

Emission and Air Quality Trends Review 1999-2011



Louisiana

July 2013

Project Objective

- To develop and present publicly available information on trends in emissions and ambient air quality in the U.S. since 1999 in easy to understand visual and tabular formats

Emission Trends

- Study Team collected and processed U.S. EPA emission inventories for years within the study period of interest (1999-2011)

- By pollutant and source category
 - electric utility coal fuel combustion
 - mobile sources
 - industrial fuel combustion & industrial processes
 - all other

Emissions Data Summary

- Data Obtained from EPA National Emission Inventory (NEI) and Trends Websites
 - EPA's Trends reports and emission comparisons include interpolations of all categories between key years (1999, 2002, 2005, 2008, 2011) at county-pollutant level
 - Represented Pollutants: VOC, NO_x, SO₂, and PM_{2.5}
- Project Improvement
 - The Study Team augmented above data with year specific CEM emissions (2002 through 2011)

Emission Changes

- The following slides also include the tonnage-based emissions change from 1999 to 2011 for each pollutant
- Negative values indicate decrease in emissions, positive values indicate an increase

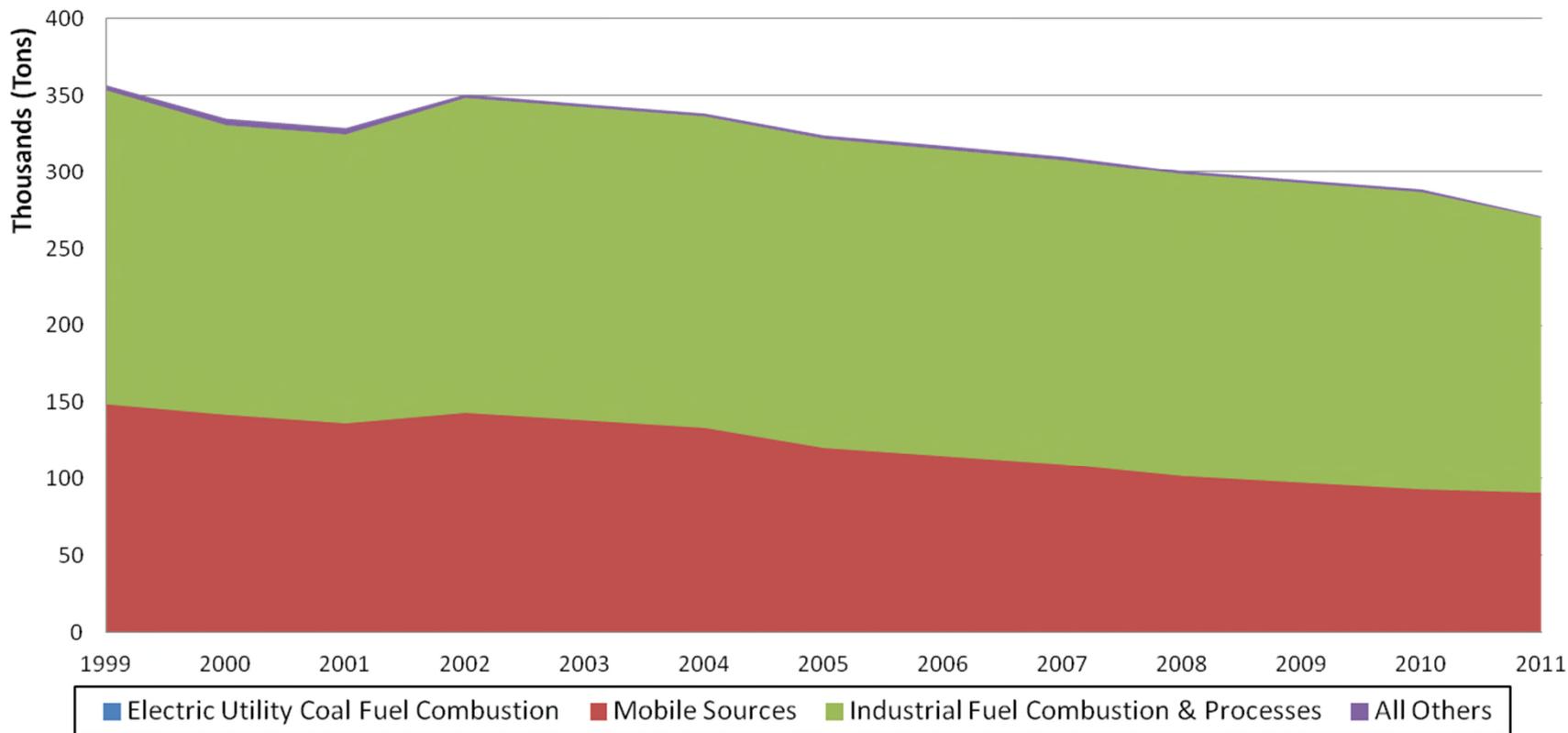
Louisiana Emission Trends (VOC)

Source Category	Annual Emissions (Tons)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	433	463	438	455	462	426	427	419	429	403
Mobile Sources	148,580	136,194	138,183	120,262	114,842	109,421	101,621	97,289	92,956	90,711
Industrial Fuel Combustion & Processes	204,452	188,219	203,997	201,417	199,823	198,231	196,640	195,044	193,458	179,180
All Others	3,227	4,109	1,942	2,109	2,375	2,257	1,851	1,789	1,754	884
Total	356,692	328,986	344,560	324,243	317,501	310,335	300,539	294,541	288,598	271,177

