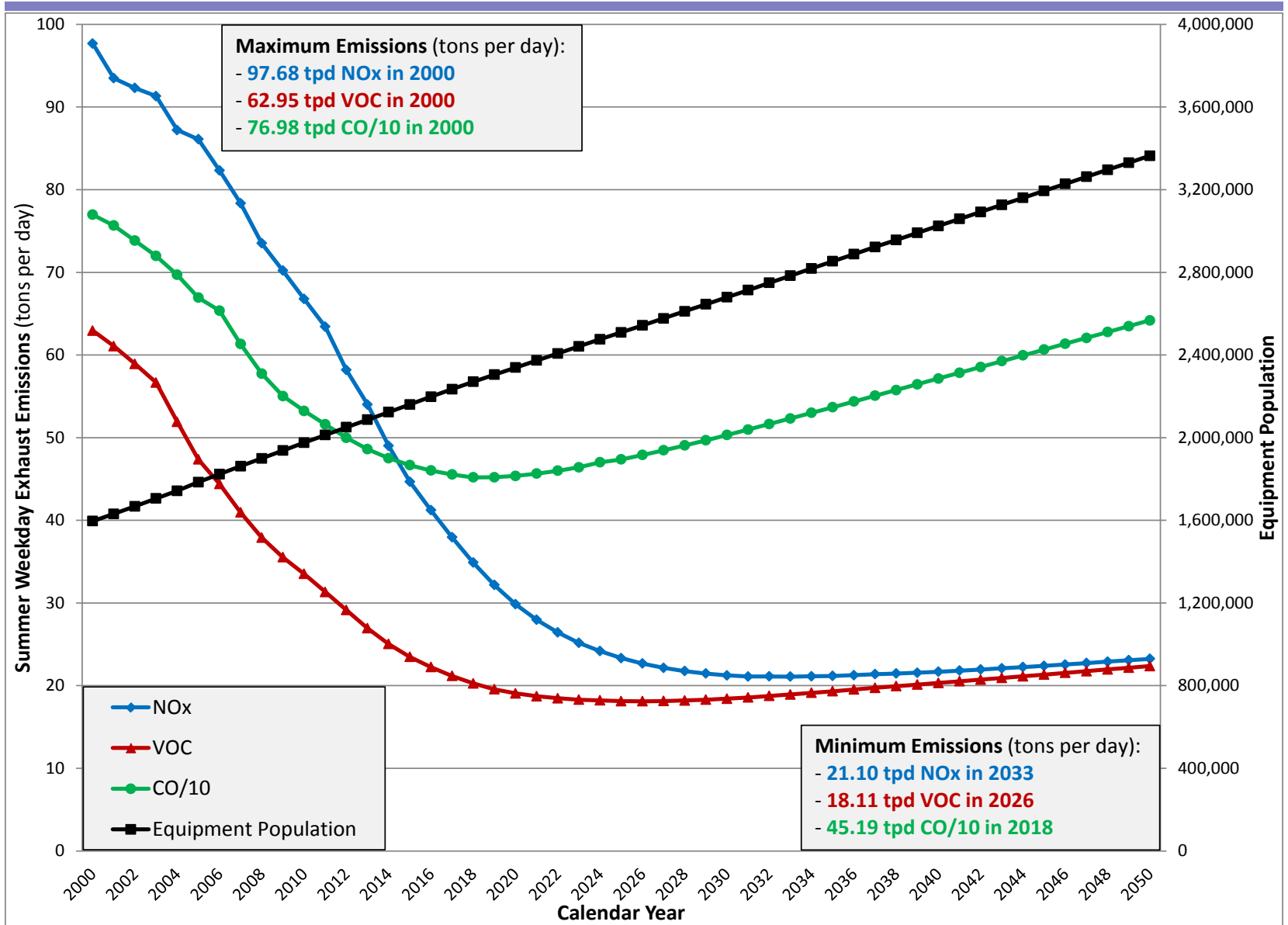






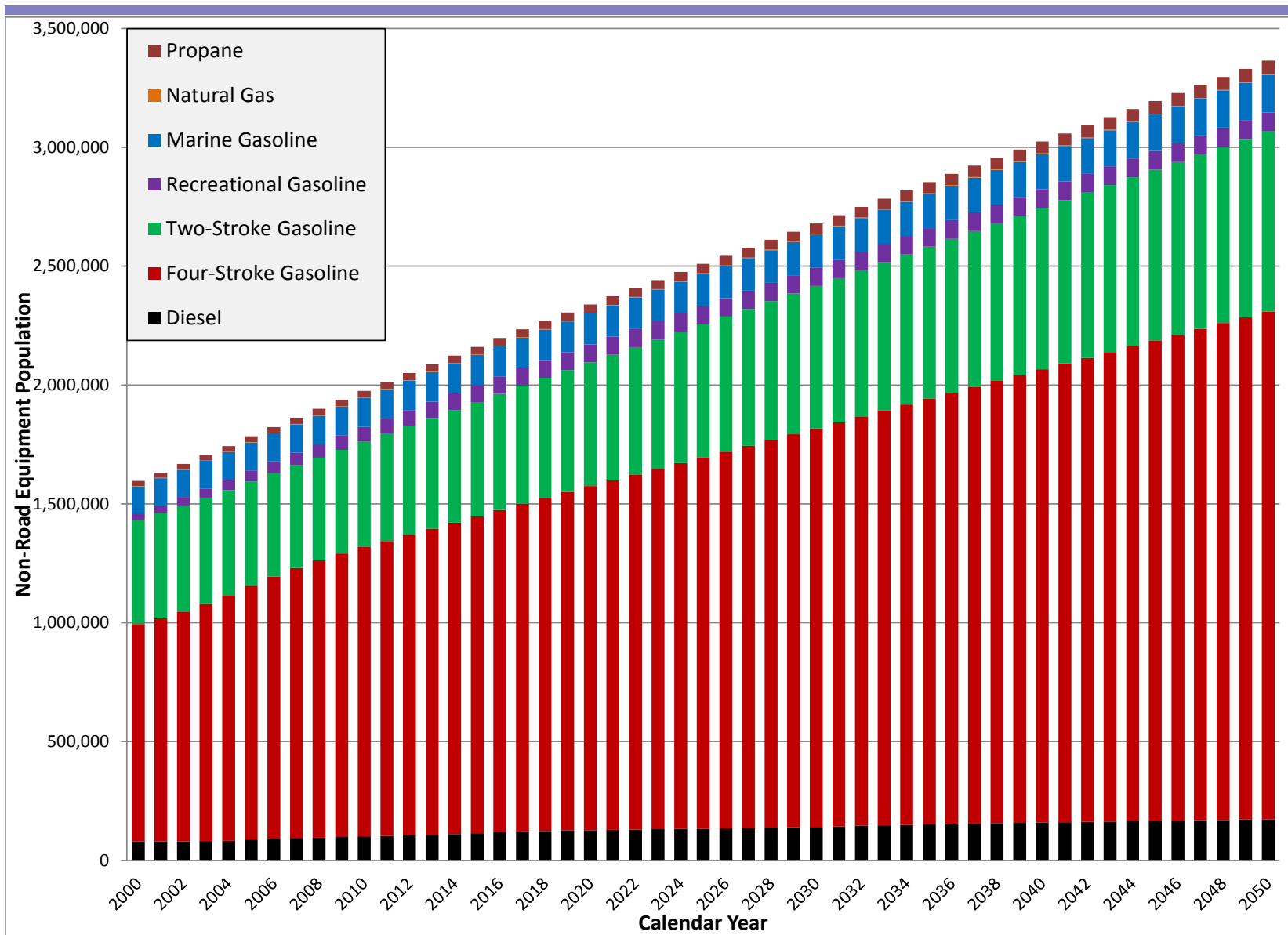
# Texas NONROAD Model Eight-County HGB Area Non-Road Emission Trends from 2000-2050

Source: Default runs of the Texas NONROAD (TexN) model for every county from 2000-2050. The TexN model is available at [http://amdataftp.tceq.texas.gov/pub/Nonroad\\_EI/TexN/](http://amdataftp.tceq.texas.gov/pub/Nonroad_EI/TexN/).



