Memorandum

To: Steam Electric ELG 2025 Reconsideration Rulemaking Record – EPA-HQ-OW-2009-0819

From: U.S. EPA

Date: August 15, 2025

Re: Overview of Costs and Benefits of Steam Electric ELG 2025 Reconsideration

1   Introduction

This memorandum details estimates of the costs and benefits of the Proposed Rule for the *Supplemental Effluent Limitations Guidelines and Standards for the Steam Electric Power Generating Point Source Category – Deadline Extensions* to satisfy the requirements of Executive Order (E.O.) 12866: Regulatory Planning and Review (58 FR 51735, October 4, 1993), as amended by E.O. 13563: Improving Regulation and Regulatory Review (76 FR 3821, January 21, 2011).

Table 1-1 summarizes the estimated costs and monetized benefits of the proposed compliance extension. Given a lack of data regarding when each facility would actually implement technologies and processes to meet effluent limitation guidelines (ELG) compliance, the EPA assumed three years as the midpoint of the actual range of years of delayed implementation at facilities (between zero and six years). Overall, the analysis shows that the proposed rule would result in net cost savings (*i.e.,* negative costs) and forgone benefits (*i.e.,* negative benefits). See Sections 2 for details.

Table 1-1: Summary of social costs and monetized benefits at 3 percent and 7 percent discount rates (million 2024$)						
	Costs		Monetized Benefits		Net Benefits	
	Low	High	Low	High	Low[b]	High[b]
3% Discount						
Total present value[a]	-$689.4	-$1,983.3	-$1,051.0	-$2,501.5	-$1,812.1	$932.3
Annualized[a]	-$30.2	-$87.0	-$46.1	-$109.7	-$79.5	$40.9
7% Discount						
Total present value[a]	-$1,049.1	-$2,857.2	-$1,314.4	-$3,189.9	-$2,140.8	$1,542.8
Annualized[a]	-$79.1	-$215.4	-$99.1	-$240.5	-$161.4	$116.3

a Total present value and annualized value over the 39-year period of 2025-2063.

b The low end of net benefits was calculated by subtracting the low end of cost savings from the high end of forgone monetized benefits, whereas the high end of net benefits was calculated by subtracting the high end of cost savings from the low end of forgone monetized benefits.

The EPA determined that this rule is deregulatory in that it results in negative costs on an annualized basis.

2   Social Costs and Benefits

2.1   Social Costs

The EPA estimated the changes in costs to society resulting from the proposed rule based on the time profile of social costs previously developed for the 2024 supplemental steam electric final rule and presented in the Benefit and Cost Analysis report (BCA; U.S. Environmental Protection Agency, 2024a).

The proposal would most directly affect compliance with limits for bottom ash (BA) transport water, flue gas flue gas desulfurization (FGD) wastewater, and managed combustion residual leachate (CRL), but actions to address discharges from legacy wastewater and unmanaged CRL may also be indirectly

affected in cases where plant owners elect to address discharges from steam electric power plants concurrently. Because of this uncertainty, the EPA conducted the analysis using two sets of cost inputs to develop low- and high-end estimates:

1. Costs previously analyzed for the 2024 final rule that include only BA transport water, FGD wastewater, and managed CRL; and

2. Costs previously analyzed and presented in the 2024 BCA (Table 11-2 and Table 11-3) which also include estimated costs to address legacy wastewater and unmanaged CRL. For the 2024 rule, the EPA had estimated costs for lower and upper bound cost scenarios that reflect the uncertainty associated with costs for meeting limits for unmanaged CRL.[1]

The baseline assumes implementation of the 2024 final rule starting in 2025. This is compared to implementation starting on average in 2028 under this proposal. In both scenarios, the maximum technology implementation outlays are incurred over the first five years (2025-2029 in the baseline and 2028-2032 with the proposed delay) when steam electric power plants are expected to implement wastewater treatment technologies. In the high-end estimate, outlays increase in 2044 in the baseline (2047 in the proposed rule) due to the implementation of treatment to meet legacy wastewater limits as plants are assumed to start dewatering ponds. Additional outlays consist of operation and maintenance (O&M) expenditures.

EPA calculated the changes in costs attributable to the 3-year implementation delay by subtracting the baseline costs from the costs for the proposed rule scenario for each of the low- and high-end estimates.