Source Category	Annual Emissions Change (Percent since 1999)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	0%	7%	1%	5%	7%	-2%	-1%	-3%	-1%	-7%
Mobile Sources	0%	-8%	-7%	-19%	-23%	-26%	-32%	-35%	-37%	-39%
Industrial Fuel Combustion & Processes	0%	-8%	0%	-1%	-2%	-3%	-4%	-5%	-5%	-12%
All Others	0%	27%	-40%	-35%	-26%	-30%	-43%	-45%	-46%	-73%
Total	0%	-8%	-3%	-9%	-11%	-13%	-16%	-17%	-19%	-24%

Louisiana Emission Trends (VOC)

**Major Source Category Summary
Annual VOC Emissions**



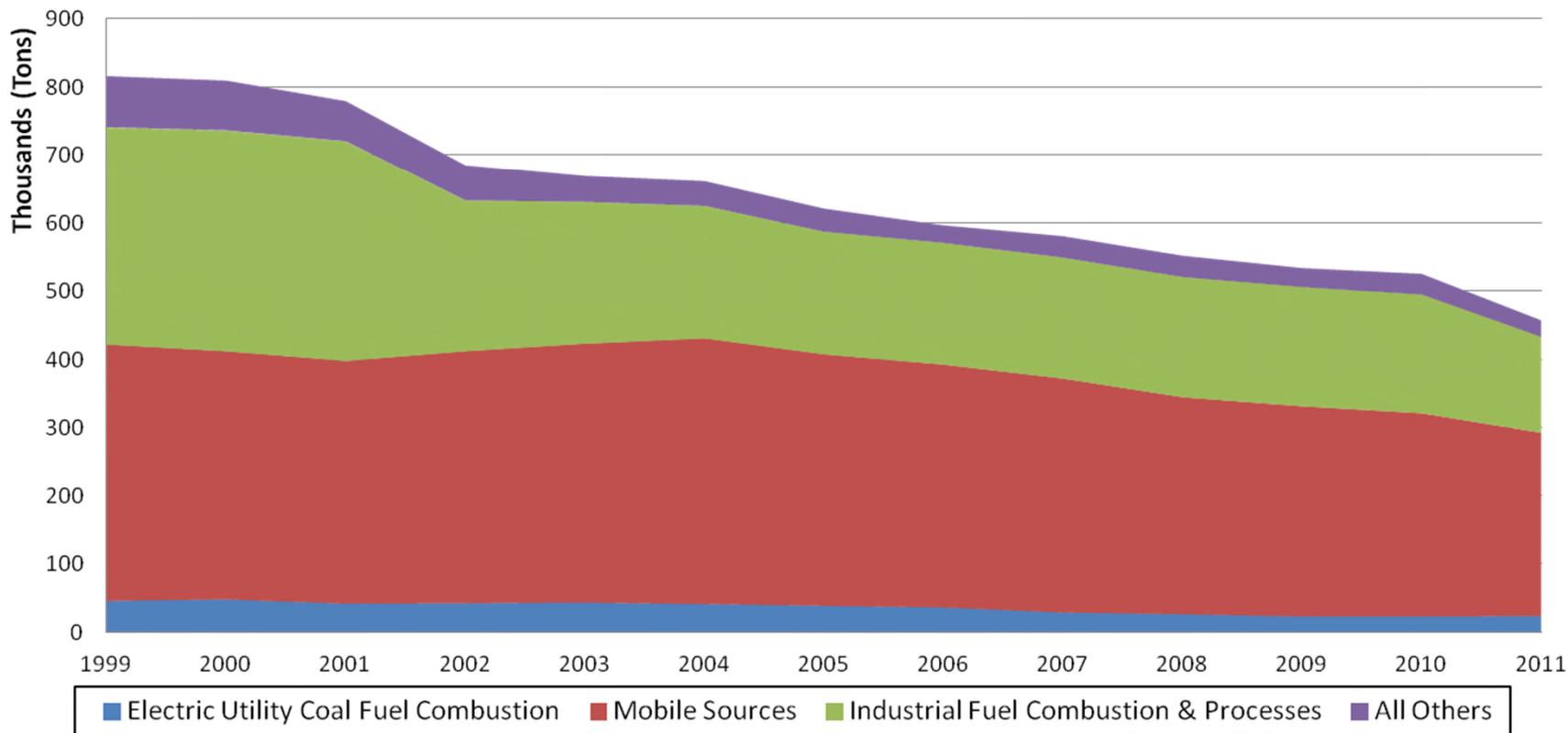
Louisiana Emission Trends (NO_x)

Source Category	Annual Emissions (Tons)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	46,169	42,182	43,649	38,943	36,646	29,013	26,698	23,373	23,225	24,086
Mobile Sources	375,655	355,680	379,391	368,586	355,816	343,045	318,181	308,142	298,104	268,742
Industrial Fuel Combustion & Processes	319,364	322,706	207,823	179,778	178,520	177,440	176,272	175,066	174,298	140,951
All Others	74,745	58,715	38,113	33,707	25,608	31,297	31,132	27,729	30,220	24,258
Total	815,933	779,283	668,977	621,014	596,589	580,795	552,284	534,310	525,847	458,038

