

# GRI G4 Report

2018 Corporate Accountability Report



**For more information contact:**

Sandy Nessing  
Managing Director Corporate Sustainability  
American Electric Power  
[smnessing@aep.com](mailto:smnessing@aep.com)

Melissa Tominack  
Sr. Sustainability Coordinator  
American Electric Power  
[matominack@aep.com](mailto:matominack@aep.com)

## 2018 Global Reporting Initiative

AEP follows the [Global Reporting Initiative](#) (GRI) G4 reporting principles in terms of data quality, report content and organizational boundaries. This report was developed according to the fourth generation of GRI's Sustainability Reporting Guidelines, otherwise known as G4, in accordance with a core adherence level. The GRI guidelines provide a voluntary reporting framework used by organizations around the world as the basis for sustainability reporting. We also responded using the Electric Utility Sector Supplement for reporting on industry-specific information.

In 2016, GRI migrated from being a voluntary framework to a set of standards. AEP is not reporting against the standards in this report, however, we have mapped G4 to the standards. We will evaluate the use of the new standards and determine how to apply them in the future to our already robust disclosure.

G4 Indicator	GRI Standards	Description	Report Location
<b>Strategy and analysis</b>			
G4-1	102-14	Statement from the most senior decision-maker	<a href="#">Message from the Chairman</a>
G4-2	102-15	Description of key impacts, risks, and opportunities	<a href="#">2017 Form 10-K</a> Risk Factors pg. 43 <a href="#">Risk Management</a> <a href="#">Carbon Analysis</a> <a href="#">Strategic Plan</a>
<b>Organizational Profile</b>			
G4-3	102-1	Name of the organization	<a href="#">See homepage</a>
G4-4	102-2	Primary brands, products, and/or services	<a href="#">About Us</a>
G4-5	102-3	Location of organization's headquarters	Columbus, OH <a href="#">About Us</a>
G4-6	102-4	Countries in which the company has operations	<a href="#">About Us</a>
G4-7	102-5	Nature of ownership and legal form	<a href="#">2017 Form 10-K</a> pg. 1
G4-8	102-6	Markets served	<a href="#">2017 Form 10-K</a> pg. 1
G4-9	102-7	Scale of the reporting organization	<a href="#">About AEP</a>
G4-10	102-8	Total number of employees by employment contract & gender	17,717 (see appendix 1)
G4-11	102-41	Total employees covered by collective bargaining agreements	<a href="#">Labor Relations</a>
G4-13	102-10	Significant changes in organizations size, structure, ownership, or its supply chain	<a href="#">2017 Form 10-K</a> pg. 31
G4-14	102-11	Explanation of whether and how the precautionary approach or principle is addressed by the organization	<a href="#">2017 Form 10-K</a> Risk Factors pg. 43 <a href="#">Risk Management</a> <a href="#">Carbon Analysis</a>
G4-16	102-13	Memberships of associations and national or international advocacy organizations	<a href="#">Lobbying &amp; Political Contributions</a>
<b>Identified Material Aspects and Boundaries</b>			
G4-17	102-45	Operational structure of the organization	<a href="#">About Us</a> or <a href="#">2017 Form 10-K</a> pg. 1

G4-18	102-46	Process for defining report content	<a href="#">About This Report</a> <a href="#">Sustainability Governance</a> <a href="#">Priority Issues</a>
G4-19	102-47	Material aspects identified in the process for defining report content	<a href="#">Priority Issues</a>
G4-20	103-1	Material aspect boundaries within the organization for the report	<a href="#">Priority Issues</a>
G4-21	103-1	Material aspect boundaries outside the organization for the report	<a href="#">Priority Issues</a>
G4-22	102-48	Explanation of the effect of any re-statements of information provided in earlier reports	No significant re-statements
G4-23	102-49	Significant changes from previous reporting periods in the scope, boundary, or measurement methods applied in the report	No significant changes
<b>Stakeholder Engagement</b>			
G4-24	102-40	Stakeholder groups engaged by the organization	<a href="#">Stakeholder Engagement</a>
G4-25	102-42	Identification and selection of stakeholders	<a href="#">Stakeholder Engagement</a> <a href="#">Resource Planning</a>
G4-26	102-43	Approaches to stakeholder engagement	<a href="#">Stakeholder Engagement</a> <a href="#">Resource Planning</a>
G4-27	102-44	Key topics and concerns raised through stakeholder engagement	<a href="#">Stakeholder Engagement</a> <a href="#">Resource Planning</a>
<b>Report Profile</b>			
G4-28	102-50	Reporting period	2017 and early 2018 <a href="#">About This Report</a>
G4-29	102-51	Date of most recent previous report	<a href="#">About This Report</a>
G4-30	102-52	Reporting cycle	<a href="#">About This Report</a>
G4-31	102-53	Contact point for questions regarding the report	<a href="#">Contact Us</a>
G4-32	102-54 102-55 102-56	Table identifying the location of the Standard Disclosures in the report	GRI Index
G4-33	102-56	Policy and current practice with regard to seeking external assurance for the report	<a href="#">About This Report</a>
<b>Governance</b>			
G4-34 G4-38	102-18 102-22	Governance structure of the organization	<a href="#">AEP Leadership</a>
G4-36	102-20	Appointed executive-level position with responsibility for sustainability topics	<a href="#">AEP Leadership</a> <a href="#">Board Statement</a>
G4-37	102-21	Stakeholder consultation process on economic, environmental and social topics	<a href="#">Stakeholder Engagement</a>
G4-38	102-22	Composition of the highest governance body and its committees	<a href="#">Board of Directors</a>
G4-39	102-23	Indicate whether the Chair of the highest governance body is an executive officer	<a href="#">Corporate Governance</a>

G4-40	102-24	Process for determining the composition, qualifications, and expertise of the members of the highest governance body	<a href="#">AEP's Principles of Corporate Governance</a>
G4-41	102-25	Processes for the highest governance body to ensure conflicts of interest are avoided	<a href="#">AEP's Principles of Corporate Governance</a>
G4-42	102-26	The Board's and senior executive's roles in the development, approval and updating purpose, values or mission statements, strategies, policies, and goals related to sustainability	<a href="#">Board Statement</a>
G4-43	102-27	Measures taken to develop and enhance the Board's knowledge of sustainability topics	<a href="#">Board Statement</a>
G4-44	102-28	Processes for evaluating the highest governance body's own performance	<a href="#">AEP's Principles of Corporate Governance</a>
G4-45 G4-47	102-29 102-31	Board-level processes for identifying and managing risks and opportunities and frequency	<a href="#">Enterprise Risk Management</a>
G4-46	102-30	Board oversight of sustainability risk management	<a href="#">Board Statement</a>
G4-48	102-32	Highest committee or position that reviews and approves the sustainability report	<a href="#">Board Statement</a>
G4-49 G4-53	102-33 102-37	Mechanisms for shareholders and employees to provide recommendations to the highest governance body	<a href="#">Corporate Leaders &amp; Governance</a>
G4-50	102-34	Nature and number of critical concerns communicated to the Board	<a href="#">2017 Proxy Statement</a>
G4-51	102-35	Linkage between compensation and the organization's performance	<a href="#">2017 Proxy Statement</a>
G4-52	102-36	Process for determining remuneration	<a href="#">2017 Proxy Statement</a> page 34
<b>Ethics and Integrity</b>			
G4-56	102-16	Organization's values, principles, standards and norms of behavior (codes of conduct and ethics)	<a href="#">Mission, Values &amp; Strategy</a> <a href="#">AEP's Principles of Business Conduct</a>
G4-57	102-17	Mechanisms for seeking advice on ethical and lawful behavior	<a href="#">AEP's Principles of Business Conduct</a>
G4-58	102-17	Mechanisms for reporting concerns about unethical or unlawful behavior	<a href="#">AEP's Principles of Business Conduct</a>
<b>Economic</b>			
G4-EC1	201-1	Direct economic value generated and distributed	<a href="#">Community Investments</a> <a href="#">Community Performance Summary</a> See appendix 2
G4-EC2	201-2	Financial implications and other risks and opportunities for the organization's activities due to climate change	<a href="#">Carbon Analysis</a>
G4-EC3	201-3	Coverage of the organization's defined benefit plan obligations	<a href="#">2017 Form 10-K</a> annual pg. 240
G4-EC5	202-1	Ratios of standard entry level wage by gender compared to local minimum wage	See appendix 3

G4-EC6	202-2	Proportion of senior management hired from the local community	See appendix 4
G4-EC7	203-1	Development and impact of infrastructure investments and services provided primarily for public benefit	<a href="#">Grid Investments</a> <a href="#">Strategic Goals &amp; Initiatives</a> <a href="#">Reliability Investments</a>
G4-EC8	203-2	Significant indirect economic impacts	<a href="#">Community Investments</a> <a href="#">Community Performance Summary</a> <a href="#">Wildlife Protection</a> <a href="#">Conservation &amp; Stewardship</a>
G4-EC9	204-1	Proportion of spending on local suppliers	<a href="#">Supplier Diversity</a>
<b>Environmental</b>			
Guidance		Strategies, current actions, and future plans for managing impacts on biodiversity	<a href="#">Conservation &amp; Stewardship</a> <a href="#">Wildlife Protection</a>
G4-EN3	302-1	Direct energy consumption within the organization by primary energy source	See appendix 5
<b>Water</b>			
G4-DMA	103-1 103-2 103-3	Collaborative approaches to managing watersheds and reservoirs for multiple uses and long-term planning for securing water resources	See appendix 6
G4-EN8	303-1	Total water withdrawal by source	See appendix 7
G4-EN9	303-2	Water sources significantly affected by withdrawal of water	See appendix 8
G4-EN10	303-3	Percentage and total volume of water recycled and reused	See appendix 9
<b>Biodiversity</b>			
G4-DMA	103-1 103-2 103-3	Approaches for vegetation management along transmission corridors	See appendix 10
G4-EN11	304-1	Operational sites owned, leased, managed in, or adjacent to protected areas, and areas of high biodiversity value outside protected areas	See appendix 11
G4-EN12	304-2	Description of significant impacts of activities, products, and services on biodiversity	See appendix 12
G4-EN13	304-3	Habitats protected or restored	<a href="#">Wildlife Protection</a> <a href="#">Conservation &amp; Stewardship</a> See appendix 13
G4-EN14	304-4	Number of IUCN Red List species and national conservation list species with habitats in areas affected by operations, by level of extinction risk	See appendix 14
<b>Emissions</b>			
G4-EN15	305-1	Direct and greenhouse gas emissions (scope 1)	<a href="#">Emissions</a> <a href="#">Carbon and Climate</a> <a href="#">Carbon Analysis</a>
G4-EN19	305-5	Reduction of greenhouse gas emissions	<a href="#">Emissions</a> <a href="#">Carbon and Climate</a> <a href="#">Carbon Analysis</a>

G4-EN20	305-6	Emissions of ozone-depleting substances	<a href="#">Emissions Carbon and Climate Carbon Analysis</a>
G4-EN21	305-7	NO <sub>x</sub> , SO <sub>x</sub> , and other significant air emissions by type and weight	<a href="#">Emissions Carbon and Climate Carbon Analysis</a>
<b>Effluents and Waste</b>			
G4-DMA	103-1 103-2 103-3	Effluents and Waste	See appendix 15
G4-EN22	306-1	Total water discharge by quality and destination	<a href="#">Toxics Release Inventory</a>
G4-EN23	306-2	Total weight of waste by type and disposal method	<a href="#">Waste &amp; Chemical Management</a>
G4-EN24	306-3	Total number and volume of significant spills	<a href="#">Waste &amp; Chemical Management</a>
G4-EN25	306-4	Weight of transported, imported, exported or treated waste deemed hazardous under the terms of the Basel Convention Annex I, II, III and VIII	<a href="#">Waste &amp; Chemical Management</a>
G4-EN26	306-5	Identify, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the organization's discharges of water and runoff	See appendix 16
G4-EN31	N/A	Total environmental protection expenditures and investments	<a href="#">Coal Fleet Optimization 2017 Form 10-K</a> – Environmental Investments pg. 13
<b>Labor Practices and Decent Work</b>			
G4-LA1	401-1	Total number and rate of employee turnover by age group, gender and region	See appendix 17
G4-LA2	401-2	Benefits provided to full-time employees that are not provided to temporary or part-time employees	<a href="#">Pay &amp; Benefits</a> also see appendix 18
G4-LA3	401-3	Return to work and retention rates after parental leave	See appendix 19
G4-LA4	402-1	Minimum notice periods regarding operational changes	Two-weeks (where applicable)
G4-LA6	403-2	Rates of injury, occupational diseases, lost days, and absenteeism, and number of work-related fatalities by region	<a href="#">Safety &amp; Health Performance</a>
G4-LA8	403-4	Health and safety topics covered in formal agreements with trade unions	Yes
G4-LA9	404-1	Average hours of training per year per employee	<a href="#">Developing Our Employees</a> See appendix 20
G4-LA10	404-2	Programs for skills management and lifelong learning	See appendix 21
G4-LA11	404-3	Percentage of employee receiving regular performance and career development reviews	See appendix 22
G4-LA12	405-1	Composition of governance bodies and breakdown of employees per category according to gender, age	<a href="#">Diversity &amp; Inclusion - Leadership</a>

		group, minority group membership, and other indicators of diversity.	See appendix 23
G4-LA13	405-2	Ratio of basic salary and remuneration of women to men	See appendix 24
<b>Human Rights</b>			
G4-HR2	412-2	Total hours of employee training on human rights policies	See appendix 25
G4-HR3	406-1	Total number of incidents of discrimination and corrective actions taken	See appendix 26
G4-HR4	407-1	Operations and suppliers identified in which the right to exercise freedom of association and collective bargaining may be violated or at significant risk	<a href="#">Labor Relations</a> See appendix 27
<b>Society</b>			
Guidance		Public policy positions and participation in public policy development and lobbying	<a href="#">Regulatory &amp; Public Policy</a> <a href="#">Lobbying &amp; Political Activity</a>
G4-SO2	413-2	Operations with significant actual and potential negative impacts on local communities	<a href="#">Environmental Performance</a>
G4-SO4	205-2	Communication training on anti-corruption policies and procedures	<a href="#">AEP's Principles of Business Conduct</a>
G4-SO6	415-1	Total value of financial and in-kind contributions to political parties, politicians, and related institutions by country	<a href="#">Political Contributions &amp; Lobbying Activity</a>
<b>Product Responsibility</b>			
PR5	"102-43 102-44"	Results of surveys measuring customer satisfaction	<a href="#">Customer Satisfaction</a> See appendix 28
<b>Electric Utility Sector Supplement</b>			
G4-EU1		Installed capacity (MW)	<a href="#">2017 Form 10-K</a> pgs. 1-3
G4-EU3		Number of residential, industrial, institutional, and commercial customer accounts	<a href="#">2017 AEP Fact Book</a> pgs. 49-80
G4-EU4		Length of transmission and distribution lines	<a href="#">About AEP</a>
<b>Electric Utility Sector Supplement - Economic</b>			
G4-DMA	103-1 103-2 103-3	Management approach to ensure short- and long-term electricity availability and reliability	<a href="#">Reliability Investments</a> <a href="#">Grid Resiliency</a> <a href="#">Enterprise Security &amp; Risk Management</a> <a href="#">Strategic Goals &amp; Initiatives</a>
G4-DMA	103-1 103-2 103-3	Demand-side management programs	Appendix 29
G4-DMA	103-1 103-2 103-3	Research and development activity and expenditure aimed at providing reliable electricity and promoting sustainable development	<a href="#">Technology &amp; Innovation</a>
G4-DMA	103-1 103-2 103-3	Provisions for decommissioning of nuclear power sites	<a href="#">2017 Form 10-K</a> pg. 18
EU10		Planned capacity against projected electricity demand over the long term	<a href="#">Sustainable Electricity</a>