Table 21 and Table 22 show the respective resulting time profile of costs for the two approaches. As shown in the tables, the 3-year compliance extension results in significant cost savings relative to the baseline in the first five years of the analysis when steam electric plants were projected to incur capital costs to install wastewater treatment technologies in the baseline, followed by net cost increases once the plants incur the delayed expenditures. In the case of the approach that includes all wastestreams (Table 22), the changes over the period of 2044 through 2047 reflect changes in the timing of expenditures associated with legacy wastewater treatment. The direction of the changes in other years (*i.e.,* cost savings or incremental costs) depends on the timing and relative magnitude of capital and O&M costs. The cost savings at the high end are up to approximately 2.5 times larger than those at the low end. Overall, looking across the analyzed scenarios, at a 3 percent discount rate the 3-year compliance extension translates into annualized savings of $30 million on the low end (Table 21) and up to $87 million on the high end (Table 22). At a 7 percent discount rate, the savings are $79 million on the low end and $215 million on the high end.

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[1] As described in the Regulatory Impact Analysis for the 2024 rule (RIA; U.S. Environmental Protection Agency, 2024b), the lower bound scenario reflects the sum of point estimates of costs to meet FGD wastewater, BA transport water, legacy wastewater, and CRL limits, plus the lower bound estimate of the cost to meet limits for unmanaged CRL, whereas the upper bound scenario reflects the sum of the point estimates for the four wastestreams plus the upper bound estimate of the cost to meet limits for unmanaged CRL.

Table 2-1: Summary of social costs for low-end estimate at 3 percent and 7 percent discount rates

Year	Costs (million 2023$)[a]			Change Due to Proposed Rule (million 2024$)[b]
	Baseline	With Proposed Rule	Difference	
2025	$1,024.4	$0.0	-$1,024.4	-$1,049.2
2026	$641.0	$0.0	-$641.0	-$656.5
2027	$936.4	$0.0	-$936.4	-$959.1
2028	$955.2	$1,024.4	$69.2	$70.8
2029	$621.4	$641.0	$19.6	$20.0
2030	$235.3	$936.4	$701.1	$718.1
2031	$240.5	$955.2	$714.7	$732.0
2032	$240.4	$621.4	$381.0	$390.2
2033	$240.0	$235.3	-$4.7	-$4.8
2034	$240.9	$240.5	-$0.3	-$0.3
2035	$240.2	$240.4	$0.2	$0.2
2036	$235.5	$240.0	$4.5	$4.6
2037	$237.7	$240.9	$3.2	$3.2
2038	$237.0	$240.2	$3.2	$3.3
2039	$236.5	$235.5	-$1.0	-$1.0
2040	$237.4	$237.7	$0.4	$0.4
2041	$236.7	$237.0	$0.3	$0.3
2042	$235.6	$236.5	$0.9	$1.0
2043	$237.0	$237.4	$0.3	$0.3
2044	$237.0	$236.7	-$0.3	-$0.3
2045	$236.4	$235.6	-$0.8	-$0.8
2046	$236.7	$237.0	$0.3	$0.3
2047	$236.5	$237.0	$0.5	$0.5
2048	$235.5	$236.4	$0.8	$0.9
2049	$235.8	$236.7	$1.0	$1.0
2050	$235.8	$236.5	$0.7	$0.8
2051	$235.8	$235.5	-$0.3	-$0.3
2052	$235.8	$235.8	$0.0	$0.0
2053	$235.8	$235.8	$0.0	$0.0
2054	$235.8	$235.8	$0.0	$0.0
2055	$235.8	$235.8	$0.0	$0.0
2056	$235.8	$235.8	$0.0	$0.0
2057	$235.8	$235.8	$0.0	$0.0
2058	$235.8	$235.8	$0.0	$0.0
2059	$235.8	$235.8	$0.0	$0.0
2060	$235.8	$235.8	$0.0	$0.0
2061	$0.0	$235.8	$235.8	$241.5
2062	$0.0	$235.8	$235.8	$241.5
2063	$0.0	$235.8	$235.8	$241.5
3% Discount			PV	-$689.4
			Annualized	-$30.2
7% Discount			PV	-$1,049.1
			Annualized	-$79.1

[a] Reflect costs to meet limits for BA transport water, FGD wastewater, and managed CRL.
[b] The EPA used the GDP deflator to convert 2023$ to 2024$ (125.22/122.27 = 1.024)

Table 2-2: Summary of social costs for high-end estimate at 3 percent and 7 percent discount rates