Source Category	Annual Emissions Change (Percent since 1999)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	0%	-9%	-5%	-16%	-21%	-37%	-42%	-49%	-50%	-48%
Mobile Sources	0%	-5%	1%	-2%	-5%	-9%	-15%	-18%	-21%	-28%
Industrial Fuel Combustion & Processes	0%	1%	-35%	-44%	-44%	-44%	-45%	-45%	-45%	-56%
All Others	0%	-21%	-49%	-55%	-66%	-58%	-58%	-63%	-60%	-68%
Total	0%	-4%	-18%	-24%	-27%	-29%	-32%	-35%	-36%	-44%

Louisiana Emission Trends (NO_x)

Major Source Category Summary
Annual NO_x Emissions



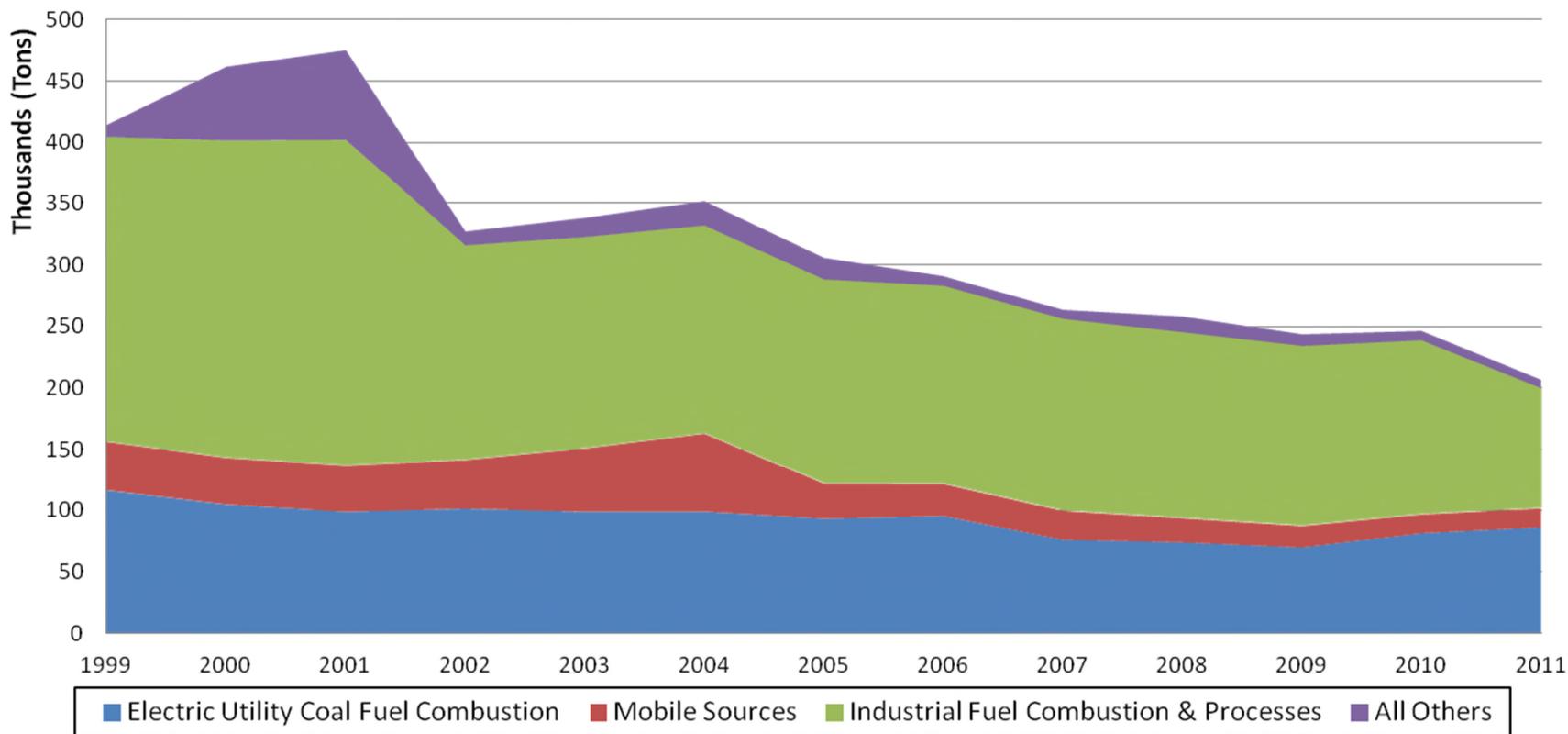
Louisiana Emission Trends (SO₂)

Source Category	Annual Emissions (Tons)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	116,702	99,015	99,033	93,426	95,553	76,187	74,118	70,060	81,599	86,286
Mobile Sources	39,505	37,929	51,925	28,556	26,017	23,479	19,573	17,401	15,228	15,410
Industrial Fuel Combustion & Processes	248,531	265,230	171,800	166,456	161,638	156,782	151,944	147,086	142,246	98,602
All Others	9,716	72,876	15,494	17,483	7,795	7,279	12,773	9,392	7,546	6,778
Total	414,454	475,051	338,253	305,920	291,004	263,726	258,408	243,938	246,619	207,076

