



**Arkansas Regional Haze Planning Period II
State Implementation Plan**

CHAPTER IV: PROGRESS REPORT

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IV. Progress Report

The RHR at 40 CFR § 51.308(f)(5) requires states to address the requirements for progress reports in 40 CFR § 51.308(g)(1)–(5) in their plan revisions. Pursuant to § 51.308(g)(1)–(5), this chapter provides the status of control strategies since the most recent progress report, emission reductions achieved through implementation of control strategies, visibility progress since the most recent progress report, and an assessment of significant changes in anthropogenic emissions of visibility-impairing pollutants.

EPA recommends that SIP revisions due in 2021 cover the period from the first full year that was not incorporated in the previous progress report through a year that is as close as possible to the submission date of the SIP.¹ Arkansas submitted its progress report for Planning Period I in June 2015 and included information up through the year 2011. As of the time that this section was written, 2019 was the most recent year for visibility impairment data, 2020 was the most recent year that emissions for EGUs were reported (NO_x, SO₂, and CO₂), 2019 was the most recent year that emissions from Type A² facilities were reported to DEQ, and 2017 was the most recent year for the national emissions inventory.

A. Planning Period I Measures

This section describes the status of implementation of all measures included in the Planning Period I SIP, as revised, and a summary of the emission reductions achieved through the Planning Period I SIP, as revised. This section is intended to comply with 40 § CFR 51.308(g)(1) and (2).

1. Implementation Status

In the Planning Period I SIP, as revised, the long-term strategy included source-specific control measures, participation in the CSAPR Ozone Season NO_x Trading Program, ongoing state and federal air pollution control programs (e.g., vehicle emission standards), and voluntary programs (e.g., DEQ’s Go RED! funding assistance program and the voluntary Arkansas Smoke Management Plan).

a. Source-Specific Control Measures

Table IV-1 provides the implementation status for each source-specific control measure

¹ EPA (2019). “Guidance on Regional Haze State Implementation Plans for the Second Implementation Period” at page 55.

https://www.epa.gov/sites/production/files/2019-08/documents/8-20-2019_-_regional_haze_guidance_final_guidance.pdf

² Stationary sources that must report emissions are categorized based on the annual potential to emit (PTE) of one or more pollutants. Type A sources must report emissions annually. Type B sources must report emissions every three years

established in the Planning Period I SIP, as revised in 2017, 2018, and 2019.

Table IV-1: Implementation Status for the Arkansas Planning Period I SIP Source-Specific Control Measures

Source	Unit	Pollutant	Control Measure	Implementation Status
Carl E. Bailey Generating Station (AFIN 74-00024)	SN-01 Boiler	NO _x	Participation in CSAPR Ozone Season NO _x Trading Program	Implementation of CSAPR began in 2015. The emissions budget stringency for Arkansas increased for 2017 and again for 2018 and beyond.
		SO ₂ and PM	Fuel switching to fuel with a sulfur content of 0.5% or less by weight	Compliance was required beginning October 27, 2021, Prohibited from purchasing fuel with a sulfur content greater than 0.5% after August 8, 2018. However, the Carl E. Bailey Generating Station was permanently retired on July 10, 2020.
McClellan Generating Station (AFIN 52-00055) ³	SN-01 Boiler	NO _x	Participation in CSAPR Ozone Season NO _x Trading Program	Implementation of CSAPR began in 2015. The emission budget stringency for Arkansas increased for 2017 and again for 2018 and beyond.
		SO ₂ and PM	Fuel switching to fuel oil with a sulfur content of 0.5% or less by weight	Compliance required beginning October 27, 2021. Prohibited from purchasing fuel with a sulfur content greater than 0.5% after August 8, 2018.
White Bluff Power Plant (AFIN 35-00110) ⁴	SN-01 Unit 1 Boiler	NO _x	Participation in CSAPR Ozone Season NO _x Trading Program	Implementation of CSAPR began in 2015. The emission budget stringency for Arkansas increased for 2017 and again for 2018 and beyond.

³ Permit #1887-AOP-R5 <https://www.adeq.state.ar.us/downloads/WebDatabases/PermitsOnline/Air/1887-AOP-R5.pdf>

⁴ Permit #0263-AOP-R16 <https://www.adeq.state.ar.us/downloads/WebDatabases/PermitsOnline/Air/0263-AOP-R16.pdf>

		SO ₂	0.60 lb/MMBtu based on fuel switching to low sulfur coal	Compliance required by August 8, 2021. The cessation of coal combustion by December 31, 2028 is enforceable by a 2018 administrative order. ⁵
		PM	714 lb/hr based on permitted emission limit as of October 15, 2007	Entergy has been required to comply with this emission limit as a permit condition since April 28, 2005.
	SN-02 Unit 2 Boiler	NO _x	Participation in CSAPR Ozone Season NO _x Trading Program	Implementation of CSAPR began in 2015. The emission budget stringency for Arkansas increased for 2017 and again for 2018 and beyond.
		SO ₂	0.60 lb/MMBtu based on fuel switching to low sulfur coal	Compliance required by August 8, 2021. The cessation of coal combustion by December 31, 2028 is enforceable by a 2018 administrative order. ⁶
		PM	714 lb/hr based on permitted emission limit as of October 15, 2007	Entergy has been required to comply with this emission limit as a permit condition since April 28, 2005
	SN-05 Auxiliary Boiler	NO _x	32.2 lb/hour NO _x	Per the Planning Period I SIP, compliance was required as of August 8, 2018; however, Entergy has been required to comply with this emission limit based on permit conditions since August 9, 2012.
		SO ₂	105.2 lb/hour SO ₂	Per the Planning Period I SIP, compliance was required as of August 8, 2018; however, Entergy has been required to comply with this emission limit

⁵ Administrative Order LIS No. 18-073 requiring White Bluff Unit 1 (SN-01) and White Bluff Unit 2 (SN-02) to permanently cease coal-fired operations by no later than December 31, 2028.
<https://www.adeg.state.ar.us/air/planning/sip/pdfs/regional-haze/entergy-ao-executed-8-7-2018.pdf>

⁶ *Ibid.*

				based on permit conditions since August 9, 2012.
		PM	4.5 lb/hour PM	Per the Planning Period I SIP, compliance was required as of August 8, 2018; however, Entergy has been required to comply with this emission limit based on permit conditions since April 28, 2005.
Flint Creek Power Plant (AFIN 04-00107) ⁷	SN-01 Boiler	NOx	Participation in CSAPR Ozone Season NOx Trading Program	Implementation of CSAPR began in 2015. The emission budget stringency for Arkansas increased for 2017 and again for 2018 and beyond.
		SO ₂	0.06 lb/hr based on installation of novel integrated deacidification system	Compliance required by August 8, 2018.
		PM	632.4 lb/hour based on the permitted emission limit as of October 15, 2007	SWEPCO has been required to comply with this emission limit as a permit condition since September 17, 2001.
Domtar Ashdown Mill (AFIN 41-00002) ⁸	SN-03 Power Boiler #1	NOx	191 lb/hr	Domtar has been operating under these emission limits since at least December 2016. These limits became state enforceable immediately upon issuance of a minor modification letter sent to Domtar on February 28, 2019.
		SO ₂	0.5 lb/hr	
		PM	5.2 lb/hr	
	SN-05 Power Boiler #2	NOx	293 lb/hr	
		SO ₂	435 lb/hr	
		PM	81.6 lb/hr	
Lake Catherine (AFIN 30-00011) ⁹	SN-03 Unit 4	NOx	Participation in CSAPR Ozone Season NOx	Implementation of CSAPR began in 2015. The emission budget for Arkansas was

⁷ Permit #0276-AOP-R9 <https://www.adeg.state.ar.us/downloads/WebDatabases/PermitsOnline/Air/0276-AOP-R9.pdf>

⁸ Permit #0287-AOP-R23 <https://www.adeg.state.ar.us/downloads/WebDatabases/PermitsOnline/Air/0287-AOP-R23.pdf>

⁹ Permit #1717-AOP-R8 <https://www.adeg.state.ar.us/downloads/WebDatabases/PermitsOnline/Air/1717-AOP-R8.pdf>

			Trading Program	tightened for 2017 and for 2018 and beyond.
		PM	45 lb/hour based on the permitted emission limit as of October 15, 2007	Entergy has been required to comply with this emission limit as a permit condition since January 5, 2005.
Independence Power Plant (AFIN 32-00042) ¹⁰	SN-01 Unit 1 Boiler	NOx	Participation in CSAPR Ozone Season NOx Trading Program	Implementation of CSAPR began in 2015. The emission budget for Arkansas was tightened for 2017 and for 2018 and beyond.
		SO ₂	0.60 lb/MMBtu based on fuel switching to low sulfur coal	Compliance required by August 8, 2021.
	SN-02 Unit 2 Boiler	NOx	Participation in CSAPR Ozone Season NOx Trading Program	Implementation of CSAPR began in 2015. The emission budget for Arkansas was tightened for 2017 and for 2018 and beyond.
		SO ₂	0.60 lb/MMBtu based on fuel switching to low sulfur coal	Compliance required by August 8, 2021.

b. CSAPR Ozone Season NOx Trading Program

In the Planning Period I SIP, as revised, DEQ determined that no additional NOx controls beyond those required for subject-to-BART sources and participation on the CSAPR ozone season NOx trading rule were necessary for reasonable progress. The statewide ozone-season NOx budget for Arkansas in 2017 was 12,048 tons with a variability limit of 2,530 tons and an assurance level of 14,578 tons. The statewide ozone-season NOx budget for Arkansas from 2018 forward is 9,210 tons with a variability limit of 1,934 tons and an assurance level of 11,144 tons. This translates to a 24% decrease in the statewide ozone-season NOx budget in 2018 and beyond. Table IV-2 lists the units required to participate in the CSAPR Ozone Season NOx Trading Rule and their allocations.