EU12		Transmission and distribution losses as a percentage of total energy	See appendix 30
<b>Electric Utility Sector Supplement – Environmental</b>			
EU13		Biodiversity of offset habitats compared to the biodiversity of the affected area	See appendix 31
<b>Electric Utility Sector Supplement – Labor Practices and Decent Work</b>			
G4-DMA	103-1 103-2 103-3	Programs and processes to ensure the availability of a skilled workforce	<a href="#">Our Workforce</a> See appendix 32
EU15		Percentage of employees eligible to retire in the next 5 and 10 years	See appendix 33
G4-DMA	103-1 103-2 103-3	Policies and requirements regarding health and safety of employees and employees of contractors and subcontractors	<a href="#">Safety &amp; Health 2017 Workforce Safety Performance</a> See appendix 34
<b>Electric Utility Sector Supplement – Society</b>			
G4-DMA	103-1 103-2 103-3	Stakeholder participation in the decision making process related to energy planning and infrastructure development	<a href="#">Stakeholder Engagement Resource Planning</a>
G4-DMA	103-1 103-2 103-3	Approach to managing the impacts of displacement	See appendix 35
G4-DMA	103-1 103-2 103-3	Contingency planning measures, disaster/emergency management plan and training programs, and recovery/restoration plans	<a href="#">Business Continuity &amp; Resiliency</a>
EU22		Number of people physically or economically displaced and compensation, broken down by type of project	See appendix 36
<b>Electric Utility Sector Supplement – Product Responsibility</b>			
G4-DMA	103-1 103-2 103-3	Programs, including those in partnership with government, to improve or maintain access to electricity and customer support services	<a href="#">Energy Assistance</a>
G4-DMA	103-1 103-2 103-3	Practices to address language, cultural, low literacy and disability related barriers to accessing and safely using electricity and customer support services	See appendix 37
EU25		Number of injuries and fatalities to the public involving company assets	<a href="#">Public Safety</a>
EU27		Number of residential disconnections for non-payment	See appendix 38
EU28		Power Outage Frequency	<a href="#">Reliability</a>
EU29		Average power outage duration	<a href="#">Reliability</a>

## 2018 Corporate Accountability Report – GRI Report Appendix

### Appendix 1: G4-10 - Total number of employees by employment contract & gender

**Total Employment by State & Gender**

State	Male	Female
AR	331	28
DC	2	4
IL	67	4
IN	855	180
KY	347	44
LA	749	236
MI	1,097	194
MO	0	1
NE	19	1
OH	4,645	1,485
OK	1,341	333
PA	13	2
TN	62	9
TX	2,157	324
VA	898	132
WV	1,835	322

**Total Employment by Contract and Gender**

Reg/Temp	Full/Part	Male	Female
Regular	Full-time	14411	3273
Regular	Part-time	2	24
Temporary	Full-time	5	2

### Appendix 2: G4-EC1 - Economic value generated and distributed, including revenues, operating costs, employee compensation, donations and other community investments, retained earnings, and payments to capital providers and governments

#### Revenues

Revenues totaled \$15.4 billion (\$16.4 billion last year). This includes revenues as reported, as well as net gain on the sale of assets and equity investments, and interest and dividend income.

#### *Economic Value Distributed*

##### Operating Costs

Operating Costs totaled \$7.4 billion (\$8.3 billion last year) based on Fuel, Purchased Energy and Operation and Maintenance expenses, adjusted for those amounts reported in the sections "Employee Wages & Benefits" and "Community Investments/ Contributions

##### Employee Wages & Benefits

Employee wages and benefits totaled \$2,259 million (\$2,327 million last year). This represents \$1,539 million (\$1,629 million last year) included in reported expenses, and \$720 million (\$698 million last year) that was capitalized during the year.

##### Payments to the Providers of Capital

Payments totaled \$2,106 million (\$2,024 million last year). This represents \$931 million (\$909 million last year) in reported expenses (Interest Expense excluding capitalized interest, minority interest expense and preferred stock dividends) and \$1,175 million (\$1,115 million last year) in common stock dividends.

### Payments to Governments

Payments totaled \$1,022 million (\$927 million last year).

### Community Investments - Contributions

Payments totaled \$12 million (\$80 million last year).

### Appendix 3: G4-EC5 - Ratios of standard entry level wage by gender compared to local minimum wage

AEP does not have a standard entry-level wage. However, AEP's 2017 actual lowest starting wages were 111 percent – 266 percent compared to local minimum wages. These numbers are based on a range of the ratios of the paid wage to the minimum wage.

State	Minimum Wage- 2018	Female		Male	
		Starting Rate 2017	Percent	Starting Rate 2017	Percent
Ohio	\$8.30	\$13.75	166%	\$13.75	166%
Michigan	\$9.25	\$16.45	178%	\$16.00	173%
Indiana	\$7.25	\$13.25	183%	\$16.45	227%
Virginia	\$7.25	\$18.94	261%	\$14.66	202%
West Virginia	\$8.75	\$9.98	114%	\$9.67	111%
Kentucky	\$7.25	\$14.87	205%	\$10.00	138%
Tennessee	\$7.25			\$19.29	266%
Texas	\$7.25	\$13.25	183%	\$14.05	194%
Oklahoma	\$7.25	\$13.50	186%	\$13.50	186%
Arkansas	\$8.50	\$16.73	197%	\$18.67	220%
Louisiana	\$7.25	\$13.25	183%	\$13.25	183%

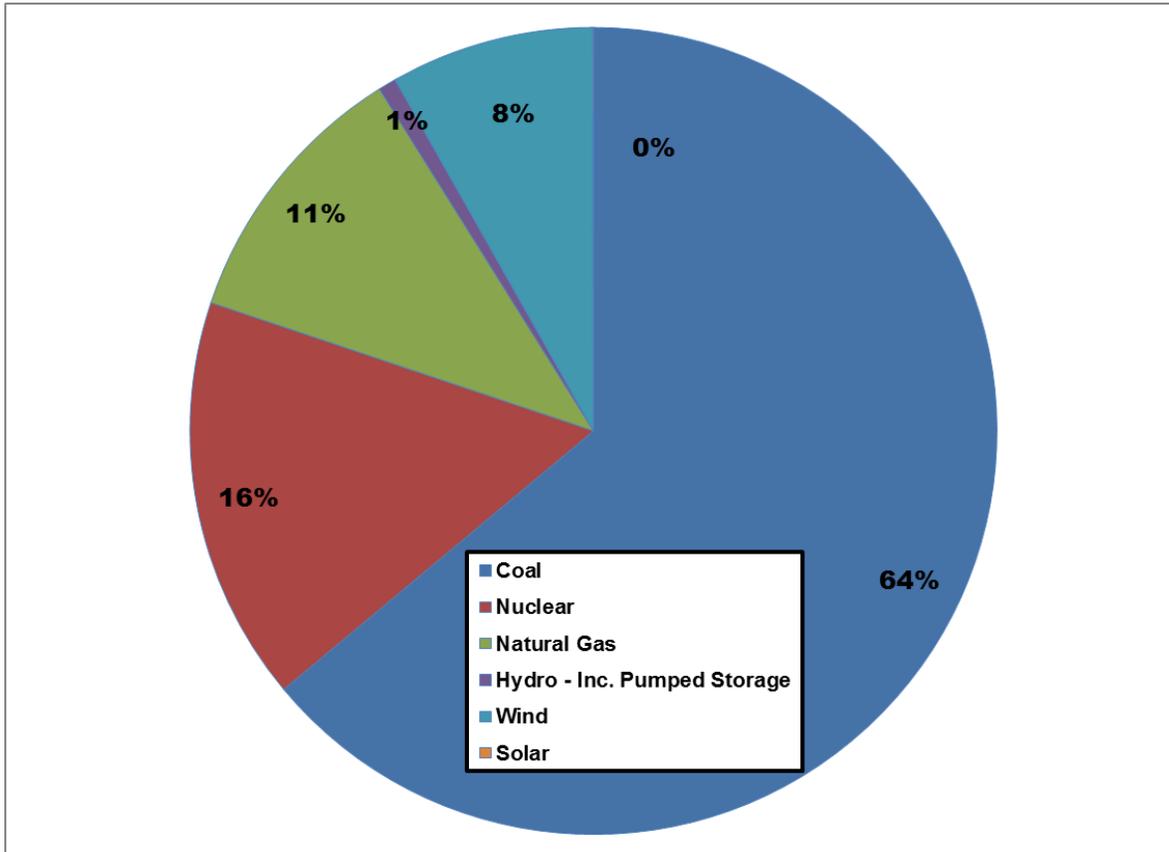
### Appendix 4: G4-EC6 - Proportion of senior management hired from the local community

While the selection of staff and senior management is based on a range of considerations, it is the company's policy to try to fill vacancies from within the organization. Leadership, knowledge, performance and diversity are some of the factors considered in making selection decisions. Every effort is made to promote from within the organization; however, there are instances when the uniqueness of job requirements or skills necessitate expanding outreach to areas outside of the company or our service territory. During 2017, one company executive, [Vice President of Tax](#), was selected from outside of the organization. Local is defined as the AEP service territory, which includes portions of 11 states and senior management/executive includes VP, SVP, EVP and Presidents.

### Appendix 5: G4-EN3 - Direct energy consumption within the organization by primary energy source

2017 AEP System	Net Generation	
	MWh	Percent
Coal	69,340,570	63.9%
Nuclear	17,592,001	16.2%
Natural Gas	11,876,386	10.9%
Hydro - Inc. Pumped Storage	775,636	0.7%

Wind	8,840,230	8.2%
Solar	37,828	0.0%
<b>Total</b>	<b>108,462,650</b>	



**Appendix 6: G4-DMA Water - Collaborative approaches to managing watersheds and reservoirs for multiple uses (irrigation, drinking water, ecosystem conservation, etc.) and long-term planning for securing water resources.**

In order to manage watersheds and reservoirs for uses such as irrigation, navigation, industrial water supply, and ecological conservation, it often requires the participation and collaboration of multiple participants. Watersheds cover miles of streams and thousands of acres of land, necessitating that the water users and property owners work together. In addition, planning for long-term water uses requires the participation of multiple stakeholders. AEP is no exception to this requirement and collaborates with many stakeholders when securing its ability to use and manage the water within a watershed.

Access to Water

An example of long-term planning to secure water resources includes AEP’s work in the southwest, which periodically experiences drought conditions. When the AEP cooling lakes in Arkansas, Louisiana and Texas were designed, it was known that the associated watershed had a limited yield during drought periods. Therefore, AEP has contracted with a more senior water right holder to ensure sufficient access to cooling water.

East Texas is also a part of the country that may have future water issues that AEP will address in a regional water planning process. As the Dallas-Fort Worth area continues to grow, residents will need additional access to water and planners may look towards the eastern part of the state. At some point, they could come into the Cypress River Basin and compete with the water needs of AEP. The regional water planning efforts are conducted on a county wide basis and in some cases, below the county level. AEP has been involved with this planning process since it was initiated almost 20 years ago and will continue to participate to ensure adequate access to water.

**Appendix 7: G4-EN8 – Total water withdrawal by source**

Steam Electric Facilities

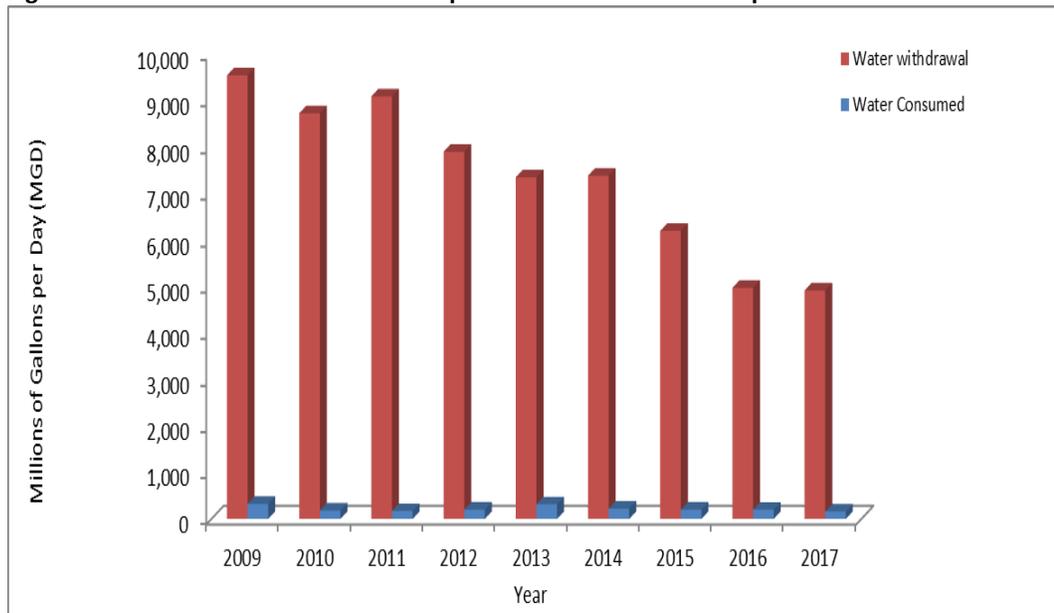
Water is a critical input for producing electricity, as power plants use water to generate electricity, cool equipment, scrub flue gas and transport combustion byproducts. Hydroelectric power is completely derived from the kinetic energy of flowing water. Our captive barge fleet operates on several rivers, and relies on consistent water levels to maintain operations, delivering fuel and other supplies to our generating facilities.

As much as we need access to water, we also have a responsibility to manage this resource to mitigate our impacts as well as reduce consumption, where we can. As AEP continues to diversify its generating portfolio, and retire coal generation capacity, our use of water will continue to decrease.

Water quality, availability, use and management are increasingly important sustainability issues for society and our company. We are continuing to take steps to reduce our water consumption, improve water quality and address water availability issues as we comply with current regulations and prepare for new ones. Because this issue is so important to AEP, we are evaluating a new sustainability goal to address our water consumption.

We have already significantly reduced our water footprint through plant retirements. Since 2013, we have reduced our water use from 7,349 million gallons/day (MGD) to 4,915 MGD – a reduction of nearly 33 percent (Figure 1). During that same time period, we have reduced our water consumption by almost 50 percent from 315 MGD to 158 MGD (Figure 1). The water that we use is generally returned to the original water source after being withdrawn. Water consumption occurs when some of the water is lost to evaporation or a water-consumptive process, such as flue gas scrubbing.