Source Category	Annual Emissions Change (Percent since 1999)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	0%	-15%	-15%	-20%	-18%	-35%	-36%	-40%	-30%	-26%
Mobile Sources	0%	-4%	31%	-28%	-34%	-41%	-50%	-56%	-61%	-61%
Industrial Fuel Combustion & Processes	0%	7%	-31%	-33%	-35%	-37%	-39%	-41%	-43%	-60%
All Others	0%	650%	59%	80%	-20%	-25%	31%	-3%	-22%	-30%
Total	0%	15%	-18%	-26%	-30%	-36%	-38%	-41%	-40%	-50%

Louisiana Emission Trends (SO₂)

Major Source Category Summary
Annual SO₂ Emissions



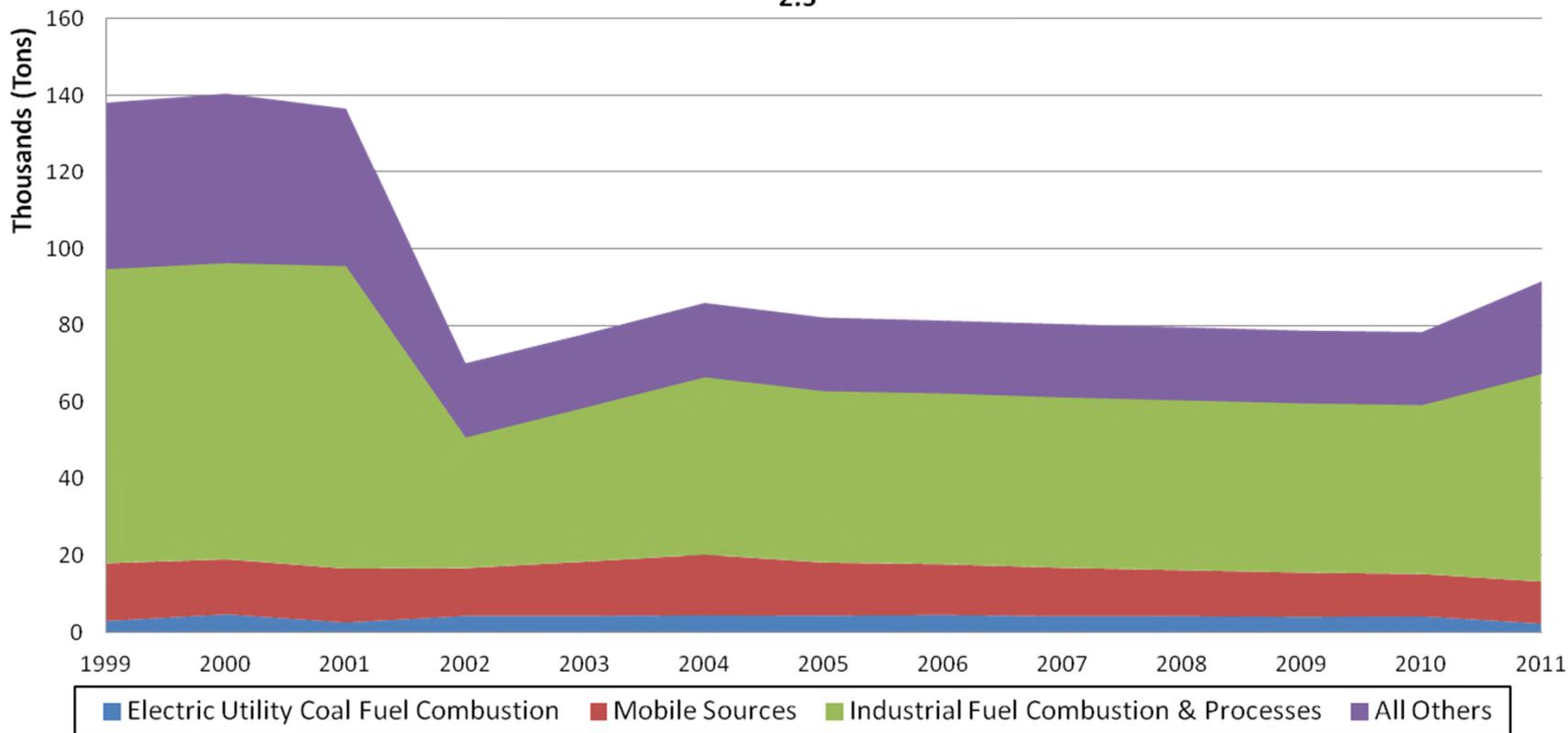
Louisiana Emission Trends (PM_{2.5})

Source Category	Annual Emissions (Tons)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	2,860	2,465	4,206	4,261	4,421	4,088	4,114	3,965	4,085	2,167
Mobile Sources	15,093	14,094	14,171	13,865	13,263	12,660	12,025	11,548	11,072	11,000
Industrial Fuel Combustion & Processes	76,809	78,995	40,429	44,931	44,797	44,668	44,532	44,393	44,282	54,332
All Others	43,569	41,220	19,138	19,145	18,911	19,097	19,018	18,892	18,997	24,128
Total	138,331	136,774	77,944	82,201	81,391	80,513	79,689	78,799	78,435	91,627