¹⁰ Permit # 0449-AOP-R17 <https://www.adeg.state.ar.us/downloads/WebDatabases/PermitsOnline/Air/0449-AOP-R2.pdf>

Table IV-2: CSAPR Ozone Season NO_x Trading Rule Allocations

Plant Name	State	ORIS ID	Boiler ID	NO_x OS Allocation 2017 (tons)	NO_x OS Allocation 2018 and Beyond (tons)
Carl Bailey	Arkansas	202	01	36	26
Cecil Lynch	Arkansas	167	2		
Cecil Lynch	Arkansas	167	3	118	86
City Water & Light - City of Jonesboro	Arkansas	56505	SN04	20	14
City Water & Light - City of Jonesboro	Arkansas	56505	SN06	24	17
City Water & Light - City of Jonesboro	Arkansas	56505	SN07	19	15
Dell Power Plant	Arkansas	55340	1	17	17
Dell Power Plant	Arkansas	55340	2	18	18
Flint Creek Power Plant	Arkansas	6138	1	1,332	965
Fulton	Arkansas	7825	CT1	14	14
Hamilton Moses	Arkansas	168	1		
Hamilton Moses	Arkansas	168	2		
Harry D. Mattison Power Plant	Arkansas	56328	1	21	21
Harry D. Mattison Power Plant	Arkansas	56328	2	19	18
Harry D. Mattison Power Plant	Arkansas	56328	3	12	12
Harry D. Mattison Power Plant	Arkansas	56328	4	9	9
Harvey Couch	Arkansas	169	1		
Harvey Couch	Arkansas	169	2	17	12
Hot Spring Energy Facility	Arkansas	55418	CT-1	28	28
Hot Spring Energy Facility	Arkansas	55418	CT-2	21	21

Hot Spring Power Co., LLC	Arkansas	55714	SN-01	37	37
Hot Spring Power Co., LLC	Arkansas	55714	SN-02	38	38
Independence	Arkansas	6641	1	1,840	1,333
Independence	Arkansas	6641	2	2,017	1,461
John W. Turk Jr. Power Plant	Arkansas	56564	SN-01	322	322
Lake Catherine	Arkansas	170	1	0	0
Lake Catherine	Arkansas	170	2	0	0
Lake Catherine	Arkansas	170	3	1	1
Lake Catherine	Arkansas	170	4	256	186
McClellan	Arkansas	203	01	108	78
Oswald Generating Station	Arkansas	55221	G1	26	22
Oswald Generating Station	Arkansas	55221	G2	19	19
Oswald Generating Station	Arkansas	55221	G3	24	21
Oswald Generating Station	Arkansas	55221	G4	14	14
Oswald Generating Station	Arkansas	55221	G5	19	17
Oswald Generating Station	Arkansas	55221	G6	18	16
Oswald Generating Station	Arkansas	55221	G7	18	18
Pine Bluff Energy Center	Arkansas	55075	CT-1	108	108
Plum Point Energy Station	Arkansas	56456	1	690	690
Robert E Ritchie	Arkansas	173	2		
Thomas Fitzhugh	Arkansas	201	2	53	45
Union Power Station	Arkansas	55380	CTG-1	27	27
Union Power Station	Arkansas	55380	CTG-2	26	26
Union Power Station	Arkansas	55380	CTG-3	32	32

Union Power Station	Arkansas	55380	CTG-4	30	30
Union Power Station	Arkansas	55380	CTG-5	27	27
Union Power Station	Arkansas	55380	CTG-6	26	26
Union Power Station	Arkansas	55380	CTG-7	32	32
Union Power Station	Arkansas	55380	CTG-8	29	29
White Bluff	Arkansas	6009	1	2,116	1,533
White Bluff	Arkansas	6009	2	2,130	1,544

c. Ongoing state and federal air pollution control programs

In the Planning Period I SIP, DEQ discussed multiple federal rules that impact emissions of visibility-impairing pollutants.

The rules mentioned in the 2008 SIP submittal were incorporated into the modeling to establish the Planning Period I RPGs. Each of these programs was implemented during the first planning period; however, the Clean Air Interstate Rule implemented through Chapter 14 of Regulation No. 19 was replaced with CSAPR, which is implemented as a FIP.

In the 2018 Phase II SIP, DEQ updated the list of ongoing state and federal air pollution control programs to reflect other federal rules that had been implemented since the 2008 SIP submittal. These rules remain in effect at the time of this progress report. The emission reductions from these ongoing state and federal programs are reflected in the emissions inventory information for Arkansas and the surrounding states presented in this chapter.

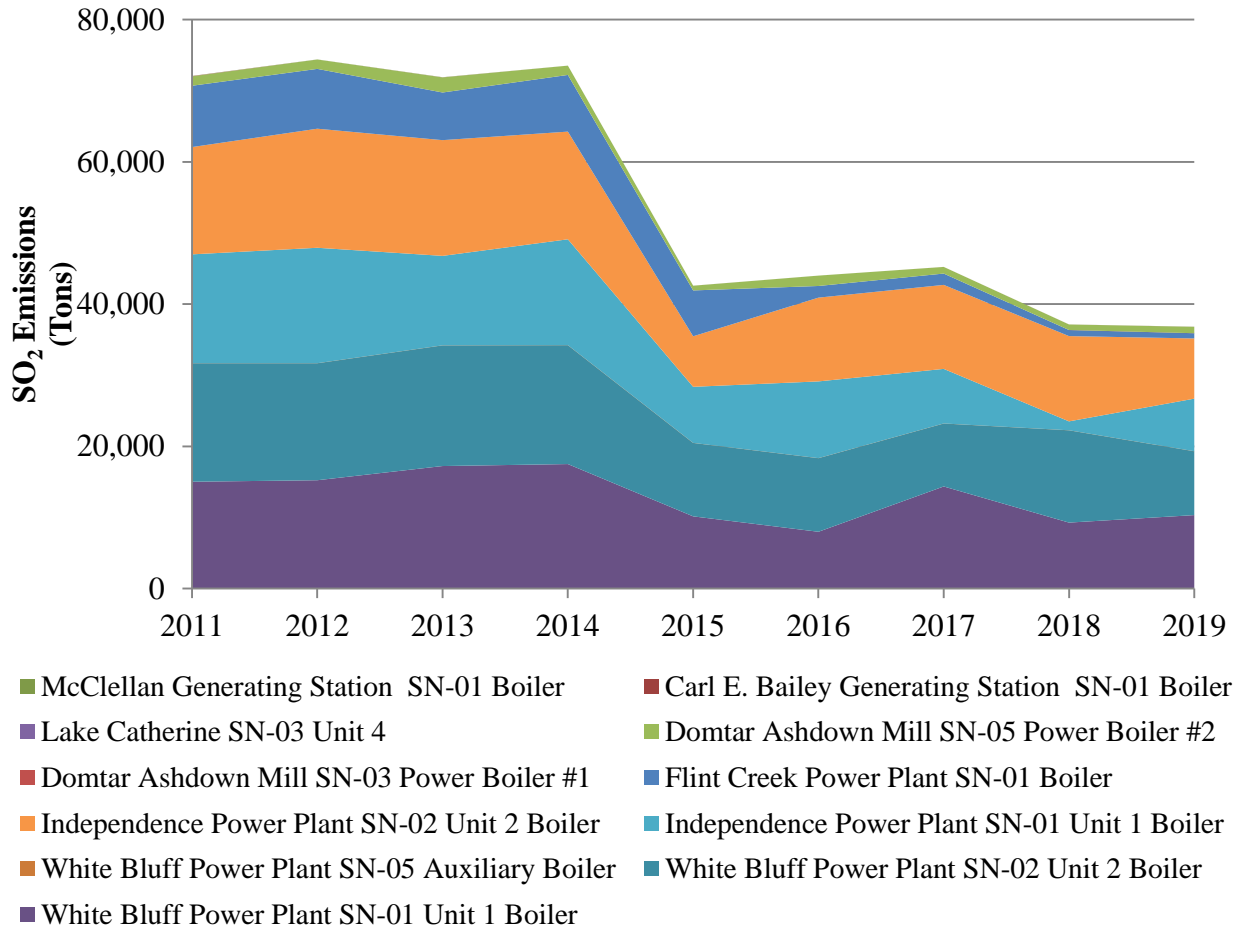
d. Smoke Management Plan

Arkansas foresters have been implementing a voluntary smoke management plan for prescribed fires since 2007. More recently, the Arkansas Department of Agriculture adopted a voluntary smoke management plan for row crop farmers based on input from a smoke management task force and members of the Agricultural Council of Arkansas, Arkansas Department of Agriculture, DEQ, Farm Bureau of Arkansas, Arkansas Rice, Arkansas Soybean Association, and the University of Arkansas Division of Agriculture Research and Extension Service. The Arkansas Department of Agriculture coordinates prescribed fire activities, reports fire weather, and assists with voluntary smoke management. Copies of the most recent publications of the Arkansas voluntary smoke management plans for prescribed fires and row crops are available at <https://www.agriculture.arkansas.gov/arkansas-voluntary-smoke-management-guidelines>.

