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An AEP Company
BOUNDLESS ENERGY

VIA U.S. Mail and E-mail (*Montgomery@adeq.state.ar.us*)

March 25, 2020

Mr. William K. Montgomery
Interim Associate Director
Arkansas Department of Energy and Environment
Division of Environmental Quality, Office of Air Quality
5301 Northshore Drive
North Little Rock, AR 72118

Re: Response to January 8, 2020 Regional Haze Four-Factor Analysis Information Collection Request
Southwestern Electric Power Company - Flint Creek Power Plant

Dear Mr. Montgomery:

This letter is provided by American Electric Power Service Company (AEP) on behalf of Southwestern Electric Power Company (SWEPCO) in response to your January 8, 2020 information collection request ("the ICR") addressed to Mr. Brian Bond. The ICR specifically asks for technical and economic information related to two potential post-combustion nitrogen oxide (NO_X) reduction strategies for the Main Boiler, source number 01 (SN-01), at the Flint Creek Power Plant (Flint Creek): Selective Catalytic Reduction (SCR) and Selective Non-Catalytic Reduction (SNCR).

As stated in the ICR, SN-01 is already equipped with low-NO_X burners and over-fire air (LNB+OFA), which constitute the most cost-effective combustion controls for NO_X. Thus, the employment of SCR and/or SNCR would be for only incrementally more NO_X emissions reduction than is already being achieved. The requested information for each of these two control options is provided below in a slightly different order/format than outlined in the ICR.

In addition to the information requested by the ICR, AEP/SWEPCO is providing, in Attachment 1, a summary of the current visibility conditions at each of the two Arkansas and two Missouri Class I areas. AEP/SWEPCO feels that it is important to bear in mind the ultimate goal of the regional haze rule and the fact that visibility conditions in all four potentially impacted Class I areas are better than what is required by the uniform rate of progress or glidepath for each area. This is true for both current monitored visibility and modeled projections for visibility. Therefore, the obligation to make reasonable progress toward the 2064 visibility goal is satisfied and further reductions are not necessary during this planning period.

Baseline Emission Rate

Per the ICR, the maximum monthly emission rate, in pounds per hour (lb/hr) or pounds per million British thermal units (lb/MMBtu), from the period between June 1, 2018 and December 31, 2019 (baseline period) is taken as the baseline emission rate. Based on monthly data in the U.S. Environmental Protection

Agency's (EPA's) Air Markets Program Data (AMPD), [1] this value is 0.20 lb/MMBtu for November 2018. November 2018 also represents the maximum monthly heat input for SN-01 for the baseline period: 4,678.4 MMBtu per hour (MMBtu/hr).

The average monthly emission rate and heat input rate during the baseline period are much less: 0.186 lb/MMBtu and 3,856.8 MMBtu/hr, respectively.

Additionally, for the purpose calculating the control cost estimates presented later in this letter, the maximum monthly total emissions value during the baseline period is 345.06 tons per month for December 2018. This value annualizes to 4,140.72 tons per year (tpy).

Control Effectiveness

The ICR lists "typical control efficiency" values for SCR and SNCR of 90% and 35-50%, respectively. These control efficiencies are possible only for boilers that do not already have low emission rates, unlike SN-01, which, as mentioned above, is already equipped with LNB+OFA.

AEP's September 2013 Best Available Retrofit Technology (BART) Five Factor Analysis (the AEP 2013 BART report) presented a vendor-estimated emission rate for SCR of 0.067 lb/MMBtu and an emissions estimate range for SNCR (with LNB+OFA) of 0.18 to 0.23 lb/MMBtu. EPA's August 2016 Federal Implementation Plan (FIP) Response to Comments (RTC) document (the EPA 2016 FIP RTC)[2] used 0.055 lb/MMBtu rather than 0.067 lb/MMBtu for SCR, and it used 0.20 lb/MMBtu for SNCR.