Source Category	Annual Emissions Change (Percent since 1999)									
	1999	2001	2003	2005	2006	2007	2008	2009	2010	2011
Electric Utility Coal Fuel Combustion	0%	-14%	47%	49%	55%	43%	44%	39%	43%	-24%
Mobile Sources	0%	-7%	-6%	-8%	-12%	-16%	-20%	-23%	-27%	-27%
Industrial Fuel Combustion & Processes	0%	3%	-47%	-42%	-42%	-42%	-42%	-42%	-42%	-29%
All Others	0%	-5%	-56%	-56%	-57%	-56%	-56%	-57%	-56%	-45%
Total	0%	-1%	-44%	-41%	-41%	-42%	-42%	-43%	-43%	-34%

Louisiana Emission Trends (PM_{2.5})

Major Source Category Summary
Annual PM_{2.5} Emissions



Emission Trends Summary

- All pollutants have decreased since 1999 in aggregate across Louisiana
- Onroad emission step increase seen between 2004 and 2005 is the result of EPA's method change and MOVES model integration for estimating onroad mobile source emissions

Air Quality Design Values

- Ozone
 - Annual 4th highest daily maximum 8-hour average averaged over three consecutive years
 - Current standard = 0.075 ppm
- PM_{2.5} Annual
 - Annual arithmetic mean of quarterly means averaged over three consecutive years
 - Current standard = 12 ug/m³
- PM_{2.5} 24-Hour
 - Annual 98th percentile of daily averages averaged over three consecutive years
 - Current standard = 35 ug/m³

State-Wide Design Value (DV) Trends

- Trends in state-wide maximum DV and average DV
 - Max DV: Maximum DVs over all valid trend monitoring sites in the state in each overlapping three year period
 - Average DV: Average of DVs over all valid trend monitoring sites in the state in each overlapping three year period
- Compute linear trend via least-squares regression

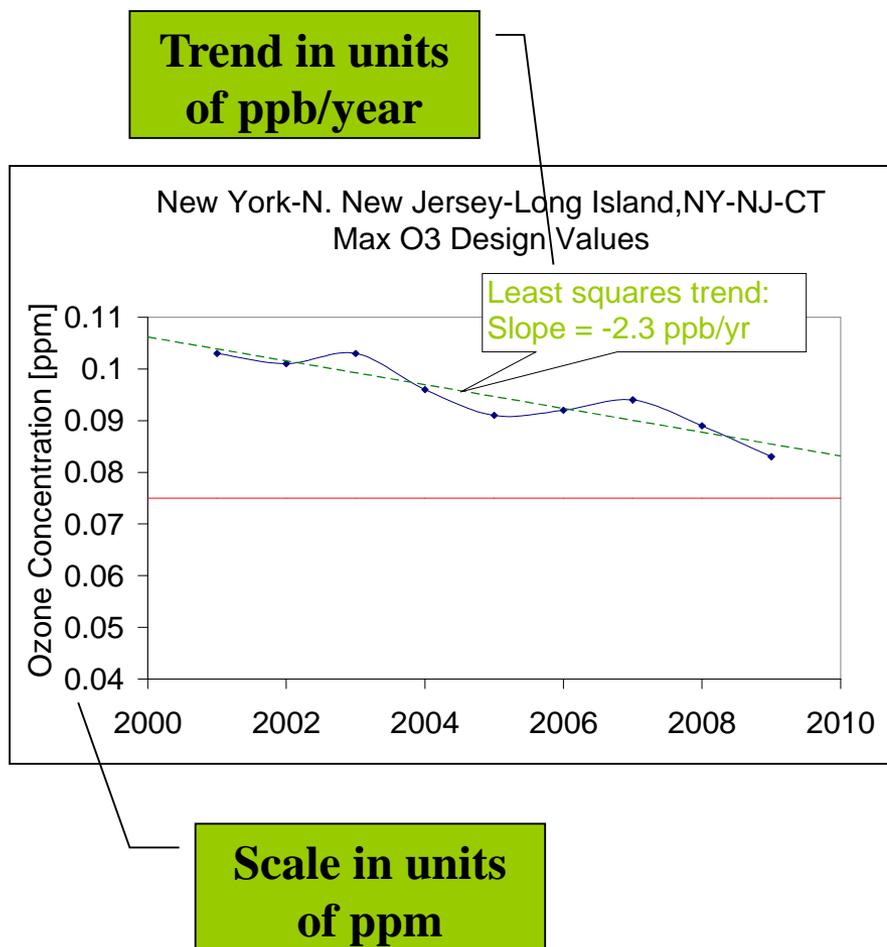
Data Handling Procedures

- O₃ design value (DV) for each overlapping three-year period starting with 1999-2001 and ending with 2009-2011
 - DV calculated using annual 4th highest daily max 8-hr averages and percent of valid observations, based on EPA data handling conventions
 - Data associated with exceptional events that have received EPA concurrence are omitted
 - Selection of trend sites require valid DV in 9 out of 11 three-year periods between 1999 and 2011
 - Identification of nonattainment areas is with respect to the 2008 8-hour standard only