2. Emission Reductions Achieved from Planning Period I Measures

Figures IV-1, IV-2, and IV-3 show the changes in SO₂, NO_x, and Primary PM_{2.5} emissions, respectively, since 2011 for each emission unit subject to source-specific emission limitations in the Arkansas Planning Period 1 SIP.¹¹ Taken together, SO₂ annual emissions from these units in 2019 were forty-nine percent lower than in 2011, NO_x annual emissions in 2019 were sixty-one percent lower than in 2011, and primary PM_{2.5} emissions decreased by ten percent. These trends are consistent with emission limitations included in the Planning Period I SIP, which primarily required emission reductions of SO₂ and NO_x and maintenance of existing particulate matter limitations. The decreases in SO₂ from the larger coal units are also influenced by changes in dispatch patterns for electricity generation that began in 2014.

Figure IV-1: SO₂ Emission Reductions from Arkansas Stationary Sources Controlled under Planning Period I SIP



¹¹ Data obtained from Arkansas emissions inventory reported to EPA. Primary PM_{2.5} includes both filterable and condensable emissions from sources, but does not include PM_{2.5} formed from photochemical reactions in the atmosphere.

Figure IV-2: NOx Emission Reductions from Sources Controlled under Planning Period I SIP

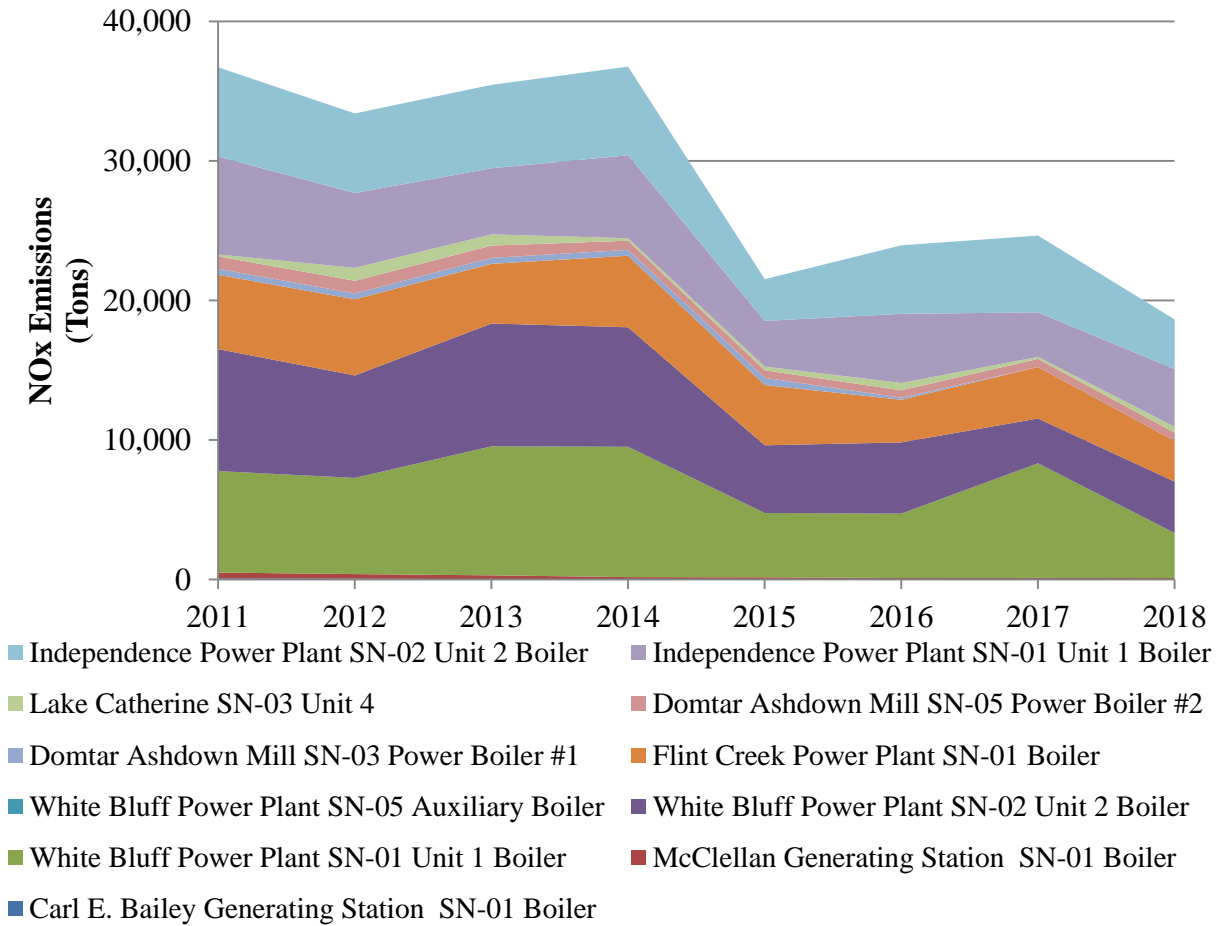


Figure IV-3: Primary PM_{2.5} Emissions from Sources Controlled under Planning Period I SIP

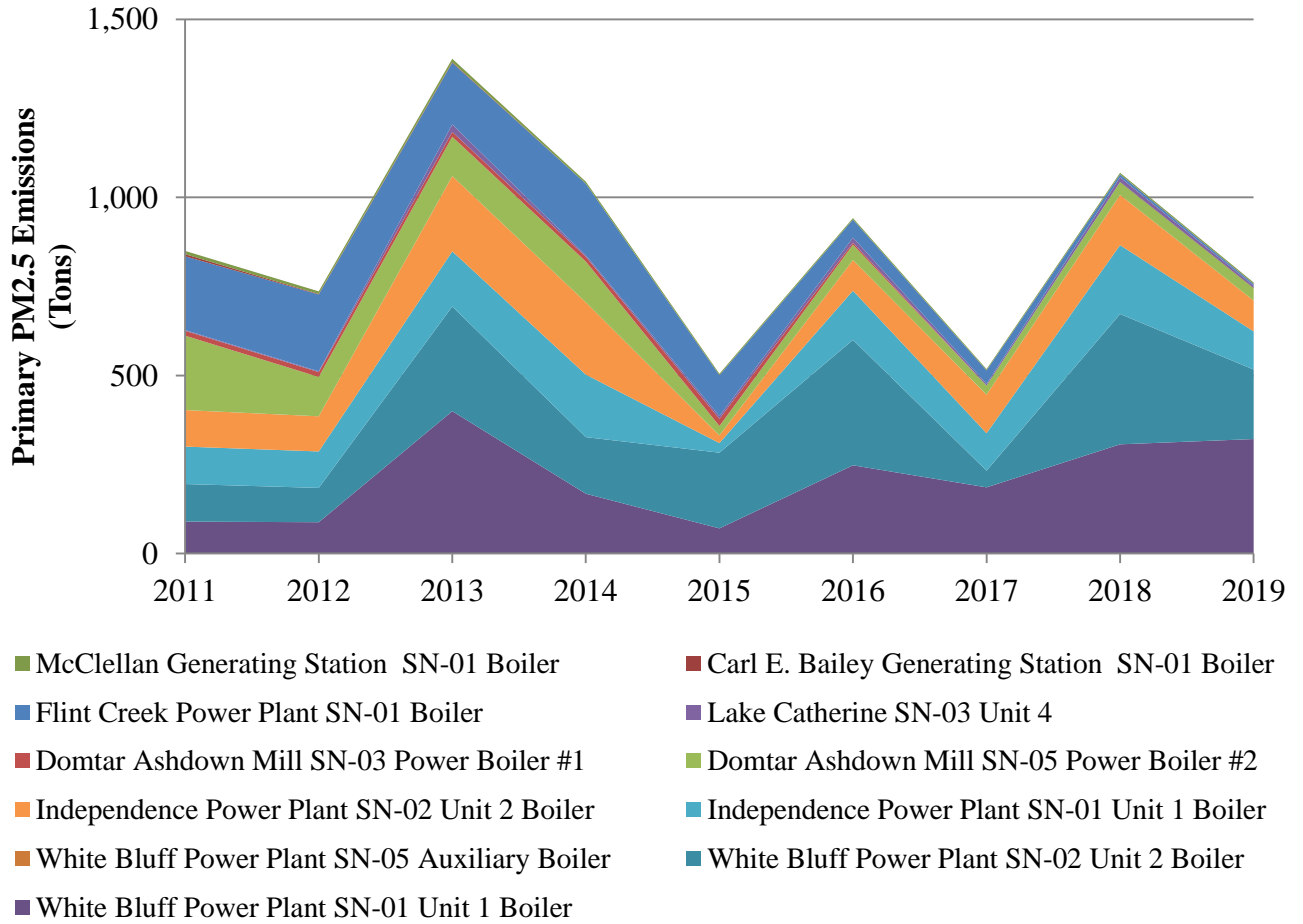


Figure IV-4 illustrates the change in annual NOx emissions since 2011 of all EGUs subject to the CSAPR trading program for ozone season NOx in each of the states that participates in CSAPR ozone season group 2. Annual NOx emissions for EGUs in these states decreased by 895,264 tons (63.7%) between 2011 and 2020.¹²