For the purposes of this ICR response, 0.055 lb/MMBtu is used as the controlled emission rate for SCR. Comparing this controlled emission rate to the baseline emission rate of 0.20 lb/MMBtu, the control efficiency possible for SCR is 72.5%. AEP/SWEPCO agrees that 0.20 lb/MMBtu is the appropriate emission rate for SNCR at Flint Creek. This rate is equal to the baseline emission rate; therefore, the SNCR control efficiency is zero (0). AEP's engineering department is in agreement with this result – since the NOx emission rate is already reduced to this lower emission rate range by the installed LNB/OFA, implementing SNCR at Flint Creek would provide for no additional emissions reductions.

Emissions Reductions

Based on the control efficiencies presented above and the baseline period annualized maximum monthly total emissions value, 4,140.72 tpy, the potential emissions reductions for SCR and SNCR are 3,002 tpy and zero (0) tpy, respectively.

Time Necessary to Implement

Were SCR or SNCR to be required for SN-01, AEP/SWEPCO would need at least three (3) years for engineering design, procurement, construction, and shakedown.

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[1] https://ampd.epa.gov/ampd/, queried on March 2, 2020.

[2] Response to Comments for the Federal Register Notice for the State of Arkansas; Regional Haze and Interstate Visibility Transport Federal Implementation Plan, Docket No. EPA-R06-OAR-2015-0189, August 31, 2016. See page 211.

Remaining Useful Life

There are no effective limitations on the remaining useful life (RUL) of SN-01; therefore, the default useful life values for SCR and SNCR from the EPA's Air Pollution Control Cost Manual (CCM),[3] 30 years and 20 years, respectively, are used for the control cost estimates presented later in this letter.

Energy and Non-Air Quality Environmental Impacts

From the AEP 2013 BART report:

> *SCR systems require electricity to operate the ancillary equipment. The need for electricity to help power some of the ancillary equipment creates a demand for energy that currently does not exist.*
>
> *SCR and SNCR can potentially cause significant environmental impacts related to the storage of ammonia. The storage of aqueous ammonia above 10,000 lbs is regulated by a risk management program (RMP), since the accidental release of ammonia has the potential to cause serious injury and death to persons in the vicinity of the release. SCR and SNCR will likely also cause the release of unreacted ammonia to the atmosphere. This is referred to as ammonia slip. Ammonia slip from SCR and SNCR systems occurs either from ammonia injection at temperatures too low for effective reaction with NO_X, leading to an excess of unreacted ammonia, or from over-injection of reagent leading to uneven distribution, which also leads to an excess of unreacted ammonia. Ammonia released from SCR and SNCR systems will react with sulfates and nitrates in the atmosphere to form ammonium sulfate and ammonium nitrate. Together, ammonium sulfate and ammonium nitrate are the predominant sources of regional haze.*

Costs to Implement

Table 1 summarizes the capital, annualized capital, and annual operations and maintenance (O&M) costs for SCR and SNCR as presented in the AEP 2013 BART report and alternative values for SNCR as presented in the EPA 2016 FIP RTC. As discussed in the EPA 2016 FIP RTC, the EPA's alternative values for SNCR include adjustments to the useful life and baseline/uncontrolled emission rate.

Table 1. Controls Costs

Control Option	Capital Cost ($)	Annualized Capital Cost ($/yr)	Annual O&M Cost ($/yr)	Total Annual Cost ($/yr)
SCR	121,440,000	9,786,413	5,260,000	15,046,413 (2016 Basis) 13,769,599 (2013 Basis)
SNCR - AEP [4]	7,124,235	672,477	2,050,684	2,723,162 (2011 Basis)
SNCR - EPA	5,683,091	457,980	325,551	783,531 (2011 Basis)

Table 2 presents cost effectiveness, in dollars per ton of NO_X reduced, based on the total annual costs in Table 1 and the emissions reductions values presented above. As noted in Table 1 above, the SCR costs were calculated in the AEP 2013 BART report using a 2016 basis, and the total was then de-escalated to a

[3] https://www.epa.gov/economic-and-cost-analysis-air-pollution-regulations/cost-reports-and-guidance-air-pollution#cost reports, accessed on March 2, 2020.