Data Handling Procedures

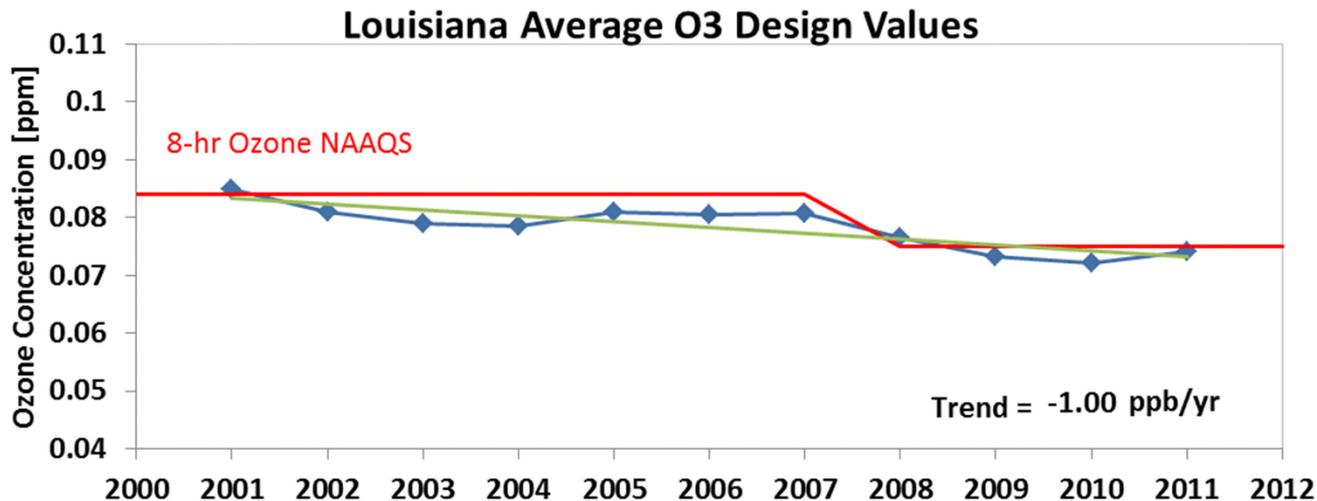
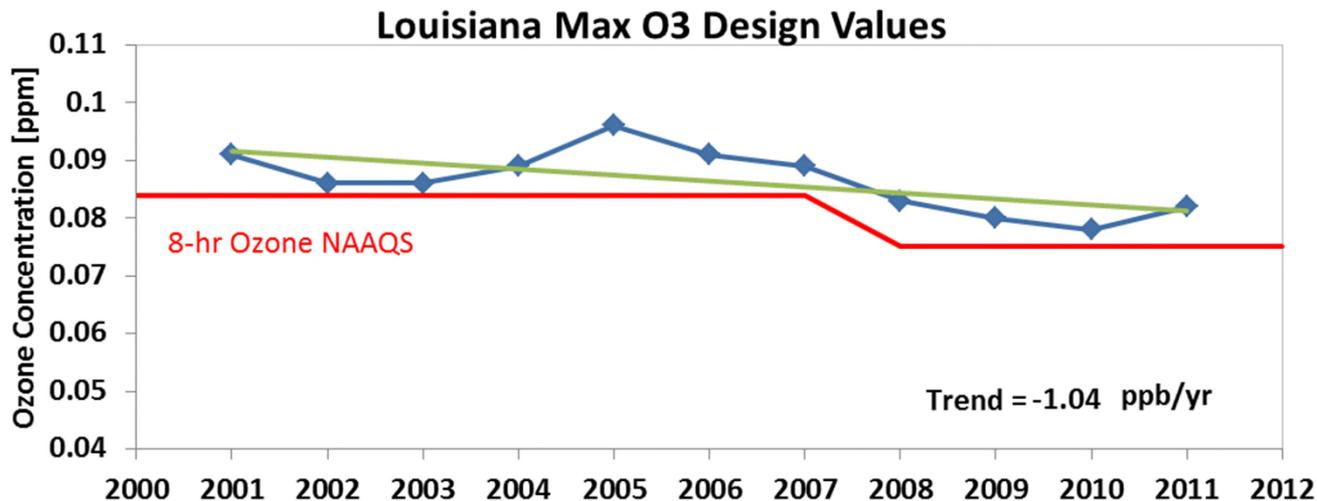
- Annual $PM_{2.5}$ DV and 24-hr $PM_{2.5}$ DV for each overlapping three-year period starting with 1999-2001 and ending with 2009-2011
 - DV calculations based on EPA data handling conventions
 - Data extracted from monitors that have a non-regulatory monitoring type are omitted
 - Selection of trend sites require valid DV in 9 out of 11 three-year periods between 1999 and 2011

Trend Calculation



- Trends based on linear least squares fit to rolling three year design values (DVs)
- Negative trend indicates improving air quality
- DVs based on each 3-year period: 1999-2001, 2000-2002, ... 2009-2011
- Notes
 - On plots, DVs are for three year period ending in year shown (i.e., 2009-2011 DV plotted as 2011 value)
 - Ozone trend values expressed as ppb/year (1,000 ppb = 1 ppm); DVs are plotted as ppm

Max/Ave O₃ DVs and Trend



Ozone Trends by Site in Louisiana

Monitoring Sites	County	2009-2011 DV [ppm]	Trend [ppm/yr]
2200500044420101	Ascension, LA	0.077	-0.53
2201500084420102	Bossier, LA	0.08	-1.04
2201700014420102	Caddo, LA	0.075	-0.77
2201900024420101	Calcasieu, LA	0.075	-0.45
2201900084420101	Calcasieu, LA	0.067	-1.47
2201900094420101	Calcasieu, LA	0.074	-0.96
2203300034420101	East Baton Rouge, LA	0.082	-1.05
2203300094420101	East Baton Rouge, LA	0.077	-1.09
2203300134420101	East Baton Rouge, LA	0.072	-0.95
2203310014420102	East Baton Rouge, LA	N/A	-1.73
2204700074420101	Iberville, LA	N/A	-0.88