Figure IV-4: Changes in Annual NOx Emissions from EGUs in States Subject to the CSAPR Ozone Season Trading Program for NOx (2011–2020)

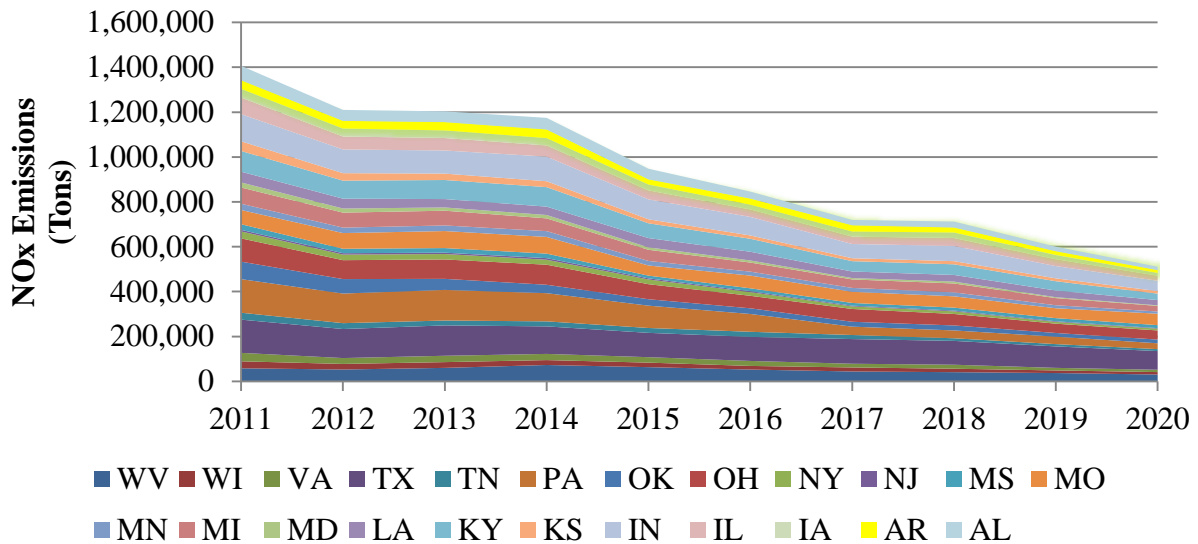
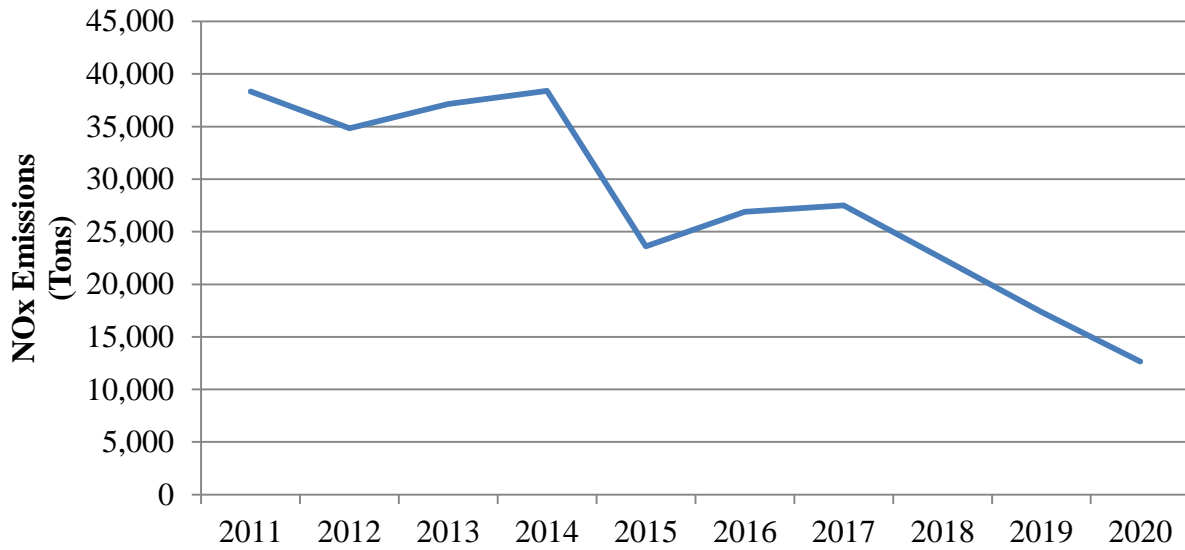


Figure IV-5 illustrates the same trend, but for Arkansas EGUs only. The dip in emissions between 2014 to 2015 reflects the transition from CAIR to CSAPR. The further decrease observed in 2018 reflects the more stringent of the two emissions budgets for Arkansas EGUs included in the CSAPR update. Furthermore, low NOx burners were installed on five large EGUs in the 2017–2018 time period. Annual NOx emissions from Arkansas EGUs decreased by 25,692 tons (67%) between 2011 and 2020.

¹²Data obtained from Air Markets Program Database

Figure IV-5: Changes in Annual NOx Emissions from EGUs in Arkansas (2011–2020)



Arkansas forest managers and farmers utilize voluntary smoke management plans to reduce smoke impacts from burning. Figures IV-6, IV-7, and IV-8 illustrate changes in NO_x, SO₂, and Primary PM_{2.5} emissions associated with agricultural fires, prescribed burns, and wildfires. Each of these figures shows a similar trend in emissions. Emissions from agricultural fires decreased in 2014 and again in 2017 for all three pollutants. Emissions of the three pollutants from prescribed fires decreased between 2011 and 2014, but those emissions increased between 2014 and 2017. The same trend in emissions is observed for wildfire. The increase between 2014 and 2017 inventories in NO_x, SO₂, and PM_{2.5} emissions are a result of a 153,612 increase in acres burned using prescribed fire and a 12,195 increase in acres burned by wildfire.