**Figure 1: Water withdrawal and consumption at AEP steam electric plants.**



**Source Information** - Data is initially collected from plant staff and used to complete Form EIA-923 (formerly EIA-767). Plant staff determine water withdraw rates in a variety of ways, but essentially they base their estimates on GADS

generation data and use a conversion factor (gals/MW) to determine water volume used. Others may use the number of pumps in service and assume a pumping rate. In general, pump meters are not used.

**Water used for Processing, Cooling and Consumption in Thermal and Nuclear Power Plants, including use of Water in Ash Handling**

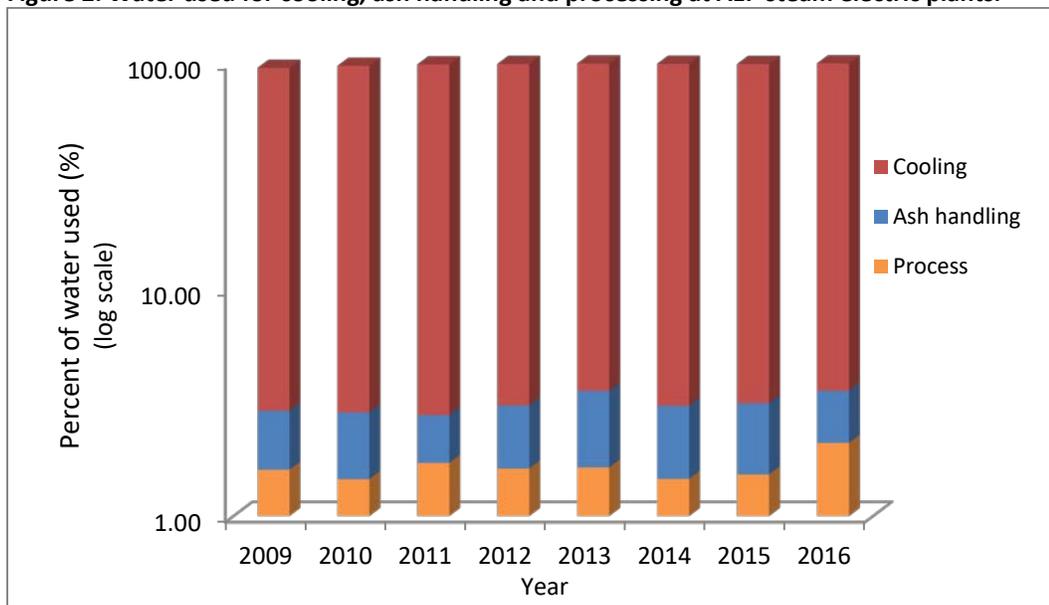
Water is critical to the operation of most power generating facilities, particularly steam electric facilities. Besides cooling, water is used for coal ash transport, cleaning, low volume waste transport, and in the boilers themselves (Figure 2). For example, in a typical fossil fuel-fired facility, fuel, such as coal, is conveyed into a boiler, where it is burned to generate heat. That heat is used in the boiler to generate steam. The steam leaves the boiler and enters a turbine generator, where it drives turbine blades. After leaving the turbine, the steam enters a condenser, where it is cooled by water flowing through the condenser tubes. The condensed water then returns to the boiler.

A constant flow of cooling water is required to cool the condenser. Once-through or recirculating cooling water systems are used. In a once-through system, the cooling water is withdrawn from a source of water, such as a river or lake, flows through the condenser, and is returned back to the source water. Almost no water is lost to evaporation or drift in such systems (less than 4 percent, NETL 2010), though a large amount of water is withdrawn to cool the condensers. In a recirculation system, the warmed cooling water is cooled in cooling towers or ponds, and is recirculated to the condenser. In a recirculating system, a small amount of water must be continuously discharged to control the buildup of solids. Make-up water is added to replace this water, as well as water lost through evaporation.

Two types of ash are produced during the combustion of coal: bottom ash and fly ash. After collection, the fly ash and bottom ash may be managed separately or together in landfills or in wet surface impoundments. If managed in surface impoundments, water is used to sluice the ash to these ponds.

Process water use at a typical fossil-fueled facility also includes water used for emission control systems, such as in the flue gas desulfurization process (wet scrubbers), and maintenance cleaning.

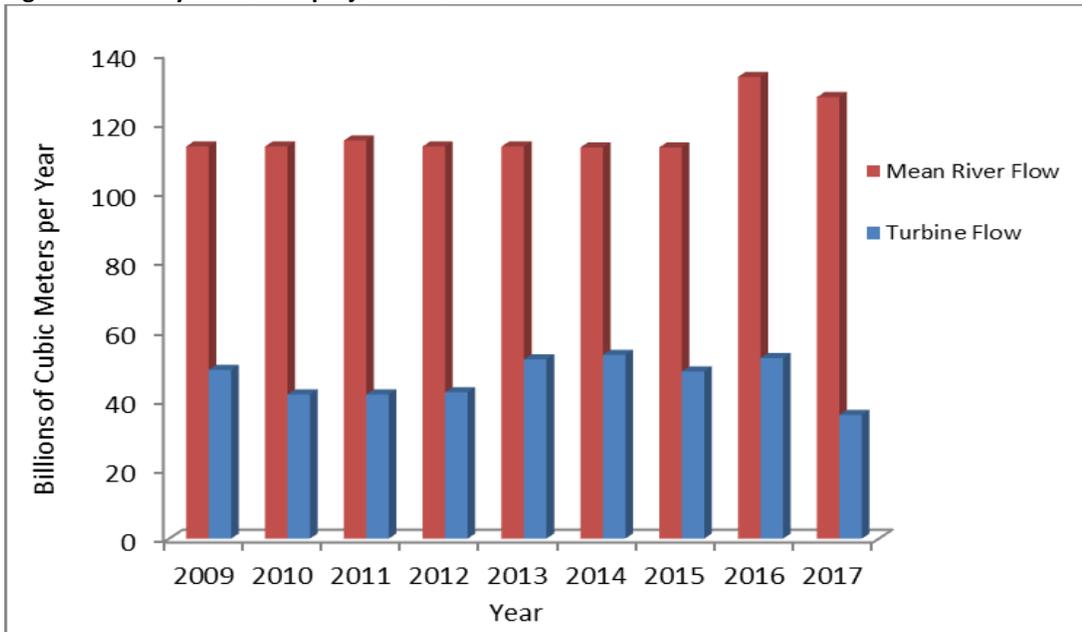
**Figure 2: Water used for cooling, ash handling and processing at AEP steam electric plants.**



Hydroelectric Facilities

AEP operates 16 hydroelectric projects in Indiana, Ohio, Michigan, Virginia, and West Virginia. Under licenses granted by the Federal Energy Regulatory Commission (FERC), these projects, with the exception of Smith Mountain Lake, which is a pumped storage facility, are operated as “run of river.” This means that the flow of water exiting the project must equal the flow of water entering the project. On average, less than half of the mean annual river flow passes through these projects every year (Figure 3). This difference is due to the fact that at times, only a portion of the river flow goes through the hydroelectric turbines. The remaining water flows over the dam spillways or through lock chambers on navigable rivers.

**Figure 3. AEP hydroelectric project water use.**



**Source Information.** Steam electric plants – water balance diagrams are used to determine the percentage of water used for cooling, ash handling, etc. These percentages are then applied to water withdrawal information from G4-EN8 to estimate the actual amount of water used for various plant processes. Hydro projects – AEP Hydro Operations Data; NETL. 2010. Water Vulnerabilities for Existing Coal-Fired Power Plants. National Energy Technology Laboratory. DOE/NETL-2010/1429. August 2010.

**Appendix 8: G4-EN9 - Water sources significantly affected by withdrawal of water**

The withdrawal of water from an ecosystem can alter its ability to support important biological and chemical functions. Such changes can affect the quality of the water or the aquatic habitat and have subsequent environmental, quality of life, or economic consequences. Significant water withdrawals are those considered to have an effect on water resources and meet one or more of the following characteristics:

1. Account for an average of 5 percent or more of the mean annual flow of a given water body,
2. Are from water bodies that are recognized by professionals to be particularly sensitive due to their relative size, function, or status as a rare, threatened, or endangered system or due to their support of a particular endangered species of plant or animal, or
3. Are from a nationally or internationally proclaimed conservation area, regardless of the rate of withdrawal.

Some water withdrawals at AEP facilities meet one or more of the above criteria and are considered to be significant (Tables 1 & 2). Eight facilities withdrew water during 2017 from water bodies that have documented populations of threatened or endangered fish or shellfish, notably, freshwater mussels, while three facilities, the Berrien Springs and

Buchanan hydroelectric facilities and the Cook Nuclear Plant, had significant water withdrawals from water-bodies that are designated as salmonid or Outstanding State Resource Waters (Tables 1 & 2).

**Table 1. Significant 2017 water withdrawals by AEP steam electric facilities.**

Facility	Type	Water Sources	Reason for Significant Water Withdrawal Designation
Clinch River	Coal	Clinch River	River reaches adjacent to the plant are listed as federally designated critical habitat for federally endangered mussels and federally threatened fish, slender chub and yellowfin madtom.
Conesville	Coal	Muskingum River	Superior High Quality Water designation by Ohio due to high biodiversity and presence of numerous threatened and endangered mussels.
Cook	Nuclear	Lake Michigan	Outstanding State Resource Water
Dresden	Gas	Muskingum River	Fresh dead shells of Snuff box mussel (federally threatened).

**Table 2. Significant 2017 water withdrawals by AEP hydroelectric facilities.**

Berrien Springs	Hydro	St. Joseph River	Salmonid stream
Buchanan	Hydro	St. Joseph River	Salmonid stream
Byllesby/Buck	Hydro	New River	Green floater mussel (federally threatened) and state listed pistolgrip mussel (state threatened) found in New River drainage.
Claytor	Hydro	New River	Green floater mussel (federally threatened) and state listed pistolgrip mussel (state threatened) found in New River drainage; Fringed mountain snail (federally endangered) historically found in the near vicinity of the Claytor Project boundary.
Leesville	Hydro	Roanoke River	Roanoke logperch (federally endangered fish) found in the Roanoke River drainage; the Pigg River has a relatively good population of Roanoke logperch and the river’s confluence is in Leesville Lake, between Leesville and Smith Mountain Dams.
Niagara	Hydro	Roanoke River	Roanoke logperch (federally endangered fish) found in the Roanoke River drainage.
Smith Mountain	Hydro-Pumped Storage	Roanoke River	Roanoke logperch (federally endangered fish) found in the Roanoke River drainage; the Pigg River has a relatively good population of Roanoke logperch and the river’s confluence is in Leesville Lake, between Leesville and Smith Mountain Dams.

**Source Information** - State water quality standard water use designations; federal and state threatened and endangered species lists; USGS river flow data. NPDES permit fact sheets are also used to document stream flows.

**Appendix 9: G4-EN10 - Percentage and total volume of water recycled and reused**

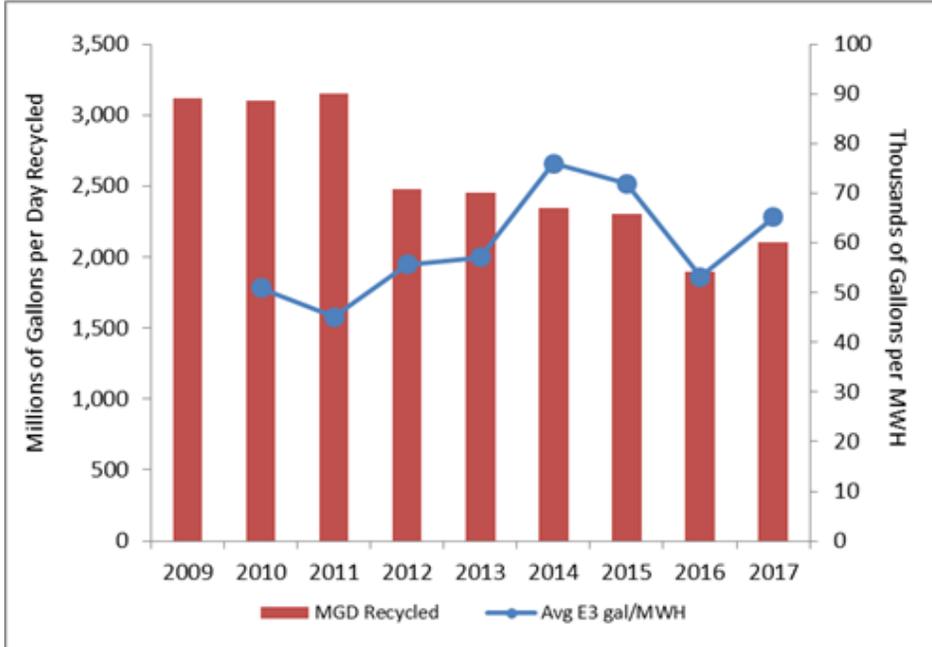
A large amount of the water withdrawn for use at power generating facilities is recycled or reused (Figure 4), such as water that is used for cooling at facilities that have closed-cycle cooling. While these systems are not entirely “closed,” as some water is lost due to evaporation in the cooling towers, they do withdraw significantly less water than once-through or open cooling systems.

Water is also recycled at many of the western plants that are on cooling water reservoirs (Comanche, Flint Creek, Knox Lee, Lieberman, Lone Star, Pirkey, Welsh and Wilkes). These reservoirs were specifically built in order to be both the source and

receiving water body for the cooling water used at these plants. Assuming negligible loss of water due to evaporation, these facilities “recycle” nearly 100 percent of the water that they withdrawal. Since the cooling lakes are typically large, open bodies of water, they also provide public fishing and recreational boating.

Water used for other non-cooling purposes is also recycled. For example, water used for bottom ash transport and other processes is directed to waste water ponds for treatment. After treatment, this water is directed to reclaim ponds from which a significant portion is recycled and used again.

**Figure 4. Amount of water recycled and water use efficiency at AEP steam electric plants.**



**Source Information** - AEP water balance data was used to determine percentage of water reused/recycled at each facility. Percentages were then applied to water withdrawal data provided under EN8. It was assumed that plants with cooling reservoirs (Comanche, Flint Creek, Know Lee, Lieberman, Lone Star, Pirkey and Welsh) recycled nearly 100 percent of the water withdrawn from the reservoirs.

**Appendix 10: G4-DMA - Biodiversity - Approaches for vegetation management along transmission corridors; assessment of impacts, mitigation measures, and monitoring at new and existing sites.**

Of AEP’s steam electric, windfarm and forestry land holdings, roughly 114,057 acres are adjacent to protected areas or areas of high biodiversity, such as wetlands, National Parks or areas that support threatened or endangered species (Figure 10). The company also maintains approximately 917 miles of transmission lines that cross National Forest lands or critical habitat. As a result, AEP has the opportunity to significantly impact, as well as to protect and conserve, biodiversity.