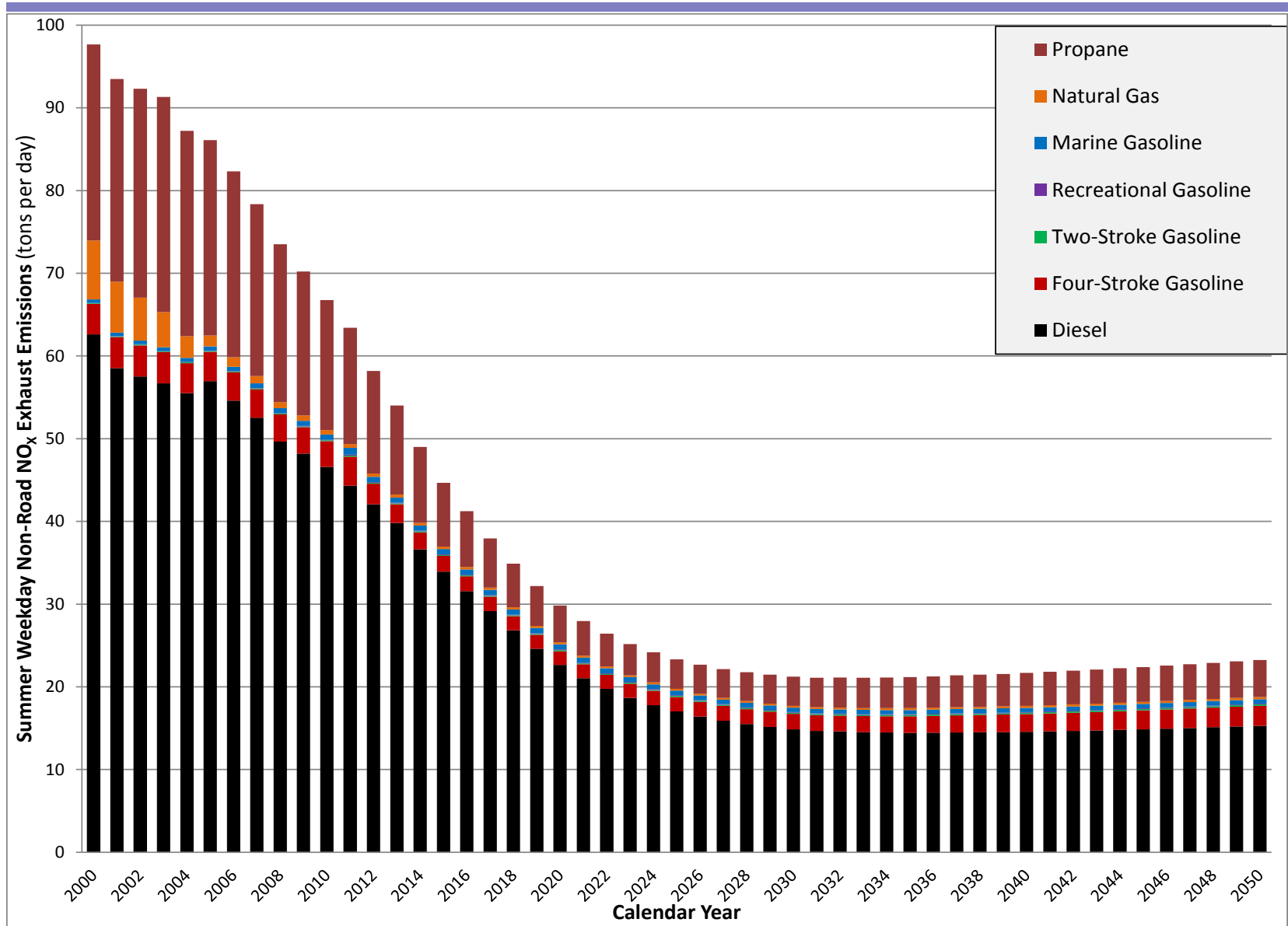


# Non-Road Equipment Population in HGB by Fuel and Engine Type from 2000-2050



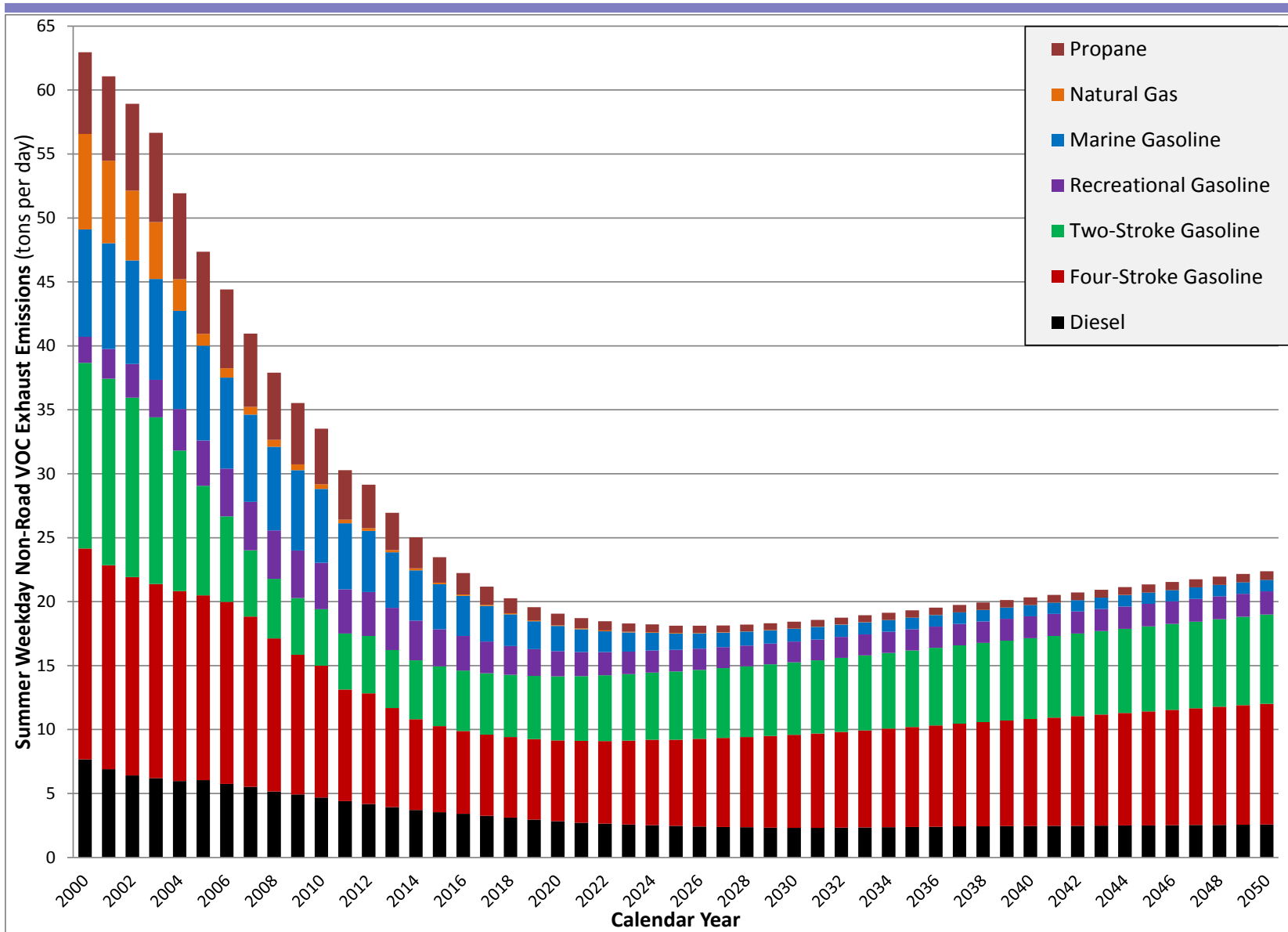


# Non-Road NO<sub>x</sub> Emissions in HGB by Fuel and Engine Type from 2000-2050



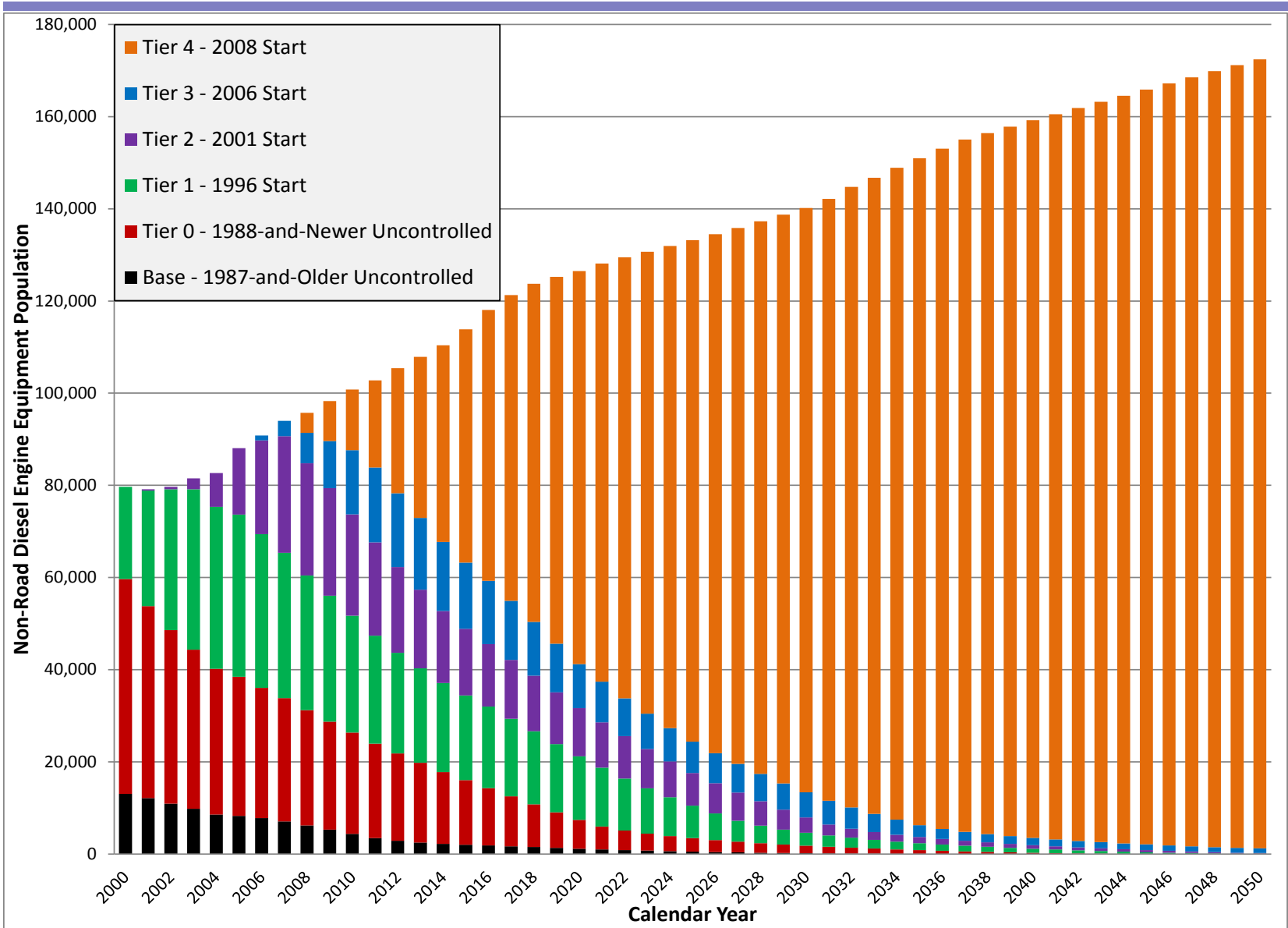


# Non-Road VOC Emissions in HGB by Fuel and Engine Type from 2000-2050



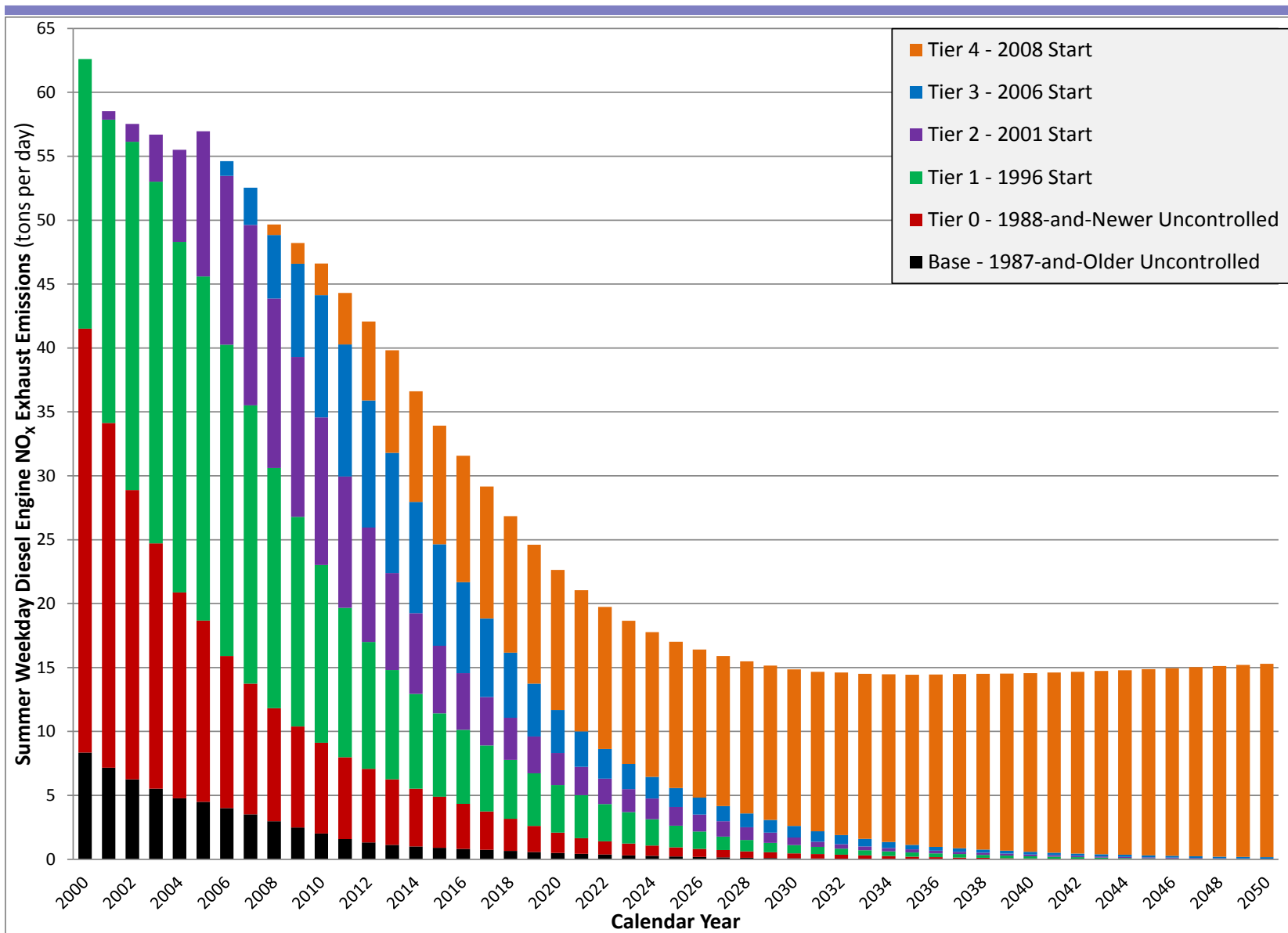


# Diesel Non-Road Equipment Population in HGB by Emission Standard from 2000-2050





# Diesel Non-Road NO<sub>x</sub> Emissions in HGB by Emission Standard from 2000-2050





# Future Changes to On-Road Emissions Inventories for Eight-County HGB Area

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- The current