Figure IV-6: Changes in Annual NOx Emissions from Fire in Arkansas

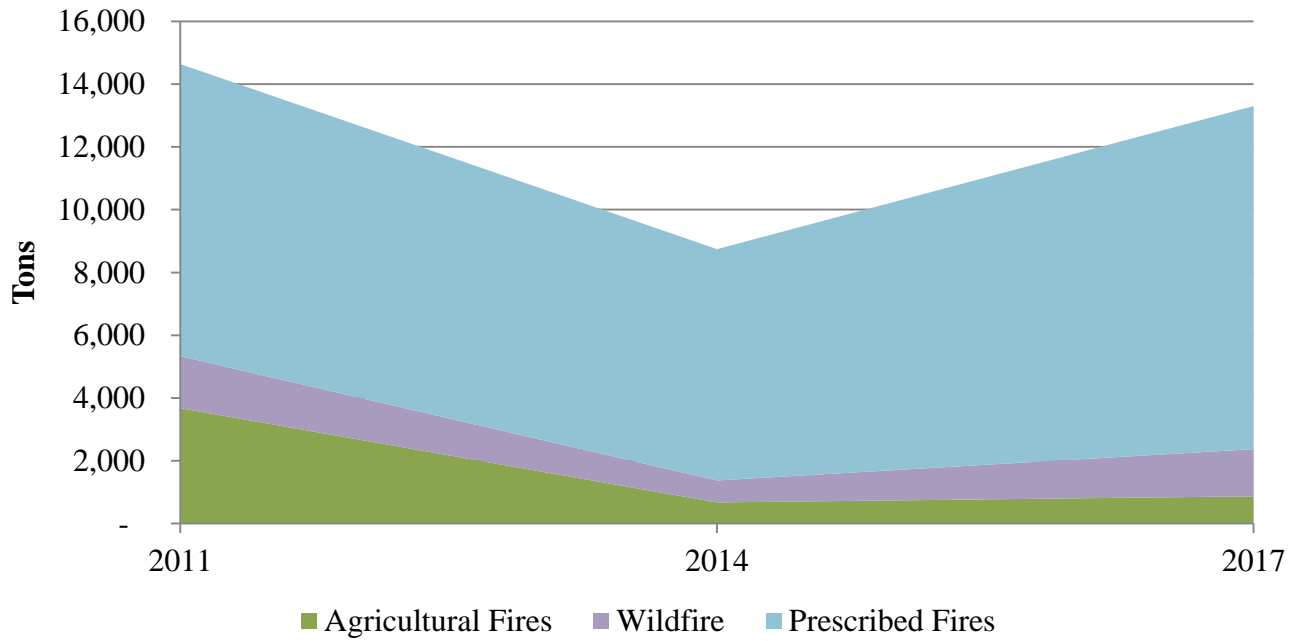


Figure IV-7: Changes in Annual SO₂ Emissions from Fire in Arkansas

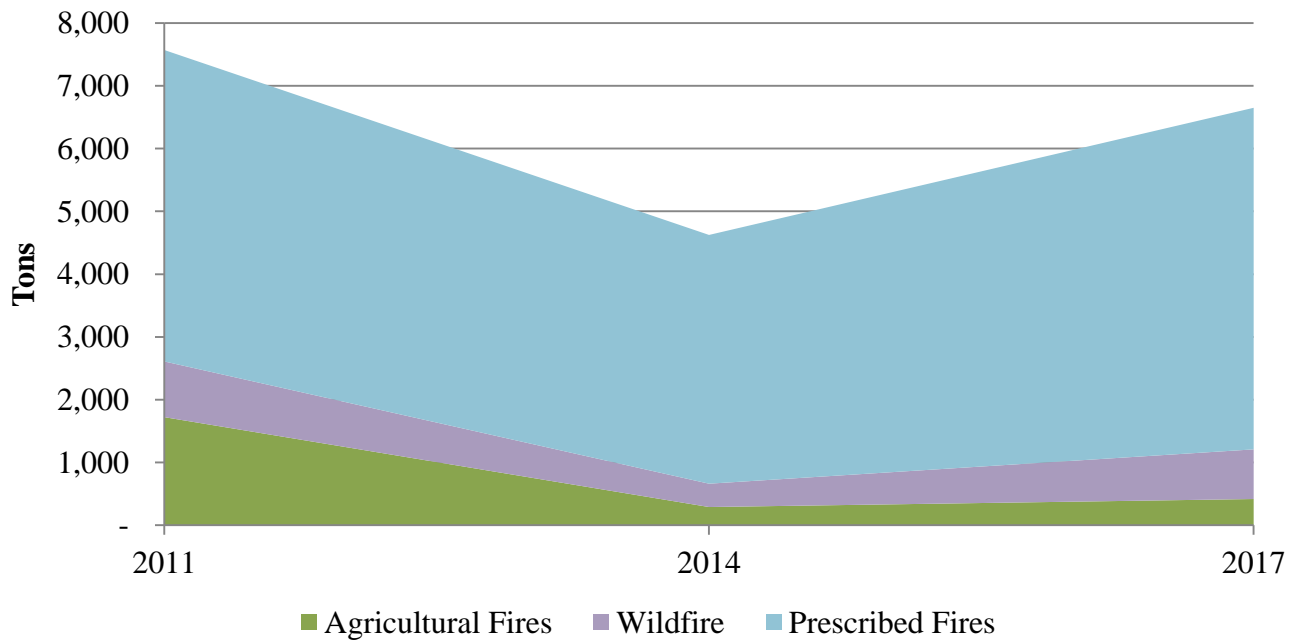
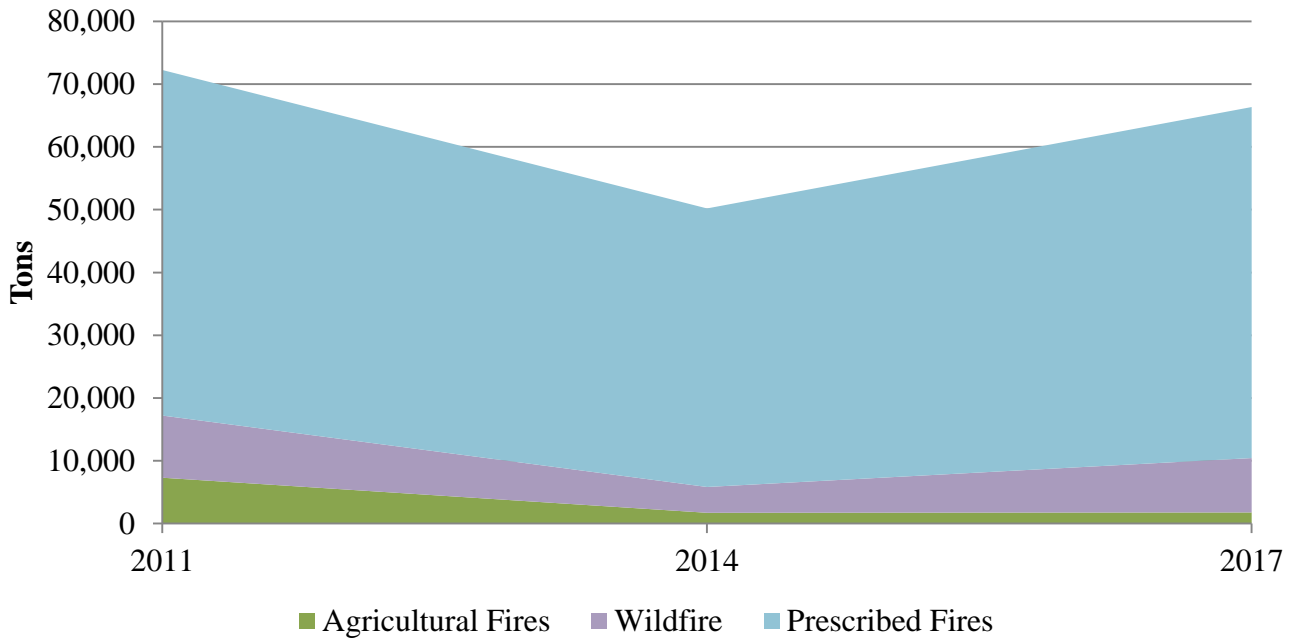


Figure IV-8: Changes in Annual Primary PM_{2.5} Emissions from Fire in Arkansas



Arkansas’s voluntary smoke management plans are intended to minimize smoke impacts associated with fire rather than reduce use of fire as a management tool. The changes in emissions do not necessarily reflect the efficacy of these plans in reducing visibility impacts.

B. Assessment of Visibility Conditions and Emissions Changes

1. Assessment of Changes in Visibility Conditions

The RHR requires states to assess changes in visibility conditions expressed in five-year averages for the most impaired days and least impaired days for progress reports due before January 31, 2025 and in terms of five-year averages for most impaired and clearest days for progress reports due after January 31, 2025. Table IV-3 compares visibility for all three metrics at Arkansas federal Class I areas for the baseline period (2000–2004), the period included in the last progress report (2007–2011), and the current (most recent) visibility conditions (2015–2019). Visibility conditions at Arkansas federal Class I areas have improved for all three metrics since the period included in the last progress report.

Table IV-3: Visibility Conditions at Arkansas Federal Class I Areas: Baseline (2000–2004), Last Progress Report (2007–2011), Current (2015–2019)

Federal Class I Area	Metric	Baseline Visibility Conditions (deciviews)	Last Progress Report Period Visibility Conditions (deciviews)	Current Visibility Conditions (2015–2019) (deciviews)
Caney Creek	Most Impaired Days	23.99	21.72	17.65
	Clearest Days	11.24	9.96	7.79
	Least Impaired Days ¹³	13.47	11.18	9.61
Upper Buffalo	Most Impaired Days	24.21	22.33	17.52
	Clearest Days	11.71	10.96	8.17
	Least Impaired Days ¹⁴	14.09	13.38	10.12

2. Assessment of Emissions of Visibility-Impairing Pollutants

The RHR requires states to report changes in visibility-impairing pollutants since the last progress report. In the 2015 Arkansas Regional Haze Progress Report, DEQ presented statewide emissions information through 2011 for the following pollutants: NO_x, SO₂, Primary PM_{2.5}, ammonia, and VOCs. The figures below illustrate the trends by sector of each of these pollutants between 2011 and the most recent NEI year 2017.

Figure IV-9 demonstrates the overall downward trajectory of statewide NO_x emissions in Arkansas between 2011 and 2017. Table IV-4 lists the emissions by category and compares 2017 emissions to the year included in the last progress report (2011).