Year	Costs (million 2023$)[a]						Change Due to Proposed Rule (million 2024$)[b]	
	Baseline		With Proposed Rule		Difference			
	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound	Lower Bound	Upper Bound
2025	$1,240.0	$1,996.8	$0.0	$0.0	-$1,240.0	-$1,996.8	-$1,270.0	-$2,045.1
2026	$748.9	$1,147.5	$0.0	$0.0	-$748.9	-$1,147.5	-$767.0	-$1,175.3
2027	$1,123.4	$1,885.6	$0.0	$0.0	-$1,123.4	-$1,885.6	-$1,150.5	-$1,931.2
2028	$1,448.5	$3,263.6	$1,240.0	$1,996.8	-$208.5	-$1,266.8	-$213.6	-$1,297.4
2029	$852.0	$1,782.3	$748.9	$1,147.5	-$103.1	-$634.7	-$105.6	-$650.1
2030	$345.3	$752.3	$1,123.4	$1,885.6	$778.1	$1,133.3	$797.0	$1,160.7
2031	$353.2	$769.8	$1,448.5	$3,263.6	$1,095.3	$2,493.8	$1,121.8	$2,554.1
2032	$352.6	$768.0	$852.0	$1,782.3	$499.4	$1,014.3	$511.4	$1,038.8
2033	$352.2	$767.5	$345.3	$752.3	-$6.9	-$15.3	-$7.1	-$15.6
2034	$353.0	$768.7	$353.2	$769.8	$0.2	$1.1	$0.2	$1.1
2035	$352.4	$768.5	$352.6	$768.0	$0.2	-$0.5	$0.2	-$0.5
2036	$347.2	$760.6	$352.2	$767.5	$5.0	$6.9	$5.1	$7.1
2037	$350.4	$767.0	$353.0	$768.7	$2.6	$1.7	$2.7	$1.8
2038	$349.2	$764.6	$352.4	$768.5	$3.2	$3.9	$3.3	$4.0
2039	$348.7	$764.0	$347.2	$760.6	-$1.5	-$3.4	-$1.5	-$3.5
2040	$349.5	$765.2	$350.4	$767.0	$0.9	$1.8	$0.9	$1.8
2041	$348.9	$765.0	$349.2	$764.6	$0.3	-$0.4	$0.3	-$0.4
2042	$347.1	$760.5	$348.7	$764.0	$1.6	$3.5	$1.6	$3.6
2043	$349.7	$766.3	$349.5	$765.2	-$0.2	-$1.1	-$0.2	-$1.1
2044	$803.7	$1,219.1	$348.9	$765.0	-$454.8	-$454.1	-$465.8	-$465.1
2045	$376.6	$792.0	$347.1	$760.5	-$29.5	-$31.4	-$30.2	-$32.2
2046	$377.5	$793.1	$349.7	$766.3	-$27.8	-$26.8	-$28.5	-$27.5
2047	$377.5	$793.6	$803.7	$1,219.1	$426.2	$425.4	$436.5	$435.7
2048	$375.2	$788.6	$376.6	$792.0	$1.4	$3.4	$1.5	$3.5
2049	$377.6	$794.2	$377.5	$793.1	-$0.1	-$1.1	-$0.1	-$1.1
2050	$377.2	$792.5	$377.5	$793.6	$0.3	$1.1	$0.3	$1.1
2051	$376.6	$792.0	$375.2	$788.6	-$1.4	-$3.4	-$1.5	-$3.5
2052	$377.4	$793.0	$377.6	$794.2	$0.2	$1.2	$0.2	$1.2
2053	$376.8	$792.9	$377.2	$792.5	$0.3	-$0.4	$0.3	-$0.4
2054	$375.2	$788.6	$376.6	$792.0	$1.5	$3.4	$1.5	$3.5
2055	$377.6	$794.2	$377.4	$793.0	-$0.3	-$1.2	-$0.3	-$1.2
2056	$377.2	$792.5	$376.8	$792.9	-$0.3	$0.4	-$0.3	$0.4
2057	$377.3	$792.7	$375.2	$788.6	-$2.2	-$4.1	-$2.2	-$4.2
2058	$377.5	$793.1	$377.6	$794.2	$0.2	$1.1	$0.2	$1.1
2059	$376.8	$792.9	$377.2	$792.5	$0.3	-$0.4	$0.3	-$0.4
2060	$375.2	$788.6	$377.3	$792.7	$2.2	$4.1	$2.2	$4.2
2061	$0.0	$0.0	$377.5	$793.1	$377.5	$793.1	$386.6	$812.3
2062	$0.0	$0.0	$376.8	$792.9	$376.8	$792.9	$386.0	$812.1
2063	$0.0	$0.0	$375.2	$788.6	$375.2	$788.6	$384.2	$807.7
3% Discount					PV		-$993.9	-$1,983.3
					Annualized		-$43.6	-$87.0
7% Discount					PV		-$1,458.8	-$2,857.2
					Annualized		-$110.0	-$215.4