on-road emissions inventories for the eight-county HGB area were developed with the 2014 version of the Motor Vehicle Emission Simulator (MOVES2014) model and vehicle miles traveled (VMT) estimates from:
  - local travel demand model (TDM) output for 2012 from the Houston-Galveston Area Council (H-GAC); and
  - projections for 2017 from the Highway Performance Monitoring System managed by the Texas Department of Transportation (TxDOT).
- 2017 “link-based” inventories based on the H-GAC TDM are under development with MOVES2014a by the Texas Transportation Institute:
  - these are scheduled for completion in the Fall of 2016; and
  - will likely be included with the 2017 attainment demonstration SIP adoption.
- H-GAC is working with TxDOT to determine if the local area VMT estimates for 2017 should be updated:
  - H-GAC is scheduled to inform TCEQ by mid-September 2016 if the VMT estimates for 2017 will change; and
  - H-GAC will need to provide any updated VMT estimates for revised on-road emission inventories to be included in future attainment demonstration SIP revisions.



# Electronic File Availability for Ozone Modeling and Emissions Inventory Development

Description	Web Page Address / FTP Directory
TCEQ Ozone Modeling Files Web Page: 2012 Episode	<a href="https://www.tceq.texas.gov/airquality/airmod/data/tx2012">https://www.tceq.texas.gov/airquality/airmod/data/tx2012</a>
TCEQ Anthropogenic Modeling Inventories: 2012 Base	<a href="ftp://amdaftp.tceq.texas.gov/pub/EI/2012_episodes/base_2012">ftp://amdaftp.tceq.texas.gov/pub/EI/2012_episodes/base_2012</a>
TCEQ Anthropogenic Modeling Inventories: 2017 Future	<a href="ftp://amdaftp.tceq.texas.gov/pub/EI/2012_episodes/future_2017">ftp://amdaftp.tceq.texas.gov/pub/EI/2012_episodes/future_2017</a>
Texas Air Emissions Repository (TexAER)	<a href="https://www.tceq.texas.gov/airquality/areasource/TexAER.html">https://www.tceq.texas.gov/airquality/areasource/TexAER.html</a>
TCEQ Air Quality Research and Contract Projects Web Page	<a href="http://www.tceq.texas.gov/airquality/airmod/project/pj.html">http://www.tceq.texas.gov/airquality/airmod/project/pj.html</a>





# Questions?

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