¹³ In the last progress report, DEQ reported 2007–2011 conditions for haziest days as current conditions. These metrics have been replaced for that time period with visibility conditions on the most impaired days in this SIP revision. Data obtained from IMPROVE SIA_group_means_12_20 and sia_impairment_group_means_12_20 datasets.

¹⁴ Id.

Figure IV-9: 2011–2017 Statewide NOx Emissions by Sector

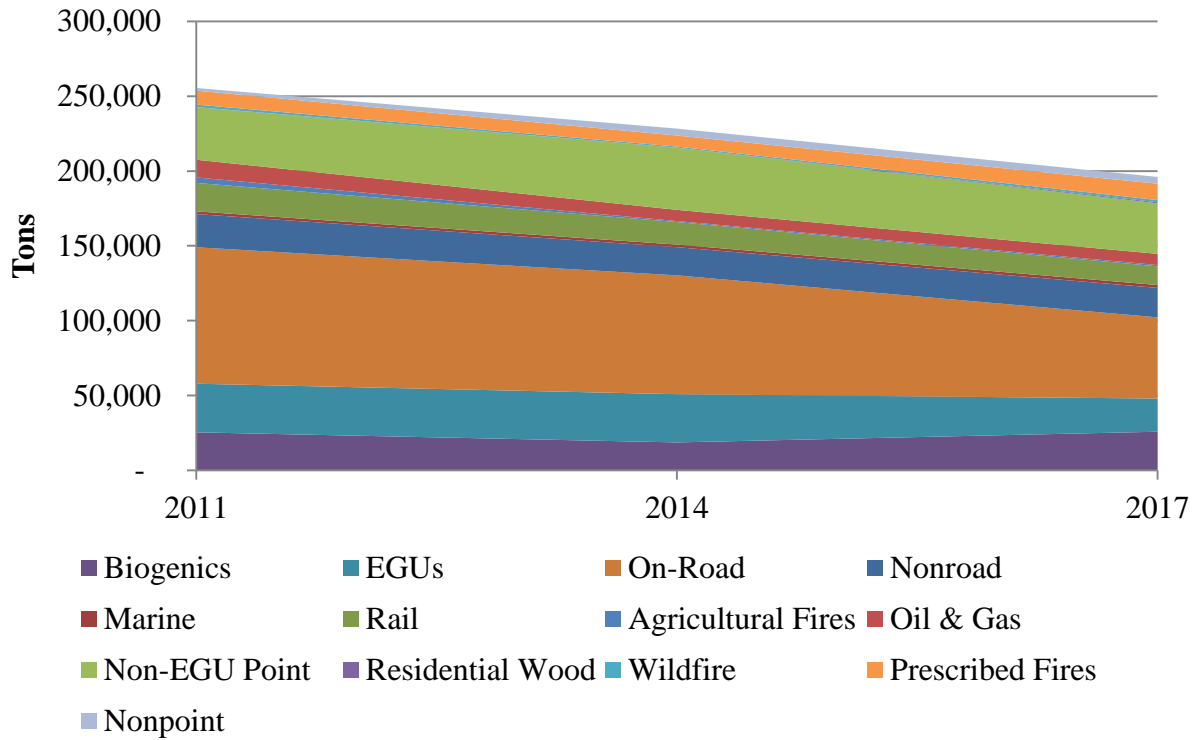


Table IV-4: Statewide NOx Emissions (Tons) by Sector (2011–2017 for non-EGUs, 2011–2020 for EGUs¹⁵)

Category	2011	2014	2017	2020	Δ Since last Progress Report (2011)
Biogenics	25,331	18,588	25,748	--	417
EGUs	32,489	32,238	22,165	12,646	(19,843)
On-Road	91,215	79,428	54,278	--	(36,938)
Nonroad	22,185	18,837	19,682	--	(2,503)
Marine	1,797	1,727	1,930	--	133
Rail	19,001	15,074	12,476	--	(6,525)
Agricultural Fires	3,673	671	866	--	(2,807)
Oil & Gas	11,834	7,482	7,463	--	(4,371)
Non-EGU Point	35,089	41,446	33,810	--	(1,279)
Residential Wood	130	143	652	--	522
Wildfire	1,656	700	1,503	--	(153)

¹⁵ Sources with CEMS that report to EPA have more recent data available than other sectors. EPA considers the appropriate “current year” for CEMS data sources (mostly EGUs) to be 2020.

Prescribed Fires	9,311	7,372	10,933	--	1,622
Nonpoint	1,793	4,632	4,515	--	2,722
Total	255,505	228,338	196,022		(69,003)

With the exception of the following categories, anthropogenic NOx emissions in Arkansas decreased between 2011 and 2017: marine, residential wood, prescribed fire, and nonpoint sources. The categories that increased make up 9% of the overall Arkansas NOx inventory. Overall, NOx emissions in Arkansas have decreased by 69,003 annual tons since 2011. The largest emission decrease came from the on-road mobile sector.

Figure IV-10 demonstrates the overall downward trajectory of statewide SO₂ emissions in Arkansas between 2011 and 2017. Table IV-5 lists the emissions by category and compares 2017 emissions to the year included in the last progress report (2011).

Figure IV-10: 2011–2017 Statewide SO₂ Emissions by Sector

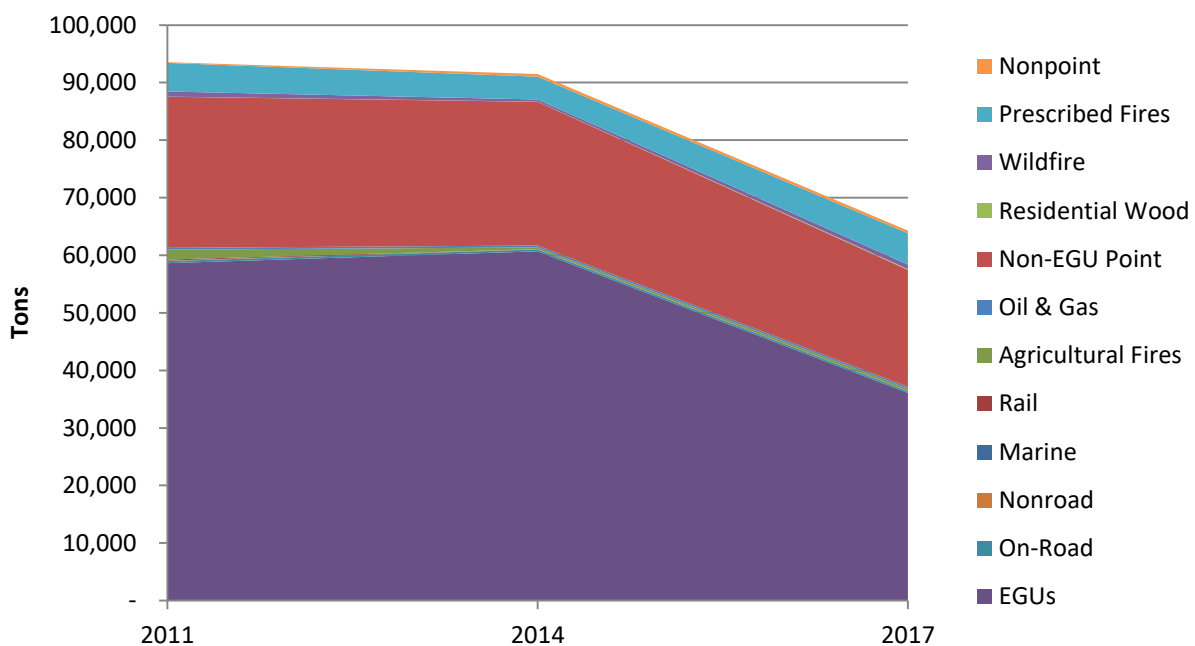


Table IV-5: Statewide SO₂ Emissions (Tons) by Sector (2011–2017 for non-EGUs, 2011–2020 for EGUs¹⁶)

Category	2011	2014	2017	2020	Δ Since last Progress report (2011)
EGUs	58,629	60,687	36,079	22,230	(36,399)
On-Road	360	333	312		(48)
Nonroad	59	42	35		(24)
Marine	22	1	7		(15)
Rail	188	9	8		(180)
Agricultural Fires	1,721	289	417		(1,304)
Oil & Gas	316	332	305		(10)
Non-EGU Point	26,253	24,976	20,293		(5,961)
Residential Wood	19	26	141		122
Wildfire	888	372	791		(96)
Prescribed Fires	4,962	3,963	5,442		480
Nonpoint	131	460	454		323
Total	93,547	91,490	64,284		(43,112)

With the exception of the following categories, anthropogenic SO₂ emissions in Arkansas decreased between 2011 and 2017: residential wood, prescribed fire, and nonpoint sources. The categories that increased make up 9% of the overall Arkansas SO₂ inventory. Overall SO₂ emissions in Arkansas have decreased by over 43,000 annual tons since 2011. The largest annual SO₂ emission decrease came from the EGU sector.

¹⁶ Sources with CEMS that report to EPA have more recent data available than other sectors. EPA considers the appropriate “current year” for CEMS data sources (mostly EGUs) to be 2020.