[a] Reflect costs to meet limits for BA transport water, FGD wastewater, and managed CRL.
[b] The EPA used the GDP deflator to convert 2023$ to 2024$ (125.22/122.27 = 1.024)

There are several differences between estimates presented in the 2024 BCA and Table 2-2. First, as mentioned above, the costs used to construct the low estimate reflect only some of the wastestreams that

were included in the costs presented in the 2024 BCA.[2] Second, whereas the 2024 BCA presented costs in 2023 dollars, the estimates in Table 2-2 use 2024 dollars.[3] Finally, whereas the 2024 BCA estimated costs over a 25-year period of 2025 through 2049, for this analysis EPA extended the analysis period to 2063. The 2024 rule analysis used 25 years based on the years over which steam electric plants would install the wastewater treatment technologies (5 years), plus the life of the technology (20 years). As all regulatory options had the same period of analysis, EPA used 25 years as the basis for tallying up the costs even though the Agency recognized that plants remaining in operations would continue to operate treatment systems and incur O&M costs. For this analysis, the EPA extended the period of analysis to 36 years to make use of the same spreadsheet cost model used for its Executive Order 14192 cost estimates.[4]

2.2 Forgone Benefits

The EPA similarly estimated the forgone benefits resulting from the 3-year implementation delay based on the time profile of benefits previously developed for the 2024 final rule and shifting that profile by 3 years for the proposed rule.[5] The EPA estimated benefits over a range that reflects the valuation uncertainty. Table 2-3 summarizes the benefits that the EPA analyzed for the 2024 final rule and identifies categories of benefits that were quantified and monetized.

Table 2-3: Estimated Welfare Effects of Changes in Pollutant Discharges from Steam Electric Power Plants				
Category	Effect of Regulatory Options	Benefits Analysis		
		Quantified	Monetized	Methods
Human Health Benefits from Surface Water Quality Improvements				
Changes in human health effects (*e.g.*, bladder cancer) associated with halogenated DBP exposure via drinking water	Changes in exposure to halogenated DBPs in drinking water	✓	✓	VSL and COI
IQ losses to children ages 0 to 7	Changes in childhood exposure to lead from consumption of self-caught fish[a]	✓	✓	IQ point valuation
Need for specialized education	Changes in childhood exposure to lead from consumption of self-caught fish[a]	✓	✓	Qualitative discussion
Incidence of cardiovascular disease in adults	Changes in exposure to lead from consumption of self-caught fish[a]	✓	✓	VSL
IQ losses in infants	Changes in in-utero mercury exposure from maternal consumption of self-caught fish[a]	✓	✓	IQ point valuation
Incidence of skin cancer	Changes in exposure to arsenic from consumption of self-caught fish[a]	✓	✓	COI; Qualitative discussion
Other adverse health effects (cancer and non-cancer)	Changes in exposure to toxic pollutants (lead, cadmium, thallium, etc.) via fish consumption or drinking water	✓		Human health criteria exceedances; Exposure above non-cancer health thresholds; Qualitative discussion

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[2] The costs used to construct the high estimate are consistent with those presented in the 2024 BCA in Table 11-2 and Table 11-3.

[3] The EPA used the GDP deflator to convert 2023$ to 2024$ (125.22/122.27 = 1.024)

[4] For the final rule analysis, EPA may consider a timeframe of costs and benefits similar to that in the 2024 rule.

[5] As discussed in the 2024 BCA, the benefits presented in the 2024 BCA were based on the BA wastewater, FGD transport water, and managed CRL wastestreams.