[4] The SNCR values are adjusted to remove the costs associated with LNB+OFA; they were presented together in the AEP 2013 BART report.

2013 basis. Additionally, the SNCR costs were calculated and presented using a 2011 basis. These values are escalated to a 2018 basis[5] for the purpose of calculating updated cost effectiveness values.

Table 2 – Controls Cost Effectiveness

Control Option	Total Annual Cost ($/yr) (2018 Basis)	Emissions Reduction (tpy)	Cost Effectiveness ($/ton)
SCR	15,962,740	3,002	5,317
SNCR - AEP	3,349,146	0	Not applicable
SNCR - EPA	963,644	0	Not applicable

Conclusion

Based on the updated emissions and controls cost information presented by AEP (and accepted by the EPA) and information published independently by the EPA in the BART determinations, post-combustion NO_X controls (i.e., SCR and SNCR) remain infeasible for SN-01.

This response is submitted on behalf of Southwestern Electric Power Company, a wholly owned subsidiary of American Electric Power, Inc. (AEP). Please contact me at (214) 777-1155 or kmhughes@aep.com if you have any questions regarding this submittal. Due to the COVID-19 pandemic situation and limited access to print, scan and postal mail abilities, please accept my electronic signature below.

Sincerely,

Kimberly Hughes

Kimberly Hughes
Environmental Engineering Supervisor
American Electric Power

ec: Jeremy Jewell, Trinity Consultants

Brian Bond/Elizabeth Gunter/Ashley Roundtree, AEP

File: FLC.10.90.50.10.2020

[5] Escalation is based on 3 % per year increased costs.

Attachment 1

Visibility Conditions in the Arkansas and Missouri Class I Areas

The following pages show plots for each of the Arkansas and Missouri Class I Areas – Caney Creek (CACR), Hercules Glades (HEGL), Mingo (MING), and Upper Buffalo (UPBU) – from EPA's September 19, 2019 memorandum *Availability of Modeling Data and Associated Technical Support Document for the EPA's Updated 2028 Visibility Air Quality Modeling*. In each plot, the "Current Avg" line represents the current visibility conditions based on the average of the 20 percent most impaired days for the years 2014 through 2017 from the Interagency Monitoring of Protected Visual Environments (IMPROVE) data, the hatched bars ("MOD2016" and "MOD2028") show the results of EPA's modeling, and the "Adj Glidepath" line shows EPA's expected new uniform rate of progress (URP) based on the 20 most impaired days (rather than the 20 percent worst days, which was used for the original URP/Glidepath). The shaded area shows EPA's expectations for the minimum and maximum adjusted glidepath – to be established with the approval of the regional haze second planning period state implementation plan (SIP). Thus, as plotted, if the "Current Avg" is below the "Adj Glidepath" and especially if it is even the lower than the shaded area, then the current Class I area visibility conditions are better than necessary to achieve the goal of the regional haze program. Moreover, if the 2028 modeling results are lower than the "Adj Glidepath" and shaded areas, then predicted visibility conditions are better than necessary. Both of these are true of all four Class I areas under consideration in the Arkansas SIP.