Note: Only monitoring sites meeting data completeness criteria listed

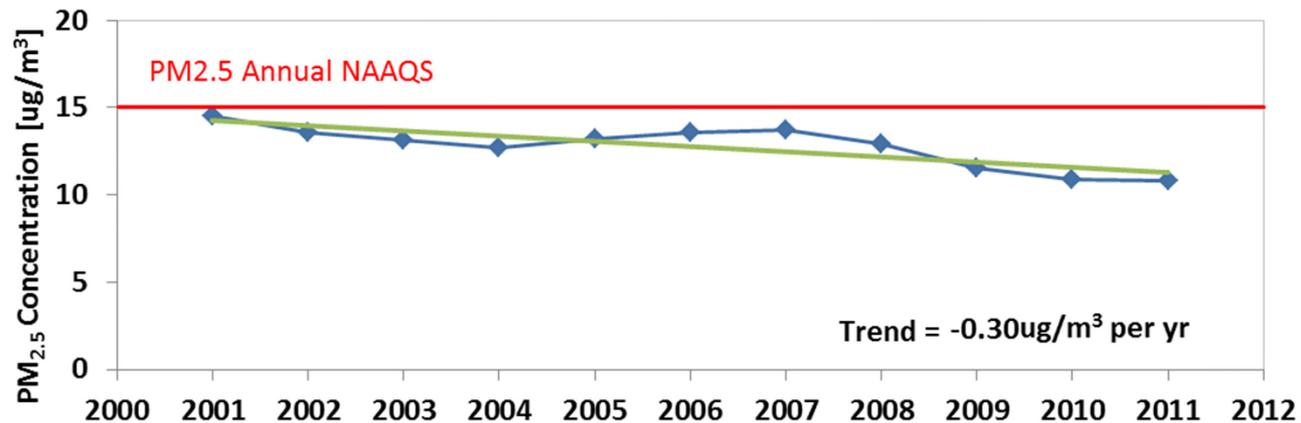
Ozone Trends by Site in Louisiana

Monitoring Sites	County	2009-2011 DV [ppm]	Trend [ppm/yr]
2204700094420101	Iberville, LA	0.074	-0.78
2204700124420101	Iberville, LA	0.077	-1.19
2205110014420102	Jefferson, LA	0.076	-1.18
2205700044420101	Lafourche, LA	0.072	-0.90
2206300024420101	Livingston, LA	0.076	-0.82
2207300044420101	Ouachita, LA	0.066	-1.82
2207700014420101	Pointe Coupee, LA	0.075	0.43
2208900034420101	St. Charles, LA	0.072	-1.29
2209300024420101	St. James, LA	0.069	-0.95
2209500024420101	St. John the Baptist, LA	0.075	-0.82
2212100014420101	West Baton Rouge, LA	0.072	-1.65

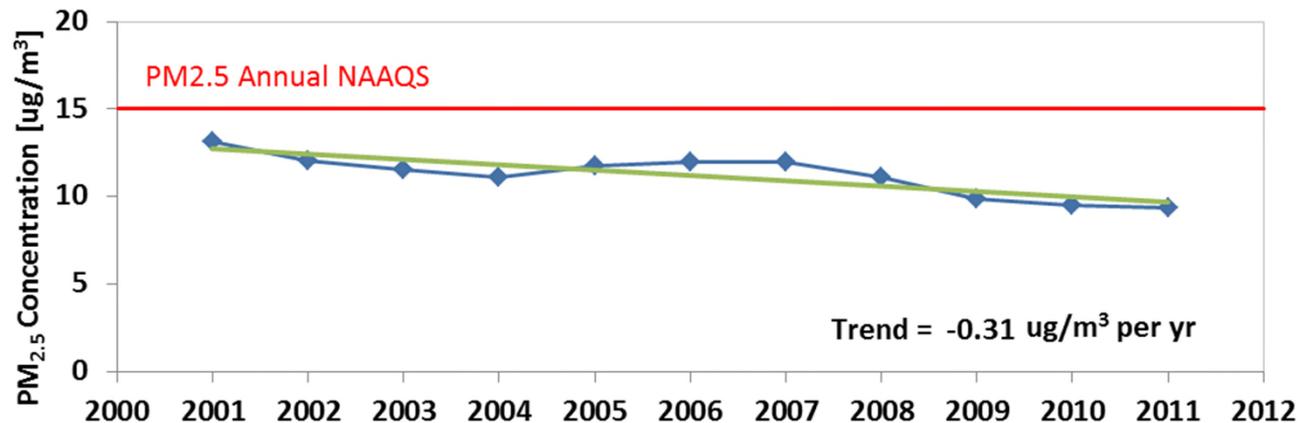
Note: Only monitoring sites meeting data completeness criteria listed