Table 2-3: Estimated Welfare Effects of Changes in Pollutant Discharges from Steam Electric Power Plants

Category	Effect of Regulatory Options	Benefits Analysis		
		Quantified	Monetized	Methods
Reduced adverse health effects (*e.g.*, rash and irritation from dermal exposure to toxins in HABs)	Changes in exposure to pollutants from recreational water uses			Qualitative discussion
Ecological Condition and Recreational Use Effects from Surface Water Quality Changes				
Aquatic and wildlife habitat[b]	Changes in ambient water quality in receiving reaches	✓	✓	Benefit transfer; Qualitative discussion
Water-based recreation[b]	Changes in swimming, fishing, boating, and near-water activities from water quality changes	✓	✓	Benefit transfer; Qualitative discussion
Aesthetics[b]	Changes in aesthetics from shifts in water clarity, color, odor, including nearby site amenities for residing, working, and traveling	✓	✓	Benefit transfer; Qualitative discussion
Non-use values[b]	Changes in existence, option, and bequest values from improved ecosystem health	✓	✓	Benefit transfer; Qualitative discussion
Protection of T&E species	Changes in T&E species habitat and potential effects on T&E species populations	✓		Habitat range intersecting with reaches with NRWQC exceedances; Qualitative discussion
Sediment contamination	Changes in deposition of toxic pollutants to sediment			Qualitative discussion
Water Supply and Use				
Water treatment costs for drinking water	Changes in quality of source water used for drinking	✓	✓	Avoided cost of drinking water treatment; Qualitative discussion
Water treatment costs for irrigation and other agricultural uses	Changes in quality of source water used for irrigation and other agricultural uses			Qualitative discussion
Other Economic Effects				
Dredging costs	Changes in sedimentation and costs for maintaining navigational waterways and reservoir capacity	✓	✓	Avoided cost of dredging; Qualitative discussion
Commercial fisheries	Changes in fisheries yield and harvest quality due to aquatic habitat changes			Qualitative discussion
Tourism industries	Changes in participation in water-based recreation			Qualitative discussion
Property values	Changes in property values from changes in water quality			Qualitative discussion
Air Quality-Related Effects				
Air emissions of $PM_{2.5}$, NO_X and SO_2	Changes in mortality and morbidity from exposure to particulate matter ($PM_{2.5}$) emitted directly or linked to changes in NO_X and SO_2 emissions (precursors to $PM_{2.5}$ and ozone)	✓	✓	VSL and COI; Qualitative discussion
Air quality effects of coal stockpiles	Air quality effects of storing and handling coal at steam electric power plants			Qualitative discussion

Table 2-3: Estimated Welfare Effects of Changes in Pollutant Discharges from Steam Electric Power Plants

Category	Effect of Regulatory Options	Benefits Analysis		
		Quantified	Monetized	Methods
Air emissions of NO_X and SO_2	Changes in ecosystem effects; visibility impairment; and human health effects from direct exposure to NO_2, SO_2, and hazardous air pollutants.			Qualitative discussion

a. Reductions in discharges of lead, mercury, and other toxic pollutants may reduce concentrations of these pollutants in open seas, thus reducing levels of pollutants in high trophic level fish harvested commercially. There are unquantified benefits associated with all of these end points for those who consume commercially harvested fish, but these benefits are very difficult to estimate.
b. These values are implicit in the total WTP for water quality improvements.

Source: Adapted from U.S. Environmental Protection Agency, 2024a

For benefits, the EPA made additional adjustments to values presented in the 2024 BCA:

- The EPA used values of an IQ point and of the range of human health effects derived using 3 percent and 7 percent discounts. These values were used to estimate the annualized benefits summarized in Appendix B of the 2024 BCA, but the BCA only presented details of the time profile of the 2024 rule benefits (in Table 10-2) based on the value of an IQ point and air-related human health effects derived using a 2 percent discount.[6]

- The EPA omitted greenhouse gas emission benefits in this analysis. This follows E.O. 14154 on "Unleashing American Energy" and the OMB-issued memo, M-25-27 (Executive Office of the President, 2025; U.S. Office of Management and Budget, 2025). As the EPA does not have a specific statutory requirement to include greenhouse gas emission, this benefit category was not relevant to the current analysis. Had the EPA conducted the 2024 economic analysis using similar assumptions about the value of greenhouse gases as in this analysis, that analysis would have also projected significantly lower benefits for the 2024 rule.

- The EPA extended the period of analysis through 2063 to be consistent with the analysis of social costs. Since the EPA did not have existing estimate of air quality benefits of the 2024 final rule after 2049, the EPA assumed that benefits would continue at the same level through the remainder of the analysis period. This may over- or understate benefits, particularly for air-related benefits that depend on the profile of electricity generation after 2050. At the present time, the EPA does not have the ability to extend this profile beyond 2050. However, the EPA expects that while its current benefits estimates may be over- or underestimated based on this assumption, the change in benefits had the EPA not made this assumption will not be large in magnitude because they would occur 25 or more years into the future and discounting will limit the effect they have.