Many biodiversity impacts are clearly evident. Construction activity such as clearing vegetation and moving earth to build new facilities, totally removes or drastically decreases onsite biodiversity. Siting transmission line corridors can also affect biodiversity through habitat fragmentation and alteration. The construction of power plants, pollution control equipment and associated landfills results in the loss of wetland and riparian habitat. The installation of hydroelectric generation can alter stream and wetland areas through inundation and flow alterations can block the movement of fish and can change the quality of the water. Fish passing over or through hydroelectric projects can be injured by impacts on turbine blades by rapid pressure changes or by abrasion on rough structures. Transmission lines and related structures can create collision hazards for birds and the transmission corridors themselves fragment the habitat, preventing the movement of animals from one site to another. Wind turbines can also create collision hazards for birds and bats.

Management of biodiversity includes those activities that are done to maintain or improve the diversity of the biological communities or species on a property. Examples include: removing trees to protect endangered flowers; stocking fish to maintain certain species; or controlling exotic animal introductions. Special management areas may need to be established to meet the habitat requirements of a sensitive species. Oftentimes, more practical applications of property management such as fencing and visitor control must be implemented. Natural areas are expected to maintain their biodiversity for many years and the long-term expenses of management can easily exceed the costs of establishing the areas in the first place.

AEP strives to minimize ecological impacts, and in general, approaches biodiversity management by protecting it, restoring it or enhancing it. AEP restores or mitigates, according to regulatory requirements, any wetland or riparian habitats that must be replaced through compensatory mitigation. AEP also works on a voluntary basis with various community groups, conservation organizations and environmental agencies to preserve, restore and enhance existing habitats. Efforts are often made to enhance properties and improve their biodiversity regardless of their current condition. The monitoring of management areas is generally conducted by state and federal resource agencies. AEP biodiversity impacts generally fall into four primary activities: steam electric generation; hydroelectric generation; wind generation; and the maintenance of transmission and distribution facilities.

### **Steam Electric Generation**

Before any major construction project begins, AEP will conduct an environmental assessment of proposed construction sites. These assessments consider all the possible impacts that the project could have on the ecological and cultural characteristics of the site. During these assessments, efforts are made to identify unique areas of special biological value or diversity. If these sites are ultimately selected for construction and the areas cannot be avoided, mitigation projects are undertaken to replace the lost areas.

Given that AEP's power plants withdraw large amounts of water, there is a concern with the effects that the plants may have on the resident populations of fish and other organisms. As an example of AEP's concern for the local ecosystems, the company has been the lead organizer, sponsor and participant of a long-term study of fish populations in the Ohio River. These field studies have provided a 43-year database demonstrating a lack of significant impacts from power plants and improvements to the overall fish community. Several clean-water fish species have recovered over the years, while pollution-tolerant species have declined. This is in response to the improved water quality of the river.

### **Hydroelectric Generation**

AEP makes every effort to operate its hydroelectric projects in an environmentally benign manner. All projects must be relicensed with FERC on a periodic basis and during the relicensing process, all potential environmental impacts are considered. If mitigation is necessary, such as a fish stocking program or the cessation of operation, it is incorporated into the operation of the particular project. For example, the alteration of river and stream flow regimes as a result of project operation can make otherwise suitable riverine habitat unfit for aquatic invertebrates, fish, amphibians and other riparian-dependent species. However, dam operation restrictions are put in place at AEP hydroelectric facilities, which require a facility to operate as run-of-river so that the volume of water leaving a reservoir equals the volume of water entering the reservoir. Stream flow alterations therefore become a function of natural phenomenon, such as heavy rains or periods of drought.

Migrating fish may be prevented from moving upstream if their passage is blocked at a hydroelectric project. This could have a significant effect on anadromous fish populations, such as chinook salmon or steelhead trout, which are stocked in the St. Joseph River by the Indiana Department of Natural Resources (IDNR) upstream and downstream of the AEP Twin Branch hydroelectric facility. Below this facility, AEP operates the Berrien Springs and Buchanan hydroelectric projects where fish ladders are maintained to facilitate the upstream passage of fish. In addition, the turbines at the Buchanan project are shut down for two weeks during the salmonid spawning period to allow out-migrating chinook salmon and steelhead trout smolts, which have been stocked by the IDNR, to pass over the dam without harm.

While hydroelectric operation is often associated with adverse environmental impacts, environmental benefits can be realized due to the formation of an aquatic ecosystem in place of a terrestrial ecosystem. Dam construction and the development of reservoirs can increase public access to otherwise remote habitats. There will typically be an increase in

fishing, motorboat use and other similar recreational activities. AEP has installed fishing platforms and has improved boat access at many St. Joseph River and other hydroelectric project locations.

### **Wind Generation**

The AEP wind farms were some of the earliest projects that took avian activity and post-construction impacts into consideration during site selection. The newest wind turbines, because of their larger size, increased visibility, and site planning have considerably reduced avian collision risk. AEP also installed bird flight diverters at the time of construction on the transmission lines serving two new wind farms in the coastal plains of Kenedy County, Texas, to reduce the potential for bird collisions with the line.

### **Transmission Facilities**

AEP follows all appropriate federal, state and local regulations when siting new transmission lines. When the location and routes of new transmission facilities are considered, a special effort is made to avoid potentially sensitive areas. When these areas cannot be avoided, AEP strives to minimize the ecological impacts. Typically, comprehensive data collection and mapping is completed including stakeholder input from the public, and federal, state and local officials and agencies. Feasible mitigations or avoidance measures are developed to address agency concerns. After intensive analysis of collected data, a preferred route is selected that reasonably minimizes adverse impact on environmental resources (visual, natural and cultural) and is consistent with the project siting criteria.

Increasingly, endangered or threatened species are of growing concern nationally. In March 2014, AEP was among 32 private companies and five states that committed to enroll more than 3.6 million acres in the [Lesser Prairie-Chicken Range-Wide Conservation Plan](#). This three-year plan is a collaborative effort to support habitat conservation for the bird, which is being considered for listing under the Federal Endangered Species Act. As we seek to build new transmission facilities across our service territory, we are mindful of potential environmental and ecological impacts we might have. Working with organizations such as the Western Association of Fish & Wildlife Agencies, which is overseeing this plan, helps us understand the issues, support habitat preservation and take appropriate actions to mitigate our impacts.

In Eastern Oklahoma and parts of Arkansas and Texas, AEP has taken steps to protect the American Burying Beetle (ABB) when building projects in its range. The beetle was listed as an endangered species in 1989 and any disturbance of its habitat must be offset. When the beetle is found in areas where a proposed transmission route is being considered, construction activities (including clearing activities) are restricted and the U.S. Fish & Wildlife Service must be consulted. AEP Transmission is developing a long-term habitat conservation plan for the beetle.

***Source Information** - AEP Corp of Engineer 404 compliance programs (wetland mitigations); AEP EPRI Ohio River Ecological Research Program reports; FERC hydro relicensing studies; WERS staff records; AEP Real Estate and Asset Management Forest Management Program; updated T&D information.*

## **Appendix 11: G4-EN11 - Location and size of land owned, leased, managed in, or adjacent to, protected areas and areas of high biodiversity value outside protected areas.**

AEP owns or manages the land around its power generating and transmission facilities. Systemwide, AEP owns in fee, around 325,000 acres. This includes power plant sites, office buildings, substations, transmission and distribution lines, as well as coal fields yet to be mined, lands that have been mined, residential structures, river access and various other sites, but excludes mineral only ownership (coal, coal bed methane, oil and natural gas).

Land owned near the power plants directly supports the generation of electricity, serves as a buffer to these operations, and is often leased for agriculture. AEP also operates electric transmission and distribution lines throughout its service territories in Arkansas, Indiana, Kentucky, Louisiana, Michigan, Ohio, Oklahoma, Tennessee, Texas, West Virginia, and Virginia. Of AEP's nearly 40,000-mile transmission network, approximately 917 miles, or less than 3 percent, traverse federal or state lands. The majority of AEP's network was constructed prior to existing federal, state and local environmental laws during the early to mid- twentieth century. Today, avoiding protected lands and areas of biodiversity, while also avoiding visual and cultural resources, is of great importance during new transmission line siting. While many of

the properties through which these lines do cross have no special designation, some of them are protected for their ecological value, including national forests maintained by the U.S. Forest Service.

Some of the company properties are located adjacent to protected areas or areas of high biodiversity value. These areas are designed, regulated or managed to achieve specific conservation objectives, are recognized for important biodiversity features, are a priority for conservation, or have been identified as areas of high biodiversity value. High biodiversity areas include national parks and forests and habitat for federal and state endangered species (Table 3).

**Table 3. Land owned, leased, managed in, adjacent to, or containing, protected areas and areas of high biodiversity.**

Property owned, leased or managed	Property Acreage	Adjacent Property Biodiversity Descriptions	Potential Impacts
Steam Electric Projects	39,014	Unique forest, prairie and avian habitats; rare plants, fish and freshwater mussels; federally designated critical habitats	Entrainment, impingement, thermal discharges; avian impacts; habitat fragmentation and alteration
Hydroelectric Projects (reservoir acreage)	25,402	Unique wetland and avian habitats; rare fish, freshwater mussels, invertebrates and unique plant species	Flow alteration, land inundation, disruption of fish passage, turbine mortality
Transmission lines	917 miles	Federally designated critical habitat and National wildlife refuges; other federal or state lands	Habitat fragmentation, avian impacts
Wind Farms	10,830	Fed designated critical habitat	Avian and bat impacts
Forests/Tree Plantations	57,900	Preserve for exotic rare and endangered species	No impacts
Other	658	State Wildlife Area; mixed forest, brushlands, and wetlands	No impacts

**Source Information** - AEP Hydro Operations data; AEP Real Estate Asset Management data; ArcGIS and Esri mapping tools, USGS PAD-US maps, IUCN-USGS “protected areas” definitions; WERS staff records (power plant sites, T&D line routes); National Forest maps; federal threatened and endangered species lists and habitat listings.

**Appendix 12: G4-EN12 – Description of significant impacts of activities, products, and services on biodiversity in protected areas and areas of high biodiversity value outside protected areas**

Impacts of Power Plant Construction

Construction of pollution control equipment and associated landfills has resulted in the loss of wetland and riparian areas near several power plant sites. However, these losses have been permitted under the Corps of Engineers’ 404 program and are mitigated by the company, often on a two to one, three to one, or higher basis.

Hydroelectric Generation

AEP operates six hydroelectric projects that are adjacent to or contain areas of high biodiversity. The potential impacts of these facilities includes alteration of stream and wetland areas by inundation, fluctuation of river flows and reservoir levels, blockage of upstream and downstream fish movement, and turbine-induced mortality. The alteration of river and stream flow regimes as a result of dam operation can make otherwise suitable riverine habitat unfit for aquatic invertebrates, fish, amphibians, and other riparian-dependent species. Fluctuating stream flows and water levels can also reduce the area suitable for fish spawning and can subject fish eggs to dehydration.

The blockage of both upstream and downstream fish movement by dams, diversion structures, turbines, spillways, and waterways can affect fish populations. Organisms passing over dam spillways or through hydroelectric turbines can be injured by strikes or impacts with solid objects, rapid pressure changes, abrasion with rough structures and the shearing effects of turbulent water. In addition, fish that pass through trash racks and into turbines become susceptible to turbine-induced mortality.

Migrating fish may be prevented from moving upstream if their passage is blocked by the dams. AEP operates the Niagara and Smith Mountain hydroelectric projects on the Roanoke River, which contains the Roanoke Logperch, a federally endangered fish species. The dams restrict the movements of these fish, potentially isolating the populations and preventing genetic mixing.

While there are many potential hydroelectric environmental impacts, all of these are assessed and if necessary, mitigated, during the FERC Licensing process. Every AEP hydroelectric project has successfully completed this process.

Impacts of Wind Generation

AEP operates two wind facilities, Trent Mesa near Sweetwater, Texas, and Desert Sky near Iraan, Texas, that are near federally designated critical habitat for certain bird species. These facilities have the potential to impact large raptors, such as golden eagles, and smaller birds, while migrating in large flocks. To avoid avian-bird interactions, turbine design and wind farm siting have taken avian issues into consideration very early in the process. In recent years, bats have come to the wind industry’s attention and studies to grasp the dimension of this issue continue. Because of deaths of endangered bats, some wind farms must curtail operations when bats are active.

Cooling Water Intake (Impingement and Entrainment) Impacts on Biodiversity

At AEP’s generating facilities that utilize a once-through cooling water heat transfer system, large quantities of water are withdrawn from large rivers, man-made impoundments, or (in the case of D.C. Cook Plant), from adjacent Lake Michigan. These facilities are typically older (built prior to 1970). The potential impacts on local biodiversity are impingement (fish irreversibly contacted upon intake screens) and entrainment (the passage of small fish and fish eggs through the condenser cooling system. Section 316(b) of the Clean Water Act requires that the placement and operation of cooling water intake systems meet Best Technology Available for minimizing adverse environmental impact (often interpreted to be synonymous with the most cost-effective means of minimizing fish entrainment and impingement).

AEP has completed studies of impingement rates at facilities located on the Ohio River. The results indicate that: 1) the vast majority of fish impinged (numbers of fish) represent very few species of abundant forage fish and 2) no fish species has been known to experience a drastic population reduction that can be attributed to impingement and/or entrainment effects. AEP has monitored the fish populations near several facilities utilizing once-through cooling for many decades. These studies indicate that the year-to-year fluctuation in population size for key species has no correlation to the rates of impingement and/or entrainment.

As an outcome of the final 316(b) and other rulemakings, AEP has closed several once-through cooled facilities and may be required to retrofit improved fish protection equipment at the remaining once-through cooled facilities. Such changes will lower the rates of impingement and/or entrainment of vulnerable fish species.

Climate Change

AEP minimizes the impacts of its operations on the environment, however, the company also recognizes that some impacts may arise that do not have a direct remedy. Of particular note, and in a much larger and more general sense, the company recognizes its possible contribution to global climate change and its potential impacts. Due to its prominence as a carbon dioxide emitter in the United States, AEP is involved in deliberations with industry, Congress, and other industrialized countries as Congress considers legislation to possibly govern carbon dioxide emissions.

**Source Information** - FERC hydro relicensing studies; AEP Corp of Engineer 404 compliance programs (wetland mitigations); AEP Avian Protection Program. Cooling water intake impacts determined from plant 316(b) studies.

Figure 11: Land owned, leased, managed in, adjacent to, or containing, protected areas and areas of high biodiversity during 2016 (\*excludes properties near Corp or FERC mitigated areas).