Figure IV-11 illustrates changes in emissions of Primary PM_{2.5} between 2011 and 2017. Table IV-6 lists the emissions by category and compares 2017 emissions to the year included in the last progress report (2011).

Figure IV-11: 2011–2017 Statewide Primary PM_{2.5} Emissions by Sector

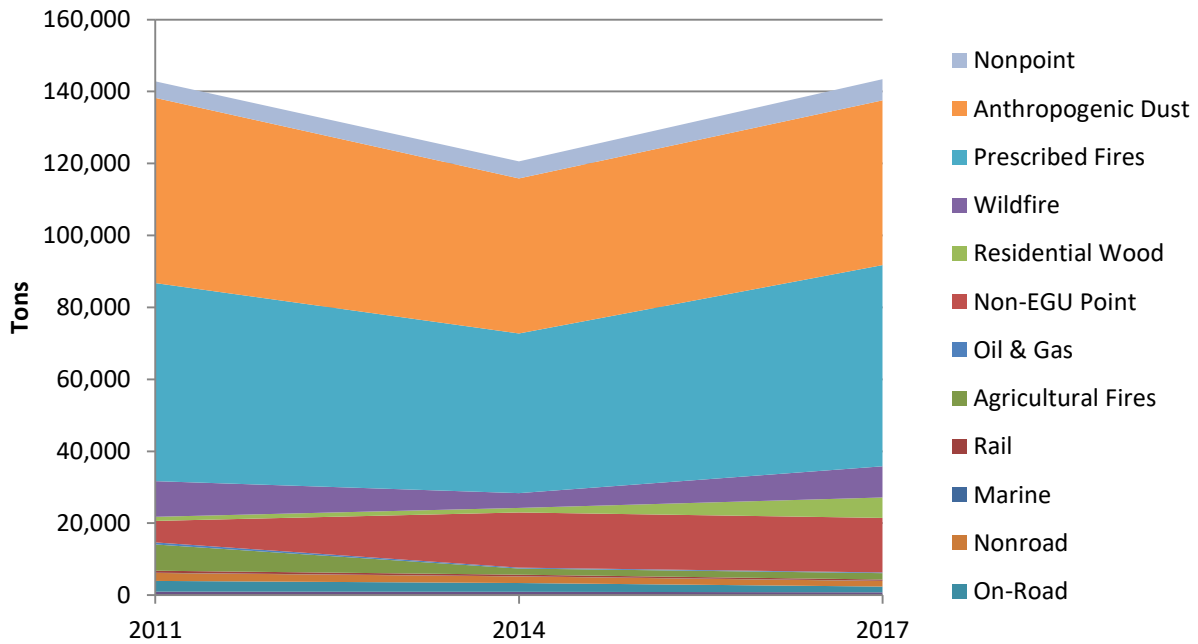


Table IV-6: 2011–2017 Statewide Primary PM_{2.5} Primary Emissions (Tons) by Sector

Category	2011	2014	2017	Δ Since last Progress report (2011)
EGUs	979	933	785	(194)
On-Road	2,981	2,436	1,600	(1,382)
Nonroad	2,213	1,836	1,559	(654)
Marine	58	43	53	(4)
Rail	566	440	353	(213)
Agricultural Fires	7,292	1,705	1,761	(5,530)
Oil & Gas	570	253	200	(371)
Non-EGU Point	5,976	15,335	15,162	9,187
Residential Wood	1,146	1,266	5,680	4,533

Wildfire	9,907	4,112	8,662	(1,244)
Prescribed Fires	55,057	44,380	55,931	874
Anthropogenic Dust	51,475	43,097	45,792	(5,683)
Nonpoint	4,598	4,742	5,892	1,293
Total	142,818	120,580	143,431	613

Overall, annual emissions of Primary PM_{2.5} increased between 2011 and 2017 by 613 tons. Although annual emissions decreased in most categories, annual emissions in non-EGU Point, residential wood, prescribed fire, and nonpoint categories increased. In particular, non-EGU point source annual emissions increased by over 9,000 tons and residential wood annual emissions increased by approximately 4,500 tons.

Figure IV-12 illustrates changes in annual ammonia emissions between 2011 and 2017. Table IV-7 lists the emissions by category and compares 2017 emissions to the year included in the last progress report (2011).

Figure IV-12: 2011–2017 Statewide Ammonia Emissions by Sector

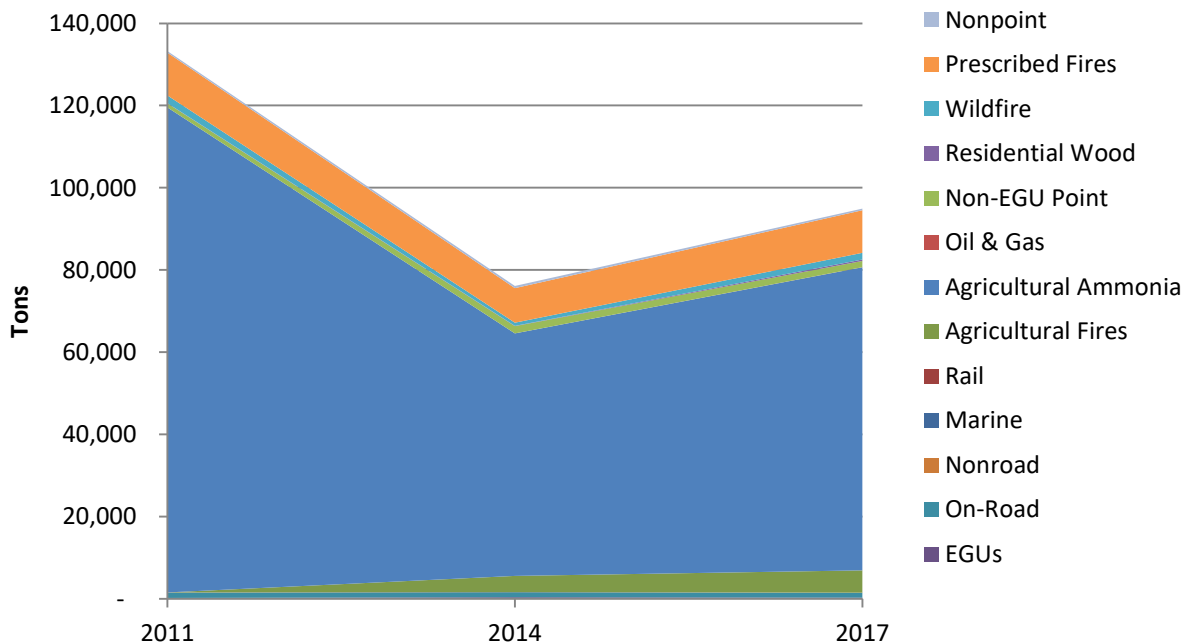


Table IV-7: 2011–2017 Statewide Ammonia Emissions (Tons) by Sector

Category	2011	2014	2017	Δ Since last Progress report (2011)
EGUs	230	406	298	68
On-Road	1,307	1,235	1,183	(124)
Nonroad	27	28	26	(1)
Marine	1	1	1	(0)
Rail	8	8	7	(1)
Agricultural Fires¹⁷	-	3,919	5,432	5,432
Agricultural Ammonia	117,957	58,981	73,710	(44,247)
Oil & Gas	1	1	30	29
Non-EGU Point	984	1,769	1,518	534
Residential Wood	63	64	340	278
Wildfire	1,874	776	1,630	(243)
Prescribed Fires	10,397	8,400	10,353	(44)
Nonpoint	390	535	401	10
Total	133,239	76,123	94,932	(38,307)

Overall statewide annual emissions of ammonia decreased since 2011, largely due to a 44,247 ton decrease in annual emissions from the agricultural ammonia category. EGU, agricultural fire, oil and gas, non-EGU point, residential wood, and nonpoint annual ammonia emissions increased. However, the categories that increased in emissions make up just 8% of the Arkansas ammonia inventory.

¹⁷ No annual emissions of ammonia from agricultural fires were reported in the 2011 NEI.

Figure IV-13 (all categories) illustrates the changes in annual VOC emissions between 2011 and 2017. For VOCs, biogenics make up the vast majority of annual emissions in Arkansas. Therefore, changes in annual emissions of each other category between 2011 and 2017 are presented in Figure IV-14. Table IV-8 lists the emissions by category and compares 2017 emissions to the year included in the last progress report (2011).