Table 2-3 and Table 2-4 detail the benefit estimates at 3 percent and 7 percent discount rates, respectively.

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[6] EPA is continuing to investigate the dose-response relationship between the lead exposure to adults and the resulting cardiovascular disease. In this rule, dietary lead exposure was assumed via self-caught fish resulting from lead discharged by power plants to receiving waters. In other contexts, the exposure route may be different. EPA will continue to consider different modes of exposure as well as decreasing the uncertainties associated with the dose response relationship.

Table 2-4: Summary of monetized benefits at 3 percent discount rate

Year	Monetized Benefits (million 2023$)						Change Due to Proposed Rule (million 2024$)[a]	
	Baseline		With Proposed Rule		Difference			
	Low	High	Low	High	Low	High	Low	High
2025	$3.2	$3.2	$0.0	$0.0	-$3.2	-$3.2	-$3.3	-$3.3
2026	$3.7	$3.7	$0.0	$0.0	-$3.7	-$3.7	-$3.8	-$3.8
2027	$4.1	$4.1	$0.0	$0.0	-$4.1	-$4.1	-$4.2	-$4.2
2028	$1,004.5	$2,504.5	$3.2	$3.2	-$1,001.2	-$2,501.2	-$1,025.4	-$2,561.7
2029	$1,004.8	$2,504.8	$3.7	$3.7	-$1,001.1	-$2,501.1	-$1,025.3	-$2,561.6
2030	$388.0	$1,208.0	$4.1	$4.1	-$383.9	-$1,203.9	-$393.2	-$1,233.0
2031	$388.8	$1,208.8	$1,004.5	$2,504.5	$615.7	$1,295.7	$630.6	$1,327.0
2032	$1,609.4	$3,709.4	$1,004.8	$2,504.8	-$604.6	-$1,204.6	-$619.3	-$1,233.8
2033	$1,610.1	$3,710.1	$388.0	$1,208.0	-$1,222.0	-$2,502.0	-$1,251.6	-$2,562.6
2034	$1,610.7	$3,710.7	$388.8	$1,208.8	-$1,221.9	-$2,501.9	-$1,251.5	-$2,562.4
2035	$1,611.2	$3,711.2	$1,609.4	$3,709.4	-$1.8	-$1.8	-$1.8	-$1.8
2036	$1,611.7	$3,711.7	$1,610.1	$3,710.1	-$1.6	-$1.6	-$1.7	-$1.7
2037	$1,612.1	$3,712.1	$1,610.7	$3,710.7	-$1.5	-$1.5	-$1.5	-$1.5
2038	$492.6	$1,212.6	$1,611.2	$3,711.2	$1,118.6	$2,498.6	$1,145.7	$2,559.1
2039	$493.1	$1,213.1	$1,611.7	$3,711.7	$1,118.6	$2,498.6	$1,145.7	$2,559.0
2040	$493.6	$1,213.6	$1,612.1	$3,712.1	$1,118.6	$2,498.6	$1,145.6	$2,559.0
2041	$494.0	$1,214.0	$492.6	$1,212.6	-$1.4	-$1.4	-$1.5	-$1.5
2042	$164.5	$384.5	$493.1	$1,213.1	$328.6	$828.6	$336.5	$848.6
2043	$164.9	$384.9	$493.6	$1,213.6	$328.6	$828.6	$336.6	$848.7
2044	$165.4	$385.4	$494.0	$1,214.0	$328.6	$828.6	$336.5	$848.6
2045	$165.9	$385.9	$164.5	$384.5	-$1.4	-$1.4	-$1.5	-$1.5
2046	$166.4	$386.4	$164.9	$384.9	-$1.5	-$1.5	-$1.5	-$1.5
2047	$166.8	$386.8	$165.4	$385.4	-$1.4	-$1.4	-$1.5	-$1.5
2048	$147.3	$317.3	$165.9	$385.9	$18.7	$68.7	$19.1	$70.3
2049	$147.7	$317.7	$166.4	$386.4	$18.7	$68.7	$19.2	$70.4
2050	$147.7	$317.7	$166.8	$386.8	$19.2	$69.2	$19.6	$70.8
2051	$147.7	$317.7	$147.3	$317.3	-$0.4	-$0.4	-$0.4	-$0.4
2052	$147.7	$317.7	$147.7	$317.7	$0.0	$0.0	$0.0	$0.0
2053	$147.7	$317.7	$147.7	$317.7	$0.0	$0.0	$0.0	$0.0
2054	$147.7	$317.7	$147.7	$317.7	$0.0	$0.0	$0.0	$0.0
2055	$147.7	$317.7	$147.7	$317.7	$0.0	$0.0	$0.0	$0.0
2056	$147.7	$317.7	$147.7	$317.7	$0.0	$0.0	$0.0	$0.0
2057	$147.7	$317.7	$147.7	$317.7	$0.0	$0.0	$0.0	$0.0
2058	$147.7	$317.7	$147.7	$317.7	$0.0	$0.0	$0.0	$0.0
2059	$147.7	$317.7	$147.7	$317.7	$0.0	$0.0	$0.0	$0.0
2060	$147.7	$317.7	$147.7	$317.7	$0.0	$0.0	$0.0	$0.0
2061	$0.0	$0.0	$147.7	$317.7	$147.7	$317.7	$151.2	$325.4
2062	$0.0	$0.0	$147.7	$317.7	$147.7	$317.7	$151.2	$325.4
2063	$0.0	$0.0	$147.7	$317.7	$147.7	$317.7	$151.2	$325.4
3% Discount					PV		-$1,051.0	-$2,501.5
					Annualized		-$46.1	-$109.7