Property owned, leased or managed	Property Acreage	Adjacent protected areas or areas of high biodiversity	Habitat Description	Potential Impacts
<b>Steam Electric Projects</b>				

Amos Plant	4,243	USA protected area across river	Mixed forest	
Breed Plant* (former plant site)	5,412	Fairbanks Landing, in river refuge	Proposed critical habitat	
Clinch River Plant	1,629	Cleveland Natural Area Preserve, Clinch River	Unique habitat, forest, rare plants and inverts, endangered freshwater mussels and fish in river	entrainment, impingement, habitat fragmentation & alteration
Conesville Plant	19,616	Wills Creek	Proposed critical habitat	
Cook Plant	662	Grand Mere State Park	Sand dunes and wooded habitat	
Gavin Plant	778	Ohio River Islands National Wildlife Refuge	Endangered freshwater mussels in river	entrainment, impingement, thermal
Flint Creek	1,300	Audubon Bird Area	Bald eagle habitat, Proposed critical habitat	
Lieberman Plant	105	USFWS lands	?	
Mitchell Plant	2,014	Ohio River Islands National Wildlife Refuge	Endangered freshwater mussels in river	entrainment, impingement, thermal
Northeastern Plant	1,327	Island and eastern shore of reservoir	Fed designated critical habitat	
Poston* (former plant site)	3,476	Wayne National Forest	National wildlife refuge	
Sporn Plant	761	Ohio River Islands National Wildlife Refuge	Endangered freshwater mussels in river	entrainment, impingement, thermal
Turk Plant	3,046	Nacatock Ravines Natural Area	Upland forests, blackland prairie	
	<b>44,369</b>			
<b>Hydroelectric Projects</b>	<b>Reservoir Acres</b>			
Buck Hydro Project	66	USFWS lands	Reservoir, mixed forest	flow alteration, forest clearing
Byllesby Hydro Project	239	USFWS lands	Reservoir, mixed forest	flow alteration, forest clearing
Claytor Hydro Project	4,363	Claytor Lake State Park	Habitat for bald eagles, fringed mountain snail, and state-listed pistol grip and green floater mussels	flow alteration, forest clearing
Mottville Hydro Project	412	Mottville protected area	Wetland fen with unique state-listed plant species	flow alteration
Niagara Hydro Project	62	Roanoke River	Habitat for federally-listed Roanoke logperch	flow alteration
Smith Mountain Pumped Storage Project	20,260	Reservoir shoreline, Roanoke River	Habitat for federally-listed Roanoke logperch	flow alteration
	<b>25,402</b>			
<b>Transmission Lines</b>	<b>Miles</b>			
Lawton-Oklaunion 345 kV line	40	Whooping crane flyway	Fed designated critical habitat	habitat frag., avian impacts

Lon Hill-Coleto 345 kV line	80	Attwater's Prairie Chicken habitat	Fed designated critical habitat	habitat frag., avian impacts
transmission lines	61	D. Boone National Forest in KY	National wildlife refuge	habitat frag., avian impacts
transmission lines	15.5	Hoosier National Forest in IN	National wildlife refuge	habitat frag., avian impacts
transmission lines	0.4	George Washington National Forest in VA	National wildlife refuge	habitat frag., avian impacts
transmission lines	208.6	Jefferson National Forest in VA and WV	National wildlife refuge	habitat frag., avian impacts
transmission lines	511.6	Wayne National Forest in OH	National wildlife refuge	habitat frag., avian impacts
	<b>917.1</b>			
<b>Wind Farms</b>				
Desert Sky Wind Farm	9600	Fed designated critical habitat	Habitat/flyway for birds	avian impacts
Trent Mesa Wind Farm	1230	Fed designated critical habitat	Habitat/flyway for birds	avian impacts
	<b>10,830</b>			
<b>Forests/Tree Plantations</b>				
ReCreation Land	58,200	The Wilds	Preserve for exotic rare and endangered species	
<b>Other</b>				
Comm. Solvents/Virginia Knight Smith	658	McClintic State Wildlife Area	Mixed forest, brushland, wetlands	

Source Information - AEP Hydro Operations data; AEP Real Estate Asset Management data; ArcGIS and Esri mapping tools, PAD-US maps, WERS staff records (power plant sites, T&D line routes); National Forest maps; federal threatened and endangered species lists and habitat listings.

### Appendix 13: G4-EN13 – Habitats protected or restored

AEP works in partnership with various community groups, conservation organizations, and environmental agencies to preserve, restore, and enhance existing habitats. This work encompasses many activities, including the reforestation and reclamation of former mine sites, the restoration of impacted wetlands and river corridors, the protection of unique habitats, the enhancement of wildlife areas and reservoirs, and the management of tree plantations to encourage wildlife. The following habitat protection and restoration examples are split between those required by law and those that were done on a voluntary basis.

#### Required by Regulation

##### *Wetland Mitigation Habitats*

Mitigation wetlands are those that have been set aside to replace those that were unavoidably lost due to the construction of AEP facilities. These mitigation projects have been approved by the Corps of Engineers and/or state environmental agencies. Over the past several years, AEP has established over 1,600 acres for mitigation purposes, mostly at steam electric, transmission, and hydroelectric projects (Table 4).

##### *New Source Review Consent Decree Projects*

On December 10, 2007, the United States District Court for the Southern District of Ohio entered a Consent Decree between AEP, the United States Department of Justice on behalf of the U.S. Environmental Protection Agency, eight states and 13 environmental organizations, regarding alleged violations of the New Source Review provisions of the Clean Air Act.

Pursuant to the Consent Decree, AEP provided \$10 million for the acquisition and/or restoration of ecologically significant areas in Indiana, Kentucky, Ohio, North Carolina, Pennsylvania, Virginia and West Virginia. In addition, AEP provided \$3 million in Project Dollars to fund nitrogen impact mitigation projects in the Chesapeake Bay watershed. AEP has made biodiversity protection and enhancement key factors in the selection of projects to meet this obligation. To date, nearly 20,900 acres have been purchased or protected as part of this program.

*Protected Shorelines*

Hydroelectric project reservoirs in western Virginia often include important resources that are of value to the local communities and need to be protected. These resources include recreational opportunities, scenic beauty, outstanding water quality, fish and wildlife habitat, and wetlands. As part of the FERC requirements for three hydroelectric projects, AEP has agreed to protect 118 miles of shoreline habitat to provide these resources.

*Enhanced Reservoirs*

AEP has enhanced nearly 6300 acres of company-managed reservoirs (Table 4). In compliance with the requirements of FERC license renewals, wildlife management plans have been negotiated at many hydroelectric projects, which require the installation and monitoring of duck boxes and nesting structures within the pools above each dam. These activities support ducks, bluebirds, purple martins, kestrels, owls, ospreys and bald eagles. Work is also done to improve the sport fishing opportunities in the reservoirs upstream of the projects. Efforts include the construction of bush pile fish attractors in the river pools and fish stocking.

**Table 4: Habitat Protected or Restored**

Habitat Restored, Protected or Enhanced	Reason for Protection/Restoration	Habitat Acreage	Habitat Designation/Use	Habitat characteristics
<b>Required by Regulation</b>				
Wetland Mitigations	Corp. permits, FERC requirements	1601	wetland/stream mitigation	wetlands, shorelines, forests, streams
NSR Conservation Areas	Consent Decree	20,888	conservation and recreation areas	forests, prairies, grass lands, marine wetlands and forests, lake dunes, stream and river corridors, bird habitat
Protected Streams	Consent Decree	20.8 miles	conservation area	warm-water fishery
Protected Shorelines	FERC requirement	118 miles	resource protection area	Wetlands, streams, fish and wildlife habitat
Enhanced Reservoirs	FERC requirement	6294	enhanced reservoir, recreation	duck boxes, nesting structures, salmon fishery, vegetation control, fish habitat
<b>Voluntary Protections and Donations</b>				
Conservation Areas	Corporate stewardship	70,752	enhanced habitats, wildlife refuge	bird, forest and prairie habitat, wetlands, dunes
Conservation Stream	Corporate stewardship	4 miles	conservation area	stream headwaters
Wildlife Management Areas	Corporate stewardship	32,200	hunting/fishing	wildlife/forest habitat

Habitat Restored, Protected or Enhanced	Reason for Protection/Restoration	Habitat Acreage	Habitat Designation/Use	Habitat characteristics
Enhanced Reservoirs	Corporate stewardship	2398	enhanced reservoir, recreation	fish habitat
Reclaimed Forests	Reforestation/mine reclamation	93,250	tree plantation, recreation	wildlife/forest habitat

### Voluntary Protections and Donations

#### *Conservation Areas*

Over 70,000 acres have been set aside as part of AEP's corporate stewardship program to protect unique habitats (Table 4). These include areas such as the Nipissing Dune Trail at the Cook Energy Information Center, a prairie at the Darby Plant, a 24 acre nature preserve to protect the Kentucky silver bell, a rare tree species near the AEP Cook Coal Terminal in southern Illinois, and the eagle watch pavilion at the Flint Creek Plant. Other examples include work with *The Nature Conservancy* in the 1990's to help develop a 37,000 acre Tall Grass Prairie in Oklahoma and work with the U.S. Fish & Wildlife Service to acquire the Bahia Grande property in Texas to re-flood and restore an 11,000-acre wetland.

#### *Wildlife Management Areas*

Up to 32,200 acres, including properties that have been set aside as wildlife management areas at the Conesville and Mountaineer Plants, are currently managed for the support of hunting, fishing and wildlife. Donations have also been made to state wildlife management areas in Ohio to allow for the expansion of land holdings (Table 4).

#### *Enhanced Reservoirs*

The Southwestern Electric Power Company, a subsidiary of AEP, has been involved in the creation of fish habitat in two SWEPCO power plant reservoirs (Welsh and Pirkey), resulting in nearly 2,400 acres of enhanced fish habitat. This work included the installation of wood duck nesting boxes and other habitat enhancements.

#### *Reforestation/Mine Reclamation and Forest Management*

AEP's commitment to trees and forest preservation is strong. Since the 1940s, AEP has planted tens of million trees in the United States on land owned by the company or under agreement with other owners. This total includes 15 million trees planted on 20,000 acres of company land between 1996 and 2000 as part of the Department of Energy's Climate Challenge program. These trees will create a new "carbon sink," which is intended to capture or "sequester" carbon dioxide, a greenhouse gas, thereby reducing the potential for global climate change.

Through AEP's ReCreation Land program, Ohio land that was once surface mined for coal has been ecologically reclaimed as outdoor recreation area for the public to enjoy. Throughout the history of this program, AEP has planted over 63 million trees, created 380 campsites, and established 350 lakes and ponds stocked for fishing for an estimated 100,000 visitors each year. As of February 2017, 58,800 acres have been reclaimed in Ohio through AEP's efforts.

For many decades AEP has had a cooperative agreement with the Ohio Department of Natural Resources, allowing citizens to use the ReCreation land for public use. With the electric market deregulation in Ohio and the reduction of coal mining in this area, AEP no longer has a future business need for this land. In 2017, we entered into an agreement with the state of Ohio that allows the state to begin purchasing some of the land so that the public can continue to enjoy this area for generations to come. Initially, the state is purchasing more than 13,000 acres to create a new state park that will be known as the Jesse Owens State Park and Wildlife Area.

AEP also supports the establishment of tree plantations by providing and planting trees on company, government-owned, not-for-profit, and private properties. The government-owned and not-for-profit properties are "protected, restored and managed," while the private properties are considered to be "restored."

AEP domestically has thousands of acres of forestland under forest management. The primary focus of this program is to maintain the long-term productivity of existing forest assets by following a management philosophy of sustainable forestry on property that will remain in forest cover for the foreseeable future. This will be accomplished by providing guidance, direction, coordination and oversight of all company forest management activities. The forest resource is maintained in a steady state by balancing forest growth with timber harvests. Following this philosophy is necessary for the credible reporting of active forest management activities. The AEP Forest Management Program emphasizes sound contributions to ecological and wildlife habitat, and its commitment to enhanced recreational use.

In addition to managing all of AEP’s forest ownerships under the long-term sustained yield guidelines, AEP is an active participant in the American Forest Foundation’s American Tree Farm Program. This program is a national effort to encourage and recognize excellent forestry on private lands that are committed to sustained production of renewable forest products under a multiple use management approach. Sustainable forestry means managing forests to meet the needs of the present without compromising the ability of future generations to meet their own needs by practicing a land stewardship ethic which integrates the reforestation, managing, growing, nurturing and harvesting of trees for useful products with the conservation of soil, air and water quality, wildlife and fish habitat and aesthetics.

**Source Information** - AEP ReCreation Land records; AEP report, “Beyond Environmental Compliance,” AEP System Environmental Performance reports; WERS staff records; AEP Wildlife Habitat Council Certification records.

**Appendix 14: G4-EN14 - Total number of IUCN red list species and national conservation list species with habitats in areas affected by operations, by level of extinction risk.**

In lieu of the IUCN Red List, AEP has created a list of federally threatened and endangered species that may be present near company facilities. A report provided by NatureServe (2015) was used as the basis for this response. This report provides a summary of priority, at-risk, species in proximity to power plants and transmission lines managed by American Electric Power (AEP).

The data used to generate this report were current as of December, 2014 and “at-risk” species are defined as those that are either federally-listed, are candidate, proposed or petitioned for listing under the U.S. Endangered Species Act (ESA), and/or are globally ranked by NatureServe as Critically Imperiled (G1/T1) or Imperiled (G2/T2). The analysis used Platt’s spatial data of power plants and transmission lines (>69kV) and identified species within three miles of the company’s electric power infrastructure.

Excluding state-listed species, a total of 111 endangered, threatened or candidate species were reported to be within a 3-mile buffer of an AEP power plant or transmission line and 298 “at-risk” species were reported to be within the same area. The top species include the plants Peters Mountain Mallow, South Texas Ragweed, Black Lace Cactus and Slender Rushpea, the invertebrate Virginia Fringed Mountain Snail, and three species of fish (Table 5). The next group of species includes freshwater mussels, plants and fish, as well as the Mitchell’s Satyr butterfly (Table 5).