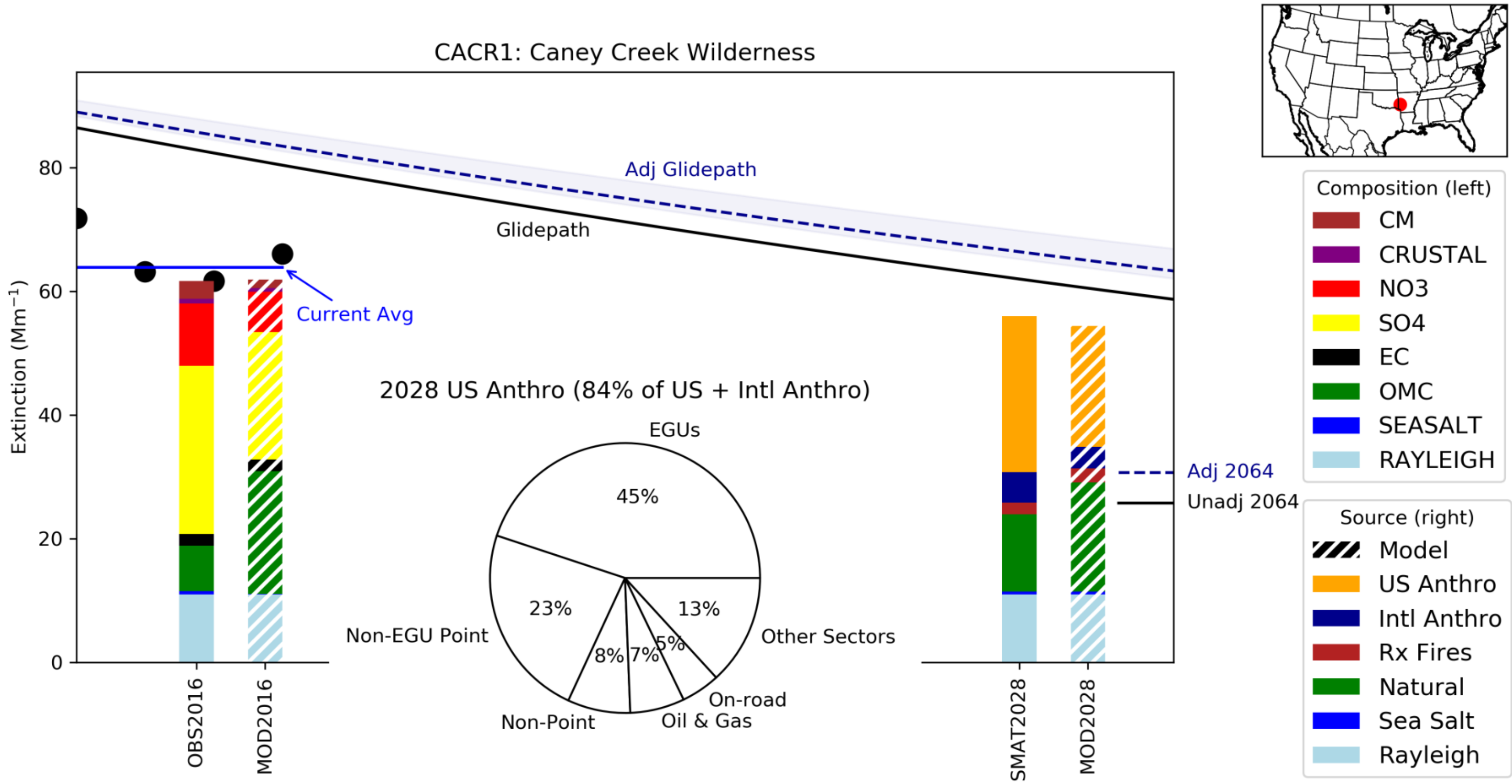

Figure 16: 2014-2017 IMPROVE observations, 2016 CAMx model predictions, 2028 modeled projection, and 2028 sector contributions at CACR1. Used for Class I areas: Caney Creek Wilderness.