[a] The EPA used the GDP deflator to convert 2023$ to 2024$ (125.22/122.27 = 1.024)

Table 2-5: Summary of monetized benefits at 7 percent discount rate

Year	Monetized Benefits (million 2023$)						Change Due to Proposed Rule (million 2024$)[a]	
	Baseline		With Proposed Rule		Difference			
	Low	High	Low	High	Low	High	Low	High
2025	$2.7	$2.7	$0.0	$0.0	-$2.7	-$2.7	-$2.8	-$2.8
2026	$3.2	$3.2	$0.0	$0.0	-$3.2	-$3.2	-$3.3	-$3.3
2027	$3.6	$3.6	$0.0	$0.0	-$3.6	-$3.6	-$3.7	-$3.7

Table 2-5: Summary of monetized benefits at 7 percent discount rate

Year	Monetized Benefits (million 2023$)						Change Due to Proposed Rule (million 2024$)[a]	
	Baseline		With Proposed Rule		Difference			
	Low	High	Low	High	Low	High	Low	High
2028	$894.0	$2,204.0	$2.7	$2.7	-$891.2	-$2,201.2	-$912.8	-$2,254.5
2029	$894.3	$2,204.3	$3.2	$3.2	-$891.1	-$2,201.1	-$912.6	-$2,254.3
2030	$326.9	$1,006.9	$3.6	$3.6	-$323.2	-$1,003.2	-$331.1	-$1,027.5
2031	$327.6	$1,007.6	$894.0	$2,204.0	$566.4	$1,196.4	$580.1	$1,225.3
2032	$1,408.3	$3,308.3	$894.3	$2,204.3	-$514.0	-$1,104.0	-$526.4	-$1,130.7
2033	$1,408.9	$3,308.9	$326.9	$1,006.9	-$1,082.0	-$2,302.0	-$1,108.2	-$2,357.7
2034	$1,409.5	$3,309.5	$327.6	$1,007.6	-$1,081.9	-$2,301.9	-$1,108.1	-$2,357.6
2035	$1,410.1	$3,310.1	$1,408.3	$3,308.3	-$1.8	-$1.8	-$1.8	-$1.8
2036	$1,410.5	$3,310.5	$1,408.9	$3,308.9	-$1.6	-$1.6	-$1.7	-$1.7
2037	$1,411.0	$3,311.0	$1,409.5	$3,309.5	-$1.5	-$1.5	-$1.5	-$1.5
2038	$421.4	$1,111.4	$1,410.1	$3,310.1	$988.6	$2,198.6	$1,012.6	$2,251.8
2039	$421.9	$1,111.9	$1,410.5	$3,310.5	$988.6	$2,198.6	$1,012.5	$2,251.8
2040	$422.4	$1,112.4	$1,411.0	$3,311.0	$988.6	$2,198.6	$1,012.5	$2,251.8
2041	$422.9	$1,112.9	$421.4	$1,111.4	-$1.4	-$1.4	-$1.5	-$1.5
2042	$143.3	$343.3	$421.9	$1,111.9	$278.6	$768.6	$285.3	$787.2
2043	$143.8	$343.8	$422.4	$1,112.4	$278.6	$768.6	$285.3	$787.2
2044	$144.3	$344.3	$422.9	$1,112.9	$278.6	$768.6	$285.3	$787.2
2045	$144.8	$344.8	$143.3	$343.3	-$1.4	-$1.4	-$1.5	-$1.5
2046	$145.3	$345.3	$143.8	$343.8	-$1.5	-$1.5	-$1.5	-$1.5
2047	$145.7	$345.7	$144.3	$344.3	-$1.4	-$1.4	-$1.5	-$1.5
2048	$136.1	$276.1	$144.8	$344.8	$8.7	$68.7	$8.9	$70.3
2049	$136.5	$276.5	$145.3	$345.3	$8.7	$68.7	$8.9	$70.4
2050	$136.5	$276.5	$145.7	$345.7	$9.2	$69.2	$9.4	$70.8
2051	$136.5	$276.5	$136.1	$276.1	-$0.4	-$0.4	-$0.4	-$0.4
2052	$136.5	$276.5	$136.5	$276.5	$0.0	$0.0	$0.0	$0.0
2053	$136.5	$276.5	$136.5	$276.5	$0.0	$0.0	$0.0	$0.0
2054	$136.5	$276.5	$136.5	$276.5	$0.0	$0.0	$0.0	$0.0
2055	$136.5	$276.5	$136.5	$276.5	$0.0	$0.0	$0.0	$0.0
2056	$136.5	$276.5	$136.5	$276.5	$0.0	$0.0	$0.0	$0.0
2057	$136.5	$276.5	$136.5	$276.5	$0.0	$0.0	$0.0	$0.0
2058	$136.5	$276.5	$136.5	$276.5	$0.0	$0.0	$0.0	$0.0
2059	$136.5	$276.5	$136.5	$276.5	$0.0	$0.0	$0.0	$0.0
2060	$136.5	$276.5	$136.5	$276.5	$0.0	$0.0	$0.0	$0.0
2061	$0.0	$0.0	$136.5	$276.5	$136.5	$276.5	$139.8	$283.2
2062	$0.0	$0.0	$136.5	$276.5	$136.5	$276.5	$139.8	$283.2
2063	$0.0	$0.0	$136.5	$276.5	$136.5	$276.5	$139.8	$283.2
7% Discount						PV	-$1,314.4	-$3,189.9
						Annualized	-$99.1	-$240.5