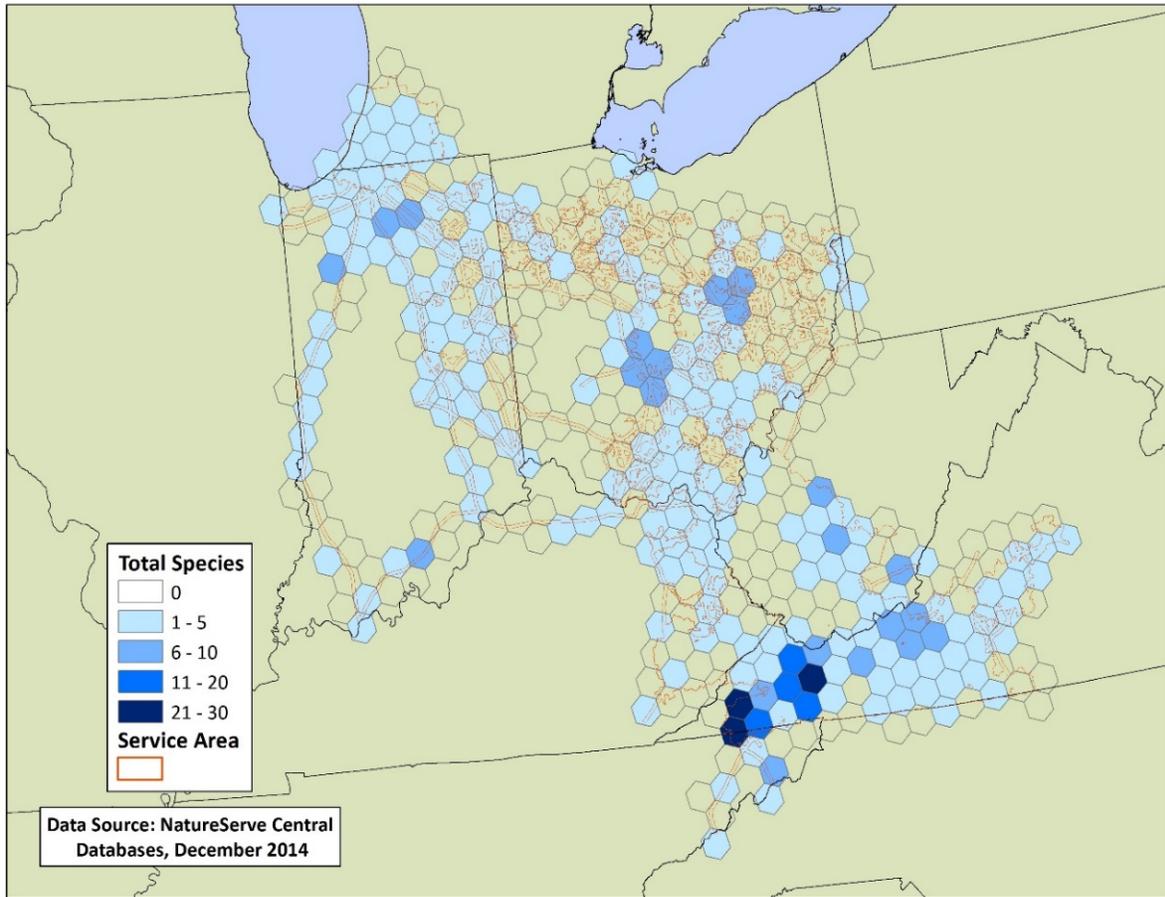
**Table 5. Priority Listed Threatened and Endangered Species**

<b>Between 50-100% of their Global Distribution within the Area of Analysis</b>		
<i>Common Name</i>	<i>Scientific Name</i>	<i>Taxonomic Group</i>
Peters Mountain Mallow	<i>Iliamna corei</i>	Flowering plant
Virginia Fringed Mountain Snail	<i>Polygyriscus virginianus</i>	Snail
South Texas Ragweed	<i>Ambrosia cheiranthifolia</i>	Flowering plant
Black Lace Cactus	<i>Echinocereus reichenbachii</i> var. <i>albertii</i>	Flowering plant
Slender Rushpea	<i>Hoffmannseggia tenella</i>	Flowering plant
Devils River Minnow	<i>Dionda diabolica</i>	Fish
Benton County Cave Crayfish	<i>Cambarus aculabrum</i>	Crustacean
Diamond Darter	<i>Crystallaria cincotta</i>	Fish

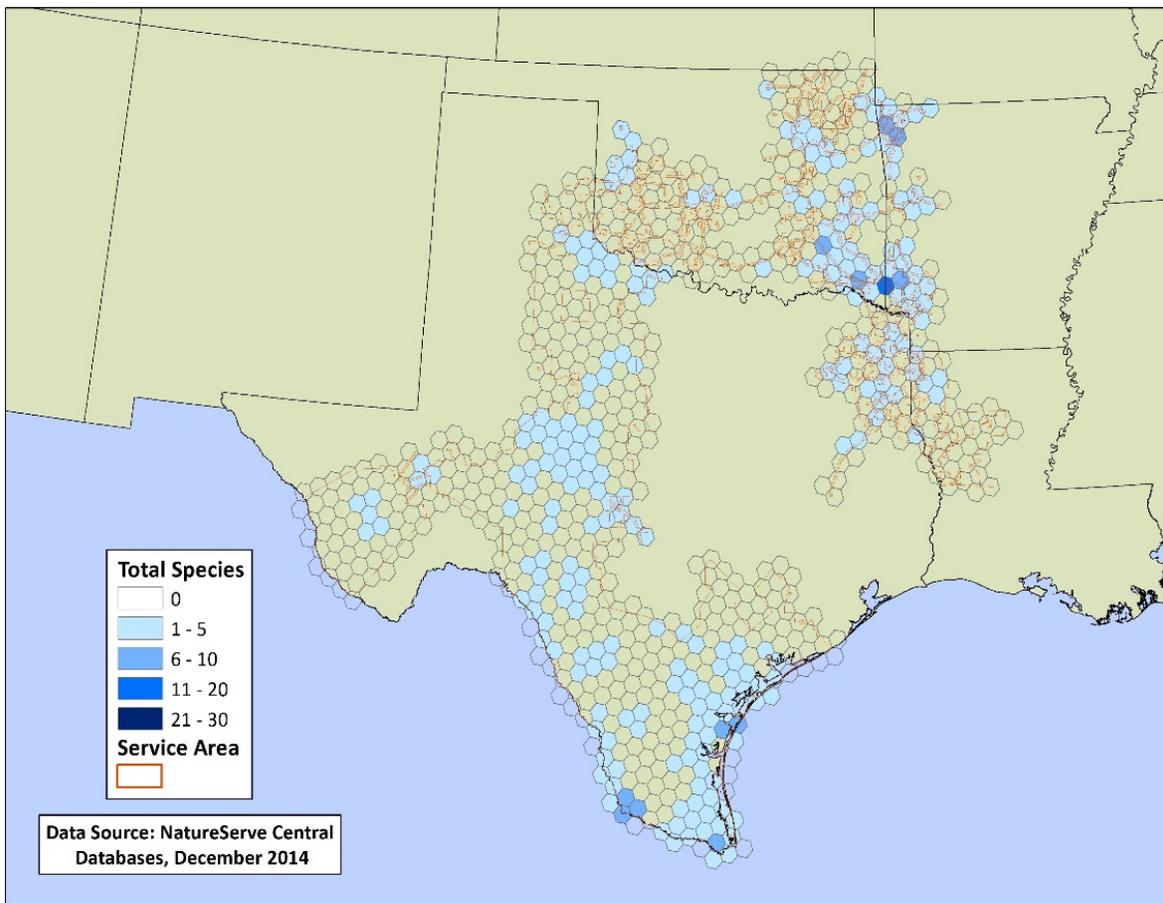
Virginia Fringed Mountain Snail	<i>Polygyriscus virginianus</i>	Crustacean
<b>Species with 15-35% of their Distribution within the Area of Analysis</b>		
Ouachita Rock Pocketbook	<i>Arkansia wheeleri</i>	Freshwater mussel
Texas Azenia	<i>Azenia limitaris</i>	Flowering plant
Zapata Bladderpod	<i>Lesquerella thamnophila</i>	Flowering plant
Duskytail Darter	<i>Etheostoma percnurum</i>	Fish
Leon Springs Pupfish	<i>Cyprinodon bovinus</i>	Fish
Texas Poppy-mallow	<i>Callirhoe scabriuscula</i>	Flowering plant
Leopard Darter	<i>Percina pantherina</i>	Fish
Mitchell's Satyr	<i>Neonympha mitchellii mitchellii</i>	Insect
Ashy Dogweed	<i>Thymophylla tephroleuca</i>	Flowering plant
Star Cactus	<i>Astrophytum asterias</i>	Flowering plant
Neosho Mucket	<i>Lampsilis rafinesqueana</i>	Freshwater mussel
Neosho Mucket	<i>Lampsilis rafinesqueana</i>	Freshwater mussel
Roanoke Logperch	<i>Percina rex</i>	Fish
Walker's Manihot	<i>Manihot walkerae</i>	Flowering plant
Clubshell	<i>Pleurobema clava</i>	Freshwater mussel
Rayed Bean	<i>Villosa fabalis</i>	Freshwater mussel
Catspaw	<i>Epioblasma obliquata obliquata</i>	Freshwater mussel
Purple Bean	<i>Villosa perpurpurea</i>	Freshwater mussel

Maps were created to illustrate the distribution of the at-risk species and help identify “hot spots” or areas where there the species are located (Figures 5 and 6). These hot spots are opportunities for targeting more effective mitigation or recovery efforts. For example, including “imperiled” species in recovery and management plans can help AEP avoid actions that could inadvertently have a negative impact on the species, thereby avoiding further declines and possible future listings. In addition, many studies have shown that developing a recovery or management plan using a regional multi-species approach is much more likely to have long-term success in achieving conservation goals (Environmental Law Institute et al. 2011). This ecosystem approach has also been promoted by U.S. regulatory and land management agencies (Brown 2006).

**Figure 5: Species by 250 square mile hexagon with ESA status or globally ranked G1/T1-G2/T2 and occur within the Midwestern states of the area of analysis.**



**Figure 6: Species by 250 square mile hexagon with ESA status or globally ranked G1/T1-G2/T2 and occur within the southeastern states of the area of analyses.**



AEP is also working with the U.S. Fish and Wildlife Service (USFWS) on a Habitat Conservation Plan (HCP) for the American Burying Beetle. This beetle is listed as endangered and the HCP is a mechanism by which AEP can comply with the ESA. The HCP deals with potential impacts from our transmission and distribution operations, maintenance, and construction activities over the next 30 years. The federal permit associated with the HCP will help AEP continue to operate efficiently to provide safe and reliable electricity to meet the energy needs of our customers, while assisting in the conservation of the ABB and its habitat. We anticipate receiving the permit from USFWS by the end of 2018.

Simultaneously, AEP is working with USFWS on a 30-year system-wide, programmatic HCP dealing with about 15 other species potentially affected by the Company's transmission construction activities, including the federally endangered Indiana bat, whooping crane, red-cockaded woodpecker, eastern massasauga rattlesnake, and rusty patched bumble bee. This HCP is currently in the drafting stage, and is anticipated to bring predictability and efficiency to the consultation and mitigation process with USFWS while providing tangible benefits to the covered bat, bird, plant and other terrestrial species in all eleven states in which AEP traditionally operates.

As the USFWS decides whether to list the monarch butterfly as a protected species under the ESA, AEP is working with stakeholders to protect the monarch. A significant component of the ESA is the limitation that it places on activities within designated critical habitat areas of listed species. Monarch butterflies, for example, rely on areas where milkweed plants are available for migration, which significantly overlaps with AEP's generation and transmission network.

In 2018, AEP is participating in the development of a collaborative monarch butterfly Candidate Conservation Agreement with Assurances (CCAA), which brings together stakeholders to commit to proactive conservation measures throughout various industries. CCAA's are administered by the USFWS. This action can support the rehabilitation of the monarch butterfly's population, while also encouraging other enterprises such as electric, gas, and oil companies to follow our example through the collaborative nature of this agreement.

AEP has also joined the EPRI Power in Pollinators Initiative, which seeks to address issues of concern regarding important pollinator species, such as bees, beetles, butterflies and other insects. Pollinating insects are necessary to support production of many of our food crops, such as apples, tomatoes and watermelon. Many of these insects are under stress and AEP is working with EPRI and other electric utilities to find ways to support and protect pollinating insects, birds, and other associated wildlife.

**Source Information** – Nature Serve. 2015. American Electric Power: Species Prioritization Brief. Prepared by NatureServe for the Electric Power Research Institute, April 14, 2015; Note - the species location data used in the analyses were downloaded in December 2014, but federal status information was reviewed in April 2015, and data for Arkansas was provided in April 2015; Environmental Law Institute, et al. 2011. A practitioner’s handbook: Optimizing conservation and improving mitigation through the use of progressive approaches. Presented by Cambridge Systematics to the National Cooperative Highway Research Program Project 25-25, Task 67; Brown, J.W. 2006. “Eco-Logical: An ecosystem approach to developing infrastructure projects.” Cambridge, Massachusetts: U.S. Department of Transportation.

## **Appendix 15: G4-DMA Effluents and Waste**

### Discharges

American Electric Power steam electric generating facilities discharge billions of cubic meters of process wastewater to surrounding surface waters each year (Figure 18). The majority of these water releases are non-contact cooling waters from steam electric facilities (Figure 3). Once-through cooling systems withdraw water from a nearby water body, pass it through a condenser, and discharge it back into the body of water. Chlorine or other biocides may be added to the water to control biofouling. In closed cooling systems, water that has passed through a condenser is sent to a cooling tower to lower the temperature. As water evaporates, the latent heat required to evaporate the water is transferred from the cooling water to the air, cooling the water (USEPA 2009). Because some of the water evaporates, fresh make-up water is added to the system. In addition, a small amount of water must be periodically discharged to control the buildup of solids. This water is referred to as “cooling tower blowdown” (USEPA 2009).

The next largest wastewater releases are ash handling waters, however, these effluents represent less than two percent of all AEP discharges (Figure 3). The burning of coal or oil in steam electric boilers produces a noncombustible residue known as ash. Heavier particles that collect at the bottom of the boiler are known as bottom ash. Finer particles that are light enough to be transferred in the flue gas are known as fly ash. Fly ash and bottom ash can be transported by wet handling systems that produce slurries of ash, referred to as “sluices,” which are typically transferred to surface impoundments. The ash settles in the impoundments prior to recycling or discharge of the water. Fly ash and bottom ash sluices typically contain heavy metals and inorganic constituents (U.S. EPA 2015).

Other waste streams from AEP facilities include metal cleaning wastes, coal pile runoff, boiler blowdown, FGD chloride purge streams, sump water, turbine seal water, landfill leachate and seepage, and other low volume wastes. Metal cleaning wastes are those resulting from the cleaning of any metal process equipment. Chemicals are often used to remove scale and corrosion from boiler tubes. The major constituents of cleaning wastes are iron, copper, nickel, and zinc. Alkaline reagents are also used to clean air preheaters and to neutralize acidity. These alkaline washes can consist of soda ash, caustic soda, phosphates, and detergent.

Coal pile runoff consists of rainwater that has accumulated on and near coal storage piles. Coal pile runoff is typically acidic and may contain high concentrations of copper, iron, aluminum, nickel, and other constituents present in coal (U.S. EPA 2009). Boiler blowdown is that water which is periodically discharged from boilers to control the build-up of solids. There are many sources of impurities in boiler blowdown, including intake water, internal corrosion of the boiler, and chemicals added to the boiler system (U.S. EPA 2006). Examples of impurities include soluble inorganic salts, calcium, magnesium, iron, copper, chromium, phenol, phosphate, and other chemical species. Other low volume wastes include laboratory and sampling streams, floor drains, cooling tower basin cleaning wastes, and recirculating service water systems (U.S. EPA 2013).

**Treatment**

The majority of water used at AEP generating facilities is used for cooling purposes, either in once-through or recirculating closed systems. Cooling towers are most frequently used to cool the water in closed systems, however, in both once-through and closed systems, various methods are used to remove biocides and residual oxidants. Typically, biocides are used in low-level applications to treat the biofouling that occurs in the cooling systems. Natural decay may be utilized to remove biocides or dehalogenation systems may be used to comply with NPDES permit limits. In these systems, a reducing agent is added to consume the residual oxidizing biocide. Sulfur dioxide is the most commonly used dehalogenation chemical. Bentonite clay can be added to absorb excess non-oxidizing biocides, which are not removed by sulfur dioxide.