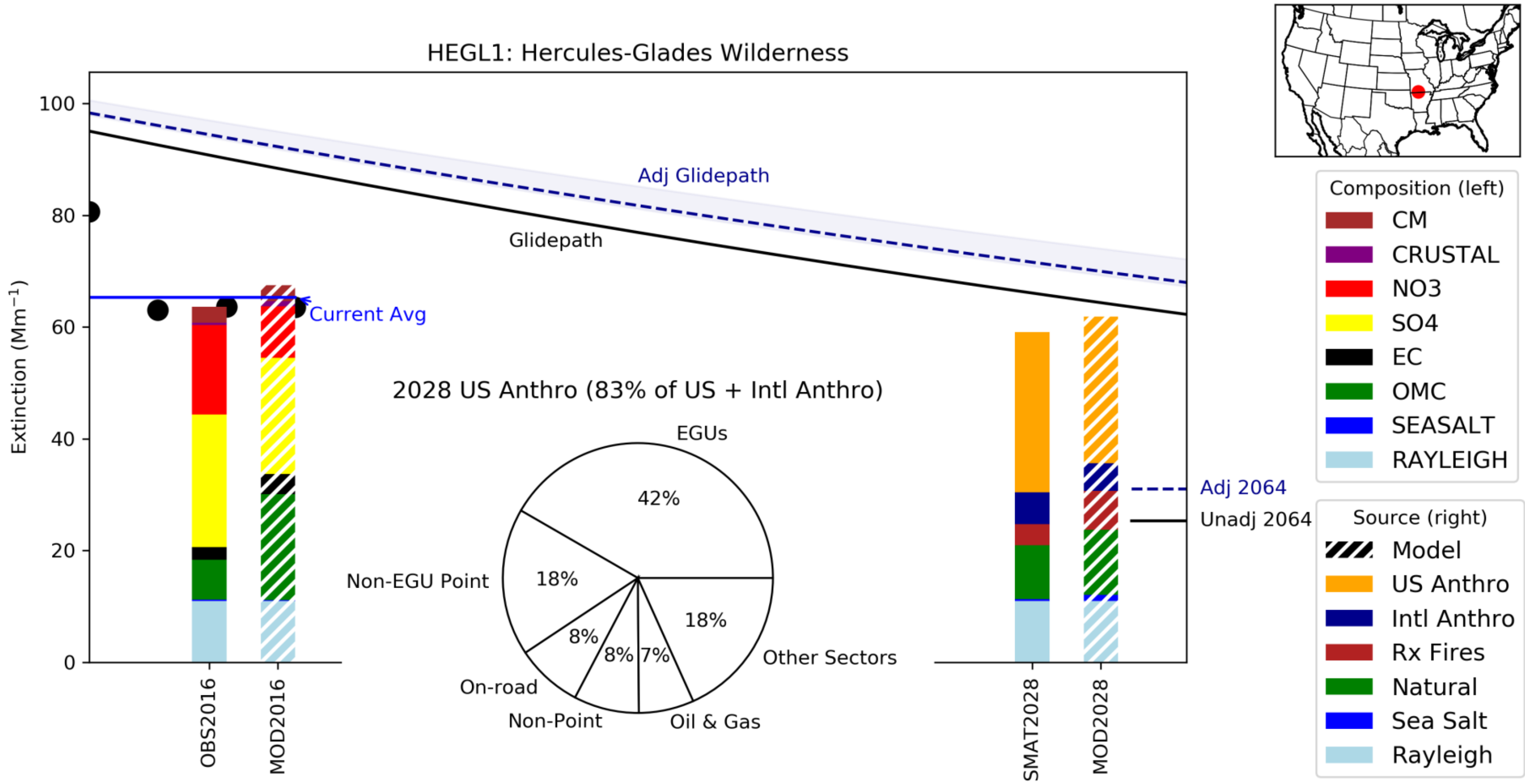

Figure 36: 2014-2017 IMPROVE observations, 2016 CAMx model predictions, 2028 modeled projection, and 2028 sector contributions at HEGL1. Used for Class I areas: Hercules-Glades Wilderness.