[a] The EPA used the GDP deflator to convert 2023$ to 2024$ (125.22/122.27 = 1.024)

Focusing on the low end, the forgone benefits are $46.1 million annually at a 3 percent discount rate and $99.1 million annually at a 7 percent discount rate. The high-end estimates are about 2.4 times larger. As detailed in the 2024 BCA, the analysis does not include additional forgone benefits that were not monetized for the 2024 rule, including avoided adverse health effects (cancer and non-cancer) from reduced exposure to pollutants discharged to receiving waters; improvements in threatened and endangered (T&E) species habitat and potential effects on T&E species populations; changes in property value from water quality improvements; changes in ecosystem effects, visibility impairment, and human health effects from direct exposure to nitrogen oxides, sulfur dioxide, and hazardous air pollutants. See the 2024 BCA for details (U.S. Environmental Protection Agency, 2024a).

3   Comparison of Forgone Benefits and Avoided Costs

The EPA has reported ranges of forgone benefits and avoided costs to reflect the uncertainty in both estimates. The ranges of both are largely overlapping, although the range of forgone benefits is somewhat larger, such that the high end is larger for forgone benefits than for avoided costs, reflecting the larger uncertainty in the benefits estimates. The low end of the avoided costs range is lower than that of the benefits range, especially when considering the cost savings estimates in Table 2-1 rather than Table 2-2, where they are essentially on par. Still, the EPA considers the $33 million to $41 million range of overlap between low-end forgone benefits and high-end costs savings to be significant. Combining the low and high ends of costs and benefits yields annualized net benefits ranging from -$79.5 million to $40.9 million at a 3 percent discount, and -$161.4 million and $116.3 million at a 7 percent discount. While the EPA considers non-water quality environmental impacts (NWQEI) in setting ELGs, the Agency notes that only a small portion of the quantified forgone benefits projected for the 2024 rule and this proposed rule were actually derived from water quality improvements. Given the uncertainty, EPA notes there are many possible combinations of avoided costs and forgone benefits from these ranges. For some combinations, forgone benefits may be larger; for some combinations forgone benefits and avoided costs are on par; and for some combinations, avoided costs are larger.

4   References

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