Bottom ash and fly ash ponds are used to treat ash sluice water and are primarily settling basins that allow ash constituents and suspended solids to settle out before the transport water reaches the discharge point or is recycled. Some iron co-precipitation also occurs in these ponds, aiding with the removal of pollutants such as arsenic. The control of pond pH also helps to precipitate out metals, such as copper. In some cases, aeration-mixing or treatment chemicals are used to maximize pond effectiveness.

The operation of a wet FGD system typically results in the generation of a chloride purge stream, which must be treated to manage pH and solids levels. The treatment process is based on three broad principles:

- Removal of the bulk of the suspended solids in a primary clarification step,
- Conversion of constituents into solid precipitates, and
- Removal of solids remaining after primary clarification, including precipitated solids.

Once treated, this effluent is generally directed to a bottom ash pond for further settling before final discharge to a receiving/source water body.

All AEP facilities that discharge such effluents have National Pollutant Discharge Elimination System (NPDES) permits that have been issued by the appropriate state agencies. These permits govern the discharge of the treated wastewaters and ensure compliance with all applicable water quality standards. The Clean Water Act requires facilities that discharge process wastewaters into receiving waters to control these discharges according to technology-based effluent guidelines and water quality-based effluent limits specified in NPDES permits.

The Steam Electric Effluent Limitation Guidelines (ELGs) specify limits for various pollutants found in power plant waste waters. These limits are based on the available and economically achievable technologies that can be implemented at steam electric facilities. Monitoring is conducted at each AEP facility to ensure that the discharges comply with these limits. USEPA recently revised the ELGs, creating new waste water categories and limits [link to EPA regulation](#). Beginning as “soon as possible” after November 1, 2018, but no later than December 31, 2023, electric utilities must cease discharging coal ash transport water. In addition, FGD waste water must be treated to meet new limits for arsenic, mercury, selenium and nitrate-nitrite. AEP is evaluating treatment technologies to meet the new limits.

**Figure 18: AEP 2016 power plant water discharges\***

Facility	Effluent Descriptions	Water Discharge 2016 (m3)	MGD	Receiving streams
Amos	Ash handling, FGD waste water, low volume wastes	7,472,857	5.41	Kanawha River and tributary
Arsenal Hill/Stall	Cooling water, low volume wastes	2,109,251	1.53	12 Mile Bayou/Red River
Big Sandy	Ash handling, low volume wastes	1,402,924	1.02	Blain Creek
Cardinal	Cooling water, ash handling, FGD waste water, low volume wastes	1,220,251,948	883.17	Ohio River and tributary
Ceredo	No discharge	0	0	---

Clinch River	Ash handling, coal pile runoff, low volume wastes	5,100,960	3.69	Clinch River and tributary
Comanche	Cooling water	1,790,462	1.30	Comanche Reservoir/Nine Mile Ck
Conesville	Cooling water, ash handling, coal pile runoff, low volume wastes	42,089,200	30.46	Muskingum River
Cook	Cooling water, low volume wastes	2,636,378,498	1908.10	Lake Michigan
Darby	No discharge	0	0	---
Dresden	Process water	783,626	0.57	Muskingum River
Flint Creek	Cooling water	427,059,525	309.09	SWEPCO Lake
Gavin	Ash handling, FGD leachate, low volume wastes	21,856,884	15.82	Ohio River and tributaries
Greenville	No discharge	0	0	---
Knox Lee	Cooling water, low volume wastes	292,497,829	211.70	Cherokee Reservoir
Lawrenceburg	Cooling water, low volume wastes	3,076,138	2.23	Tanners Creek
Lieberman	Cooling water, low volume wastes	48,062,183	34.79	Caddo Lake
Lone Star	Cooling water, low volume wastes	10,050,105	7.27	Ellison Creek Res.
Mattison	No discharge	0	0	---
Mitchell	Ash handling, coal handling, AMD, low volume wastes	13,979,243	10.12	Ohio River
Mone	No discharge	0	0	---
Mountaineer	Ash handling, FGD waste water, low volume wastes, coal handling	4,433,298	3.21	Ohio River
Northeastern	Cooling water, ash handling, coal pile runoff, low volume wastes	2,545,448	1.84	Verdigris River
Oklaunion	Wash water, low volume wastes	0	0	Tributary of Boggy Ck.
Pirkey	Cooling water, ash handling, low volume wastes	634,625,681	459.32	Brandy Branch Res.
Riverside	Cooling water	3,042,798	2.20	Arkansas River
Rockport	Ash handling, coal handling, low volume wastes	11,718,357	8.48	Ohio River
Southwestern	Cooling water, low volume wastes	1,418,249	1.03	Washita River
Tulsa	Cooling water, low volume wastes	899,457	0.65	Arkansas River
Turk	Cooling water, low volume wastes	308,783	0.22	Little River
Waterford	Cooling water, low volume wastes	1,140,927	0.83	Muskingum River
Weleetka	No discharge	0	0	---
Welsh	Cooling water, ash handling, low volume wastes	923,752,984	668.57	Welsh Reservoir
Wilkes	Cooling water, low volume wastes	283,126,031	204.92	Johnson Creek Res.
<b>Totals:</b>		<b>6,600,973,646</b>	<b>4777</b>	

\* Discharge information based on annual water withdrawal reports and plant water balance.

**Source Information** - USEPA reports: USEPA. 2006. *Interim Detailed Study Report for the Steam Electric Power Generating Point Source Category*. EPA-821-R-06-015. Washington, D.C. (November). USEPA. 2009. *Steam Electric Power Generating Point Source Category: Final Detailed Study Report*. EPA-821-R-09-008. Washington, D.C. (October) [link](#) USEPA. 2013. *Technical Development Document for the Proposed Effluent Guidelines and Standards for the Steam Electric Point Source Category*. EPA-821-R-13-002 Washington D.C. (April). USEPA. 2015. *Technical Development Document for the Effluent Limitations Guidelines for the Steam Electric Power Generating Point Source Category*. EPA-821-R-15-007. Washington, D.C. (September) [link](#) AEP water balance diagrams were used to determine the percentage of water discharged from

various waste streams. These percentages are then applied to water withdrawal information from EN8 to estimate actual amount of water discharged.

**Appendix 16: G4-EN26 - Identity, size, protected status, and biodiversity value of water bodies and related habitats significantly affected by the reporting organization’s discharges of water and runoff.**

While American Electric Power discharges billions of gallons of wastewater per day from its steam-electric facilities, based on design flows, approximately 41 percent of this water is released to waters that could be sensitive and about 97 percent of this water is non-contact cooling water discharged into Lake Michigan by the Cook Nuclear Plant (Table 6). This discharge meets all water quality standards and, though biocides are periodically applied, it is treated and considered to be clean water. However, this discharge is considered to be significant because it is released to Lake Michigan, which is designated as an Outstanding State Resource Water by Indiana and other adjoining states.

Other discharges constitute the remaining flows to receiving streams which are considered to be significant. However, these discharges meet all applicable water quality standards. Other AEP discharges are released to water bodies that support federally-listed threatened and endangered species, in particular, freshwater mussels. While not believed to be harmful, the discharges are listed due to the presence of these species.

**Table 6. Water bodies significantly affected by discharges of water from steam-electric facilities.**

Water Body	Facility	Discharge Type	Reason for Significant Discharge Designation
Blockhouse Hollow	Cardinal	Fly ash pond	>5% mean flow (effluent dominated water body).
Clinch River	Clinch River	Waste water treatment	Multiple federally endangered mussels within the Clinch River. River reaches adjacent to the plant are listed federally designated critical habitat for these listed mussels. Slender chub (federally threatened) and yellowfin madtom (federally threatened) occur in the Clinch River and river reaches adjacent to plant are federally designated critical habitat for these species.
Muskingum River	Dresden	Process water	Fresh dead shell of Snuff box mussel (federally threatened).
Honey Creek	Rockport	Landfill runoff	>5% mean flow (effluent dominated water body).
Lake Michigan	Cook	Cooling water	Outstanding State Resource Water
Muskingum River	Conesville	Cooling water	>5% of mean flow; Superior High Quality Water designation by Ohio due to high biodiversity and presence of numerous threatened and endangered mussels.
Muskingum River	Waterford	Cooling tower blowdown	Presence of threatened and endangered mussels.
Unnamed tributary of Ninemile Creek	Comanche	Cooling water	>5% mean flow (effluent dominated water body).

The remaining water bodies receive discharges that make up more than 5 percent of their mean annual flow. While there is no evidence of harm to such systems, the volume of the discharged water makes the receiving streams vulnerable to water quality changes.

Four hydroelectric facilities are listed as significantly affecting water bodies due to the discharge of cooling water and process wastewater to streams that contain federally threatened or endangered fish or freshwater mussels (Table 7). However, the discharges to these streams are very small, being less than one percent of the total flow of water through these facilities and is of no consequence to the aquatic life.

**Source Information** - State water quality standard water use designations; federal and state threatened and endangered species lists; USGS river flow data.

**Table 7. Water bodies significantly affected by discharges of water from hydroelectric facilities.**

Water Body	Facility	Discharge Type	Reason for Significant Discharge Designation
New River	Claytor	Cooling water, seal water	Green floater mussel (federally threatened) and state listed pistolgrip mussel (state threatened) found in New River drainage; Fringed mountain snail (federally endangered) historically found in the near vicinity of the Claytor Project boundary.
Roanoke River	Leesville	Cooling water, seal water	Roanoke logperch (federally endangered fish) found in the Roanoke River drainage; the Pigg River has a relatively good population of Roanoke logperch and the river's confluence is in Leesville Lake, between Leesville and Smith Mountain Dams.
Roanoke River	Niagara	Cooling water, bearing water	Roanoke logperch (federally endangered fish) found in the Roanoke River drainage.
Roanoke River	Smith Mountain	Cooling water, seal water	Roanoke logperch (federally endangered fish) found in the Roanoke River drainage; the Pigg River has a relatively good population of Roanoke logperch and the river's confluence is in Leesville Lake, between Leesville and Smith Mountain Dams.

#### Appendix 17: G4-LA1 - Total number and rate of employee turnover by age group, gender and region

##### Hires in 2017

State	Gender	Active Employees	Total Hires	Hires Under 30	% Hires Under 30	Hires 30-50	% Hires 30-50	Hires Over 50	% Hires Over 50
AR	M	325	14	4	28.57%	9	64.29%	1	7.14%
AR	F	28	2	1	50.00%	1	50.00%	0	0%
CA	M	1	0	0	0%	0	0%	0	0%
CA	F	1	0	0	0%	0	0%	0	0%
DC	M	3	0	0	0%	0	0%	0	0%
DC	F	3	0	0	0%	0	0%	0	0%
FL	M	3	0	0	0%	0	0%	0	0%
FL	F	2	0	0	0%	0	0%	0	0%
IL	M	65	4	0	0%	3	75.00%	1	25.00%
IL	F	5	0	0	0%	0	0%	0	0%
IN	M	881	81	41	50.62%	35	43.21%	5	6.17%
IN	F	174	18	5	27.78%	9	50.00%	4	22.22%
KS	M	0	0	0	0%	0	0%	0	0%
KS	F	1	0	0	0%	0	0%	0	0%
KY	M	334	26	17	65.38%	9	34.62%	0	0%
KY	F	40	7	0	0%	6	85.71%	1	14.29%
LA	M	749	30	11	36.67%	19	63.33%	0	0%
LA	F	238	22	8	36.36%	12	54.55%	2	9.09
MI	M	1,130	54	20	37.04%	28	51.85%	6	11.11%
MI	F	185	16	10	62.50%	3	18.75%	3	18.75%
MO	M	0	0	0	0%	0	0%	0	0%
MO	F	1	0	0	0%	0	0%	0	0%
NC	M	1	0	0	0%	0	0%	0	0%
NC	F	1	0	0	0%	0	0%	0	0%
NE	M	19	0	0	0%	0	0%	0	0%
NE	F	1	0	0	0%	0	0%	0	0%

NY	M	1	0	0	0%	0	0%	0	0%
NY	F	0	0	0	0%	0	0%	0	0%
OH	M	4,786	445	200	44.94%	197	44.27%	48	10.79%
OH	F	1,446	159	55	34.59%	99	62.26%	5	3.14%
OK	M	1,274	125	67	53.60%	51	40.80%	7	5.60%
OK	F	316	37	15	40.54%	16	43.24%	6	16.22%
OR	M	1	0	0	0%	0	0%	0	0%
OR	F	0	0	0	0%	0	0%	0	0%
PA	M	14	1	1	100.00%	0	0%	0	0%
PA	F	2	1	0	0%	0	0%	1	100.00%
TN	M	63	2	2	100.00%	0	0%	0	0%
TN	F	9	0	0	0%	0	0%	0	0%
TX	M	2,116	151	77	50.99%	72	47.68%	2	1.32%
TX	F	313	23	11	47.83%	11	47.83%	1	4.35%
VA	M	874	72	43	59.72%	26	36.11%	3	4.17%
VA	F	131	11	5	45.45%	5	45.45%	1	9.09%
WV	M	1,833	70	33	47.14%	37	52.86%	0	0%
WV	F	322	24	5	20.83%	12	50.00%	7	29.17%

Terminations in 2017

State	Gender	Total Term.	Term. Under 30	% Term. Under 30	Term. 30-50	% Term. 30-50	Term. Over 50	% Term. Over 50
AR	M	9	0	0%	3	33.33%	6	66.67%
AR	F	2	0	0%	1	50.00%	1	50.00%
CA	M	0	0	0%	0	0%	0	0%
CA	F	0	0	0%	0	0%	0	0%
DC	M	1	0	0%	0	0%	1	100.00%
DC	F	0	0	0%	0	0%	0	0%
FL	M	1	0	0%	0	0%	1	100.00%
FL	F	0	0	0%	0	0%	0	0%
IL	M	3	0	0%	1	33.33%	2	66.67%
IL	F	1	0	0%	1	100.00%	0	0%
IN	M	93	14	15.05%	41	44.09%	38	40.86%
IN	F	13	0	0%	7	53.85%	6	46.15%
KS	M	0	0	0%	0	0%	0	0%
KS	F	0	0	0%	0	0%	0	0%
KY	M	16	0	0%	0	0%	16	100.00%
KY	F	4	0	0%	0	0%	4	100.00%
LA	M	43	4	9.30%	15	34.88%	24	55.81%
LA	F	21	3	14.29%	12	57.14%	6	28.57%
MI	M	84	7	8.33%	29	34.52%	48	57.14%
MI	F	8	1	12.50%	3	37.50%	4	50.00%
MO	M	0	0	0%	0	0%	0	0%
MO	F	0	0	0%	0	0%	0	0%
NC	M	0	0	0%	0	0%	0	0%
NC	F	0	0	0%	0	0%	0	0%
NE	M	0	0	0%	0	0%	0	0%
NE	F	0	0	0%	0	0%	0	0%
NY	M	0	0	0%	0	0%	0	0%
NY	F	0	0	0%	0	0%	0	0%
OH	M	553	52	9.40%	215	38.88%	286	51.72%
OH	F	120	14	11.67%	52	43.33%	54	45.00%
OK	M	60	9	15.00%	28	46.67%	23	38.33%
OK	F	18	4	22.22%	4	22.22%	10	55.56%
OR	M	0	0	0%	0	0%	0	0%
OR	F	0	0	0%	0	0%	0	0%
PA	M	2	0	0%	1	50.00%	1	50.00%
PA	F	0	0	0%	0	0%	0	0%
TN	M	4	0	0%	0	0%	4	100.00%
TN	F	1	0	0%	0	0%	1	100.00%
TX	M	107	19	17.76%	29	27.10%	59	55.14%
TX	F	14	1	7.14%	2	14.29%	11	78.57%
VA	M	39	3	7.69%	7	17.95%	29	74.36%
VA	F	9	0	0%	0	0%	9	100.00%
WV	M	96	11	11.46%	24	25.00%	61	63.54%
WV	F	28	2	7.14%	8	28.57%	18	64.29%