Max/Ave PM_{2.5} Annual DVs and Trend

Louisiana Max PM_{2.5} Annual Design Values

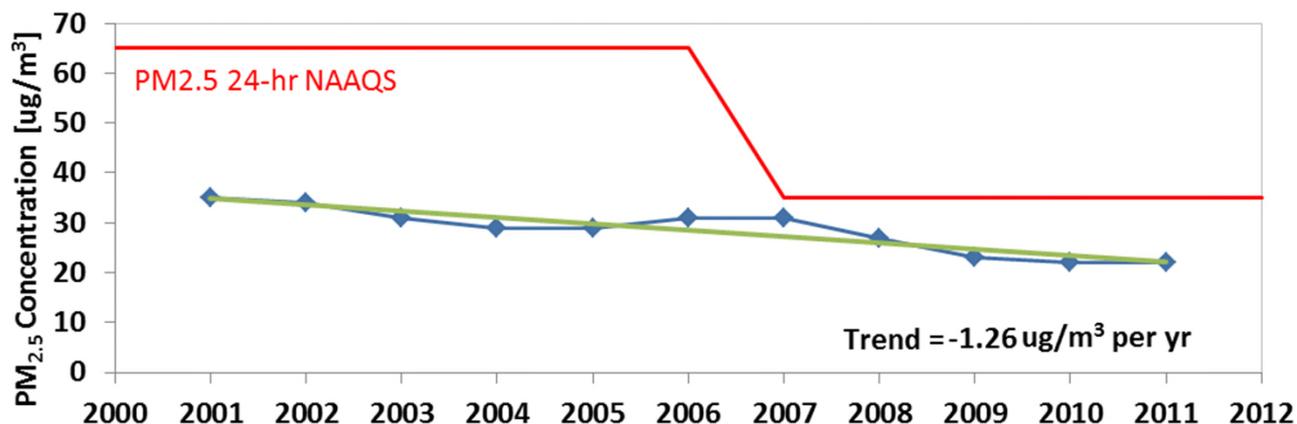


Louisiana Average PM_{2.5} Annual Design Values

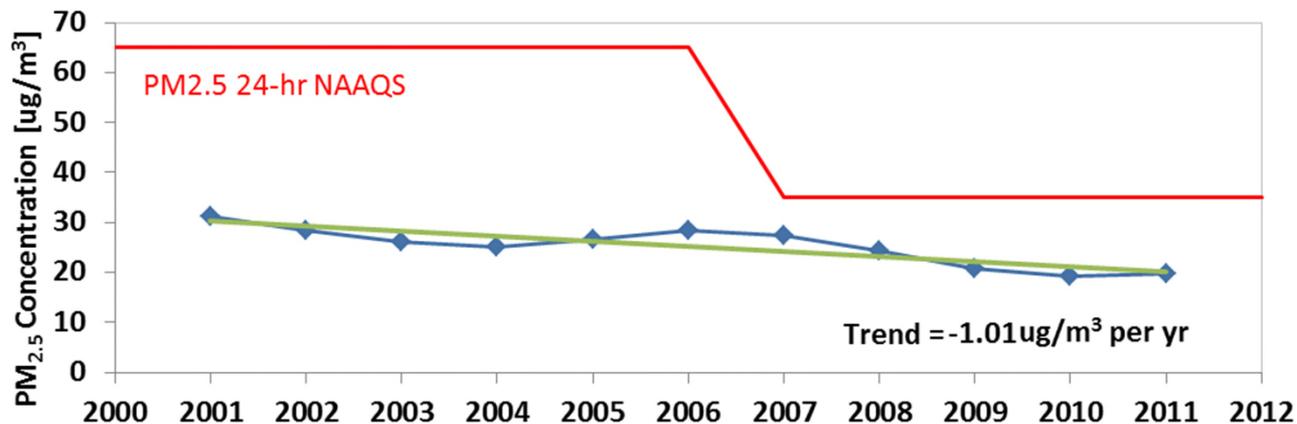


Max/Ave PM_{2.5} 24-Hour DVs and Trend

Louisiana Max PM_{2.5} 24-Hour Design Values



Louisiana Average PM_{2.5} 24-Hour Design Values



PM_{2.5} Trends by Site in Louisiana

Monitoring Site	County	2009-2011 DV [ug/m ³]		Trend [ug/m ³ per year]	
		Annual	24-Hr	Annual DV	24-Hr DV
220190009	Calcasieu Parish	8.6	19	-0.24	-0.84
220190010	Calcasieu Parish	9.1	20	-0.34	-1.53
220330009	East Baton Rouge Parish	10.2	21	-0.36	-1.03
220331001	East Baton Rouge Parish	N/A	N/A	-0.32	-1.11
220470005	Iberville Parish	10.0	21	-0.30	-1.16
220470009	Iberville Parish	8.9	19	-0.23	-0.95
220511001	Jefferson Parish	9.0	19	-0.36	-0.90
220730004	Ouachita Parish	9.2	19	-0.32	-0.97
221050001	Tangipahoa Parish	8.9	19	-0.32	-0.88
221090001	Terrebonne Parish	8.6	18	-0.25	-0.74
221210001	West Baton Rouge Parish	10.8	22	-0.25	-0.84

Note: Only monitoring sites meeting data completeness criteria listed

Air Quality Trends Summary

- Average O₃ and PM_{2.5} design values have decreased since 1999 in Louisiana.
- O₃ design values have decreased at the Baton Rouge, LA, the only currently designated O₃ non-attainment area in Louisiana. There are no currently designated PM_{2.5} non-attainment areas in Louisiana.