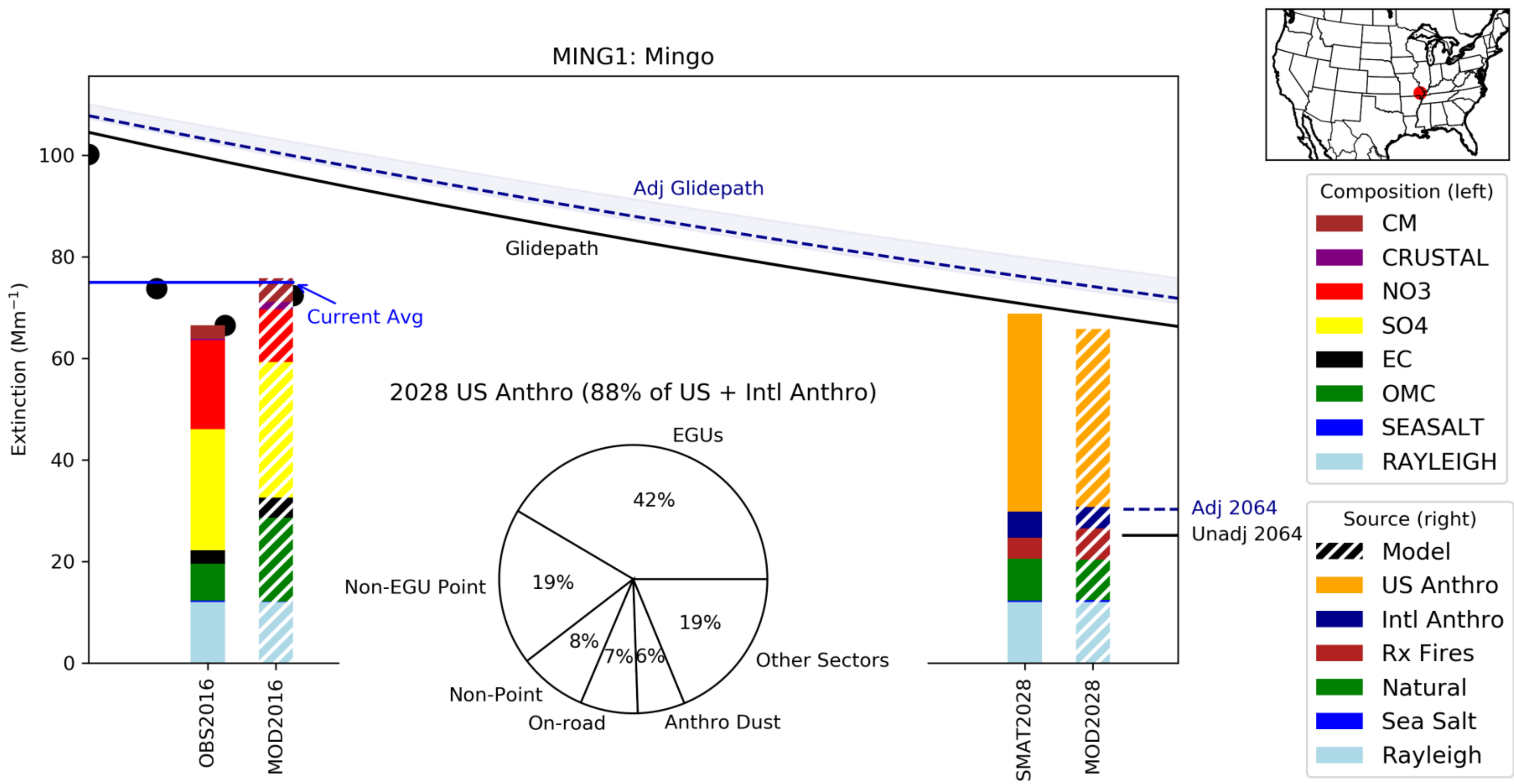

Figure 53: 2014-2017 IMPROVE observations, 2016 CAMx model predictions, 2028 modeled projection, and 2028 sector contributions at MING1. Used for Class I areas: Mingo.