Figure IV-13: 2011–2017 Statewide VOC Emissions by Sector

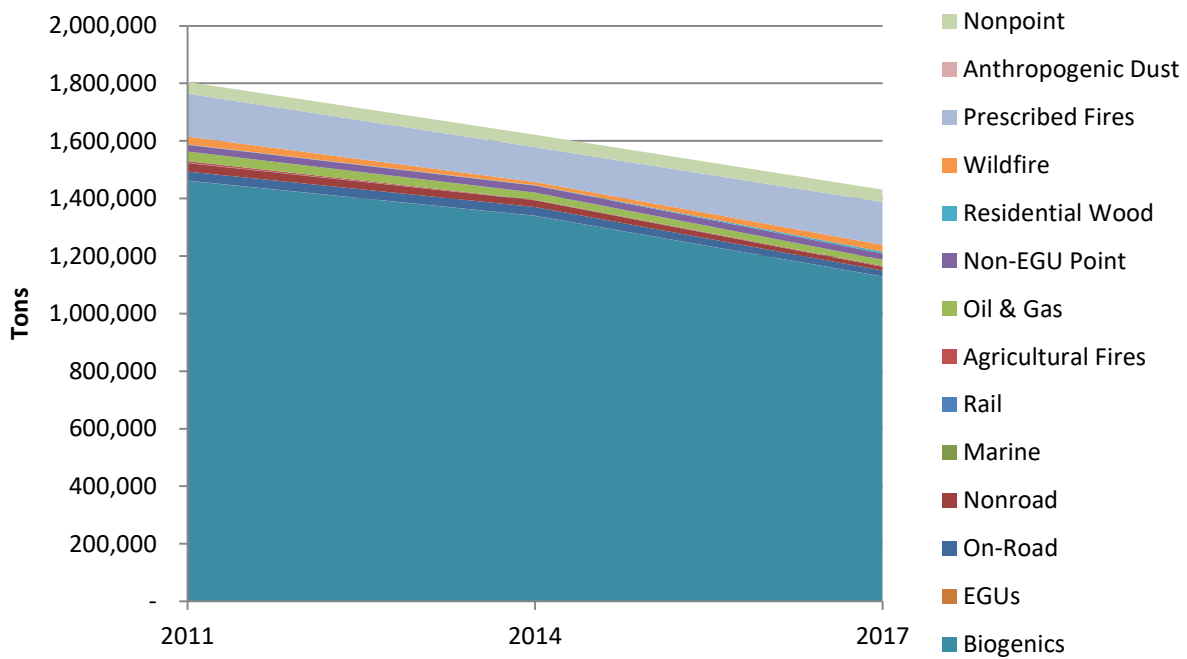


Figure IV-14: 2011–2017 Statewide VOC Emissions Without Biogenics by Sector

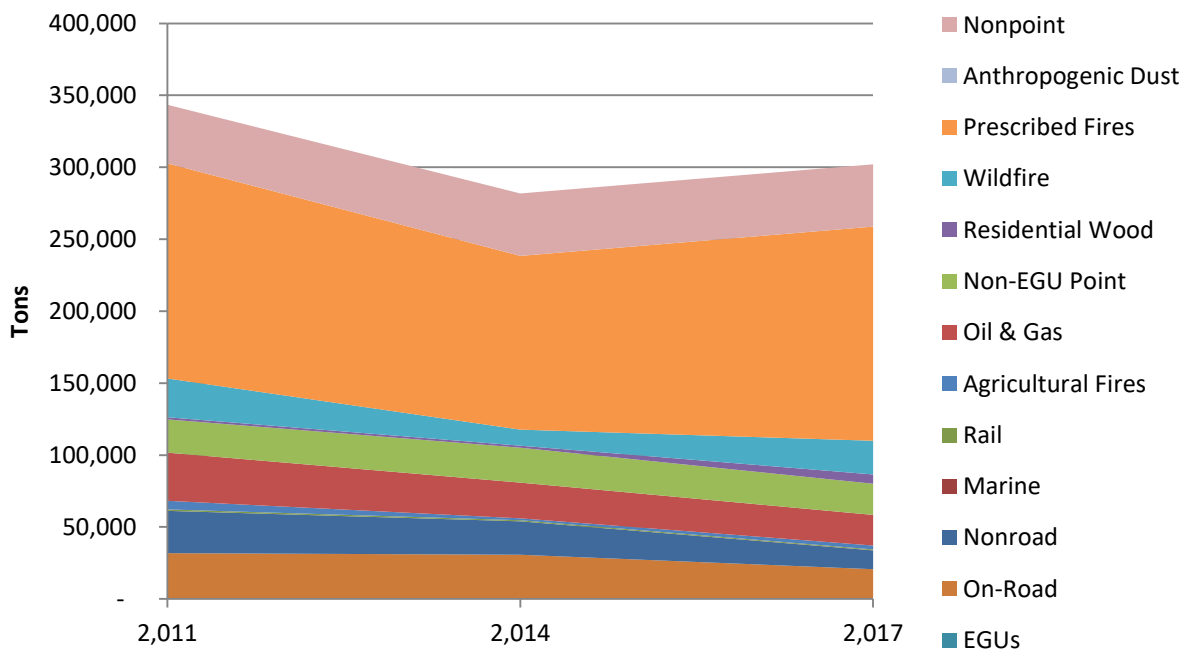


Table IV-8: 2011–2017 Statewide VOC Emissions (Tons) by Sector

Category	2011	2014	2017	Δ Since last Progress report (2011)
Biogenics	1,461,600	1,339,614	1,128,900	(332,701)
EGUs	442	427	356	(85)
On-Road	31,389	30,298	20,322	(11,067)
Nonroad	29,374	23,209	13,051	(16,323)
Marine	41	20	91	49
Rail	980	764	594	(386)
Agricultural Fires	5,987	1,297	2,707	(3,281)
Oil & Gas	33,449	24,836	21,285	(12,164)
Non-EGU Point	23,117	24,257	21,665	(1,452)
Residential Wood	1,485	1,406	6,427	4,942
Wildfire	26,933	11,154	23,437	(3,495)
Prescribed Fires	149,459	120,746	148,830	(629)
Anthropogenic Dust	-	0	0	0
Nonpoint	40,750	43,383	43,276	2,526
Total (excluding biogenics)	343,406	281,796	302,041	(41,365)
Total	1,805,006	1,621,410	1,430,940	(374,066)

With the exception of the marine, anthropogenic dust, and nonpoint categories, annual emissions of VOCs decreased in Arkansas between 2011 and 2017. The categories that increased in emissions make up 4% of the Arkansas VOC inventory. Total annual emissions decreased by 374,066 tons. However, once the biogenics category is excluded, emissions across all other categories decreased by 41,365 tons.

3. Assessment of Significant Changes in Anthropogenic Emissions

With the exception of Primary PM_{2.5}, emissions of visibility-impairing pollutants in Arkansas decreased significantly since the last progress report. Annual Primary PM_{2.5} emissions increased by 613 tons between 2011 and 2017, largely due to emission increases in non-EGU point and residential wood source categories. This emission increase in Primary PM_{2.5} is dwarfed by the annual emission reductions in NO_x and SO₂ (69,003 tons and 43,112 tons, respectively), which contribute the most to visibility impairment at Arkansas federal Class I areas.

Although overall emissions of anthropogenic NO_x, SO₂, ammonia, and VOCs have decreased between 2011 and 2017, there were some increases in emissions estimates for certain source sectors:¹⁸

- NO_x and VOC emissions estimates increased for marine vessels;
- NO_x, SO₂, and ammonia emissions estimates increased for residential wood combustion;
- NO_x and SO₂ emissions estimates increased for prescribed fire;
- NO_x, SO₂, ammonia, and VOC emissions estimates increased for nonpoint sources;
- Ammonia emissions estimates increased for agricultural fire;
- Ammonia emissions estimates increased for oil and gas; and
- VOC emissions estimates increased for anthropogenic dust.

These emissions represented a fairly small portion of the Arkansas inventory for each of the pollutants identified above. Furthermore, EPA revised methodology in the 2017 NEI for estimating emissions used in previous NEIs for certain source categories.

- For commercial marine vessels, EPA created new source classification codes (SCC), revised emission factors, changed the way it uses shape files for estimating marine emissions, and eliminated maneuvering, hoteling, cruise, and reduced speed zone emission types.
- For residential wood combustion, EPA revised its estimates based a national survey of wood-burning activity in 2018.
- For nonpoint sources:
 - EPA revised its fertilizer estimates for crops without state or USDA fertilizer data by approximately 20% from 2014 NEI estimates resulting in a large increase in ammonia emissions estimates;
 - Ammonia emission factors for livestock were updated between 2014 and 2017;
 - EPA revised VOC emission factors and added ammonia estimates for agricultural fires;
 - EPA revised emission factors for oil and gas production; and
 - EPA revised how county-level estimates for publically-owned treatment works

¹⁸ DEQ has no authority to regulate the source sectors listed in this section.

were calculated by summing facility-level data instead of allocating a national flow rate to counties based on population;

Therefore, it is likely that some of the emission increases identified for certain source categories may not represent an actual change in emissions.

Based on DEQ's evaluation of emissions trends for Arkansas sources and visibility trends on the most impaired, least impaired, and clearest days at Caney Creek and Upper Buffalo since the last progress report, DEQ concludes that the changes in anthropogenic emissions are facilitating, rather than impeding, progress towards natural visibility conditions at Arkansas federal Class I areas.