**Turnover in 2017**

State	Gender	Turnover % Under 30	Turnover % 30-50	Turnover % Over 50
AR	M	0%	0.92%	1.85%
AR	F	0%	3.57%	3.57%
CA	M	0%	0%	0%
CA	F	0%	0%	0%
DC	M	0%	0%	33.33%
DC	F	0%	0%	0%
FL	M	0%	0%	33.33%
FL	F	0%	0%	0%
IL	M	0%	1.54%	3.08%
IL	F	0%	20.00%	0%
IN	M	1.59%	4.65%	4.31%
IN	F	0%	4.02%	3.45%
KS	M	0%	0%	0%
KS	F	0%	0%	0%
KY	M	0%	0%	4.79%
KY	F	0%	0%	10.00%
LA	M	0.53%	2.00%	3.20%
LA	F	1.26%	5.04%	2.52%
MI	M	0.62%	2.57%	4.25%
MI	F	0.54%	1.62%	2.16%
MO	M	0%	0%	0%
MO	F	0%	0%	0%
NC	M	0%	0%	0%
NC	F	0%	0%	0%
NE	M	0%	0%	0%
NE	F	0%	0%	0%
NY	M	0%	0%	0%
NY	F	0%	0%	0%
OH	M	1.09%	4.49%	5.98%
OH	F	0.97%	3.60%	3.73%
OK	M	0.71%	2.20%	1.81%
OK	F	1.27%	1.27%	3.16%
OR	M	0%	0%	0%
OR	F	0%	0%	0%
PA	M	0%	7.14%	7.14%
PA	F	0%	0%	0%
TN	M	0%	0%	6.35%
TN	F	0%	0%	11.11%
TX	M	0.90%	1.37%	2.79%
TX	F	0.32%	0.64%	3.51%
VA	M	0.34%	0.80%	3.32%
VA	F	0%	0%	6.87%
WV	M	0.60%	1.31%	3.33%
WV	F	0.62%	2.48%	5.59%

## **Appendix 18: G4-LA2 - Benefits provided to full-time employees that are not provided to temporary or part-time employees**

### **Benefits Available to Full and Part-Time Employees**

Medical  
Dental  
Vision  
Health Savings Account (HSA)  
Employee Assistance Program  
Retirement-defined benefit pension plan  
Savings - 401k plan  
Flexible Spending Account (Health Care & Dependent Care)  
Vacation  
Leave of Absence  
Long-term Care Insurance  
Group Legal plan  
Auto/Homeowners/Pet insurance  
Vacation Donation Program  
Vacation Purchase Program  
Cancer Navigation Service  
Hearing and Vision discount programs  
Travel Assistance program  
Military leave  
Corporate Wellness Program-including Care Management Programs  
Financial Counseling  
Student Loan Refinancing Program

### **Additional Benefits Available to Full-Time Employees Only**

Life insurance  
Accidental Death & Dismemberment  
Critical Illness and Accident Insurance  
Holidays/Personal Days Off  
Sick Pay  
Long Term Disability  
Phased Retirement Program  
Educational Assistance  
Adoption Assistance  
Paid Parental Leave  
Dependent scholarships

**Appendix 19: G4-LA3 - Return to work and retention rates after parental leave**

	Male	Female	Notes
Report the number of employees by gender who were entitled to parental leave.	14,314	3,236	All full time actively at work male employees are eligible for AEP paternity leave benefits and full time actively at work females are eligible for AEP sick pay benefits. As such, finding the total number of individuals eligible for the benefit can be found by taking a full time headcount as of the end of each month in 2017 and dividing by 12.
Report the number of employees by gender who took parental leave.	319	48	The number of male employees who took parental leave was determined by querying time reporting within PeopleSoft and determining how many individuals had used the 'PAT' or 'PATF' code during the 2017 calendar year.  As females do not use the time codes outlined above (their parental leaves can be coded as sick, FMLA and vacation in PeopleSoft) a query was written against the HR Recovery Center's Lotus Notes database looking for individuals who had a leave of absence in 2017 with a pregnancy ICD9 code. (Usually 650, V22, 080- 082 or 000-099) A query was also written against the new Integrated Disability Recovery Center Database (Absence Tracker) looking for individuals who may have had a pregnancy/maternity leave reason in the 2017 calendar year.
Report the number of employees who returned to work after parental leave ended, by gender.	318	45	These are the number of employees who both went out on a parental leave in 2017 and returned to work. To determine males return to work rate the number of individuals who had coded 'PTA' or 'PTAF' in the PeopleSoft time reporting system for 2017 were run against a current active employee roster from PeopleSoft. Any individuals who were no longer listed as active were reviewed to see if they had coded regular hours after their last coding of 'PTA' or 'PTAF' hours in 2017.  Females who were listed in the HR Recovery Center Lotus Notes or Absence Tracker databases with a pregnancy ICD9 code were then checked against PeopleSoft time data to see if regular hours had been coded during the month of January 2018. Any individuals who did not have regular hours coded in 2018 were reviewed to see if they had returned to work.
Report the number of employees who returned to work after parental leave ended who were still employed 12 months after their return to work by gender.	125	4	Individuals who had their last hours coded to 'PAT' or 'PATF' January through March of 2017 and are still active in PeopleSoft as of April 2018 were considered employed for a year after their leave had ended.  For females, a query was run against the HR Recovery Center Lotus Notes database looking for individuals who began their maternity leave in Jan through March of 2017. Those individuals were then checked against PeopleSoft to see if they remain active employees as of April 2018.
Return To Work Rate	100%	94%	This rate was determined by dividing the total number of employees who had returned to work (question 2.3) by the total number of employees who had taken parental leave. (question 2.2)
Retention Rate	89%	94%	These rates are determined by taking the number of parental leaves that began during the months of January through March of 2017 and dividing by the number of employees still employed at AEP as of April 2018.

**Appendix 20: G4-LA9 - Average hours of training per year per employee**

<b>Employee Category</b>	<b>HOURS</b>	<b>STUD_COUNT</b>	<b>AVG_HOURS</b>
Administrative Support Workers	14,855.51	1,210	12.28
Craft Workers	459,578.53	5,656	81.26
Executive/Sr Level Officials	4,703.02	222	21.18
First/Mid-Level Officials	158,538.97	3,024	52.43
Laborers and Helpers	3,826.15	60	63.77
No EEO-1 Reporting	24,301.11	840	28.93
Operatives	38,866.11	555	70.03
Professionals	177,981.92	5,496	32.38
Service Workers	1,947.27	25	77.89
Technicians	101,087.70	1,647	61.38
<b>Total</b>	<b>985,686.29</b>		

**Appendix 21: G4-LA10 – Programs for skills management and lifelong learning**

**Training**

AEP provides a broad range of training and assistance that supports lifelong learning and transition support. Programs develop knowledge, competencies and learning that collectively benefit our employees, the business objectives of AEP and the communities we serve.

Our knowledge and skills development strategy is accomplished through our processes for ongoing performance coaching, operational skills training, resources supporting our commitment to environment, safety and health (ESH), job progression training, our tuition assistance program, and KEY, our corporate-wide learning management system.

**Performance Coaching** is an ongoing process designed to increase communication between employees and managers around performance and development. It is divided into three phases: Phase 1 - Plan; Phase 2 - Coach; and Phase 3 - Review. During the planning phase, the employee collaborates with his or her manager to create a performance plan for the year. This plan includes performance goals, competencies and values importance to success, and development goals that can upgrade skills, boost performance and increase job satisfaction. In the coaching phase, the manager and employee meet regularly to discuss progress toward the plan they created. These two-way conversations provide opportunities to recognize positive results, discuss opportunities for improvement and provide new direction. During the review phase, both the employee and manager assess and discuss the employee’s performance for the year, focusing on performance goals, competencies and values and development goals.

**Operational Skills Training:** AEP offers a wide range of skills to ensure skills needed for effective performance and safe operations. Examples include:

Distribution provides the training for technical personnel responsible for designing distribution facilities and enables technicians to be better designers. Distribution also provides distribution line, dispatch and meter training for personnel to enhance performance in safety, reliability, and productivity. AEP's distribution line apprentice training program is certified by the U.S. Department of Labor.

Fossil and Hydro Generation and the Nuclear Generation Organizations provide employee development and learning services for employees in the areas of technical, safety, environmental, business and front line leadership training. Fossil & Hydro Generation has implemented individualized Learning Plans in the Learning Management System based on work location training needs and job responsibilities. The goal is to develop a Learning Culture where employees are involved in their personal development and learning by understanding what training is needed.

AEP's Projects, Controls and Construction (PC&C) Organization conducts a Project Management Certification program focused on basic and advanced project management principles to provide opportunities for individual development as well as to obtain the industry recognized and PMI sponsored, PMP (Project Management Professional) certification. Additionally, PC&C sponsors internal project management courses to enhance the ongoing professional development of project managers within AEP. These courses are consistent with the Project Management Body of Knowledge (PMBOK®) and allow PMP (Project Management Professional) credential holders to gain professional development continuing education credit. PC&C also provides formal leadership development and cultural education programs that foster high impact leaders and a high performing culture.

AEP's Generation Engineering Services (GES) Organization provides opportunities for the Professional Engineer (PE) certification, continuing education requirements. The opportunities are based on PE State Board requirements for continuing education, as developed by individual State Legislation. Additionally, GES sponsors internal engineering courses, as well as workshops, to enhance the ongoing professional development of all corporate engineers and technicians.

The AEP Transmission Training Center serves Transmission field employees across eleven states of AEP's service territory. The Training Center's technical program is delivered in training blocks that align with an employee's progression. Students receive a balanced hybrid of electronic-learning, classroom instruction, and dynamic hands on learning activities in an environment that provides for the application of electrical concepts in a fail-safe environment. Special emphasis is placed on developing fundamental and advanced skills with a strong emphasis on safety and human performance error reduction techniques. This unique training environment allows employees to gain operational experiences, as well as correct and learn from errors without negative impacts to business facilities or their safety and well-being.

Transmission provides skills training to Transmission Line Mechanics, Substation Electricians, and Protection and Control Technicians. Classes are designed to train employees from the entry level to the "journey" level of expertise. All technical skills programs at the AEP Transmission Training Center take place on the 14-acre A. Ray King Training Campus, which features operational and simulated 69-kV to 765-kV lines and indoor substations with digital and electromechanical relay protection. An energized 345-kV line is available on the property for live-line and bare hand experience.

Ethics & Compliance offers training to foster an ethical culture, including AEP's Principles of Business Conduct, FERC Standards of Conduct, FERC Affiliate Restriction Rules, Sarbanes Oxley, antitrust, conflicts of interest, and insider trading.

Human Resources offers training and development in leadership skills, diversity, generational differences, and unlawful harassment for all levels of staff. In addition, AEP offers extensive on-line training resources to all employees in the technical, safety, security, business, ethics and personal skill development areas.

Transmission Operations (TOPs) provides training to our real-time Transmission System Operators and Transmission Dispatchers. We use a systematic approach to training which improves the skills of real-time personnel (performing, as appropriate, the functions of Transmission Operator) who are responsible for real-time system operations; which complies with North American Reliability Corporation (NERC) Standards and the applicable Regional Reliability Standards. The training program (initial and continuing) is designed to train employees from the entry level to the "journey" level of expertise. This training program is structured to ensure all operating personnel have an opportunity to learn principles, concepts and specific tasks required to operate the Bulk Electric System.

**Resources for ES&H:** No aspect of operations is more important than the health and safety of people. Our customers' needs are met in harmony with environmental protection. AEP has implemented a multi-faceted approach to safety and health promotion, including many behavior based initiatives such as:

- HPI (Human Performance Improvement) - Human performance improvement is about helping individuals maintain control of workplace situations through the use of error reduction tools. Training and tools on human performance improvement are regularly being implemented across several areas of American Electric Power.
- Wellness - Healthy living habits are an essential ingredient for healthy employees. For that reason, AEP sponsors a number of programs and initiatives designed to help employees achieve and maintain a healthy lifestyle.
- Safety and Health Management System - SHEMS is an integrated system that allows AEP to manage all safety and health events in one system, resulting in common processes, terminology and information. It allows us to track preventative and corrective actions as well for timeliness.
- Serious Injuries and Fatalities (SIF) - events that meet established criteria and have caused or have the potential to cause severe harm to employees. While our goal is ZERO HARM, by placing emphasis on these 'most severe events' we can eliminate the major contributors that cause the greatest harm to our employees.
- Employee Job Site Observation (EJSO) - observing employees perform their tasks in the field remains a solid safety & health tool. We have begun the use of an electronic version that allows us to more quickly review the information which permits better sorting for trending purposes. Not only do we look at the 'at-risk' activity, which is immediately corrected; we also note the safe activities utilized which in turn are shared accordingly across AEP.
- Hazard Recognition - In order to protect our employees, everyone needs to get better at recognizing hazards. Since hazards are accidents just waiting to happen; through this program, employees are provided tools to recognize and mitigate job site hazards, as well as the accidents and incidents associated with those hazards.
- Risk Assessment - Risk Assessment addresses how to evaluate control measures to protect us from harm while doing our work.
- JHA - Job Hazard Analysis. The JHA tool is a place to capture the tasks, steps, hazards and controls for the most hazardous jobs within Fossil & Hydro.
- JSA - Job Safety/Site Assessment is a process that helps us look at how to perform a job safely from beginning to end.

**Job Progression training** is defined by each business unit (i.e. Transmission, Distribution, Generation, etc.), specific to position responsibilities and the work environment. As an example, progression in field positions for maintenance, operations, and electrical work takes several years. After an initial new-hire orientation, employees learn their job through classroom training, on-the-job instruction, video instruction, observation, mentoring, and job experience. Advancement criteria can include slot availability, time in grade, skills demonstrations and knowledge testing.

**Educational Assistance:** To meet the demands of a competitive, technology driven economy, AEP invests in our workforce through our Educational Assistance Program. This program provides financial reimbursement to eligible employees, encouraging them to equip themselves with the training and knowledge they need to excel in their careers at AEP and their lives beyond AEP.

**KEY** is an on-demand learning management system (LMS) that provides access to learning resources including 24/7 access to online courses, registration for live learning events and tracking and reporting of the training activities. This Web-based system is used to schedule, launch, and track training for employees and contractors.

**Transition Assistance:**

AEP also provides transition assistance including retirement counseling and severance pay for those whose employment has been involuntarily terminated, typically as part of a restructuring. Severance pay amounts are determined based on