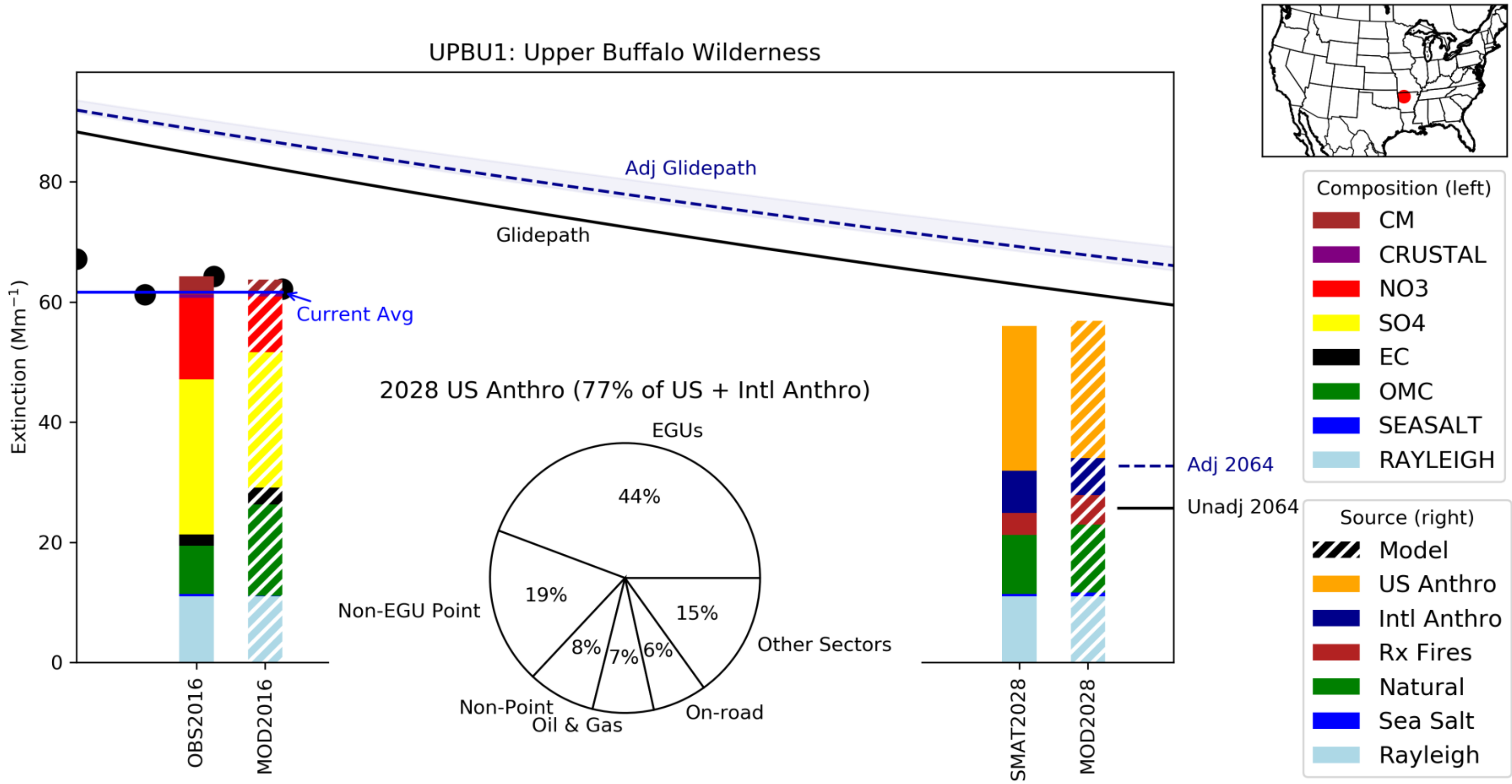

Figure 93: 2014-2017 IMPROVE observations, 2016 CAMx model predictions, 2028 modeled projection, and 2028 sector contributions at UPBU1. Used for Class I areas: Upper Buffalo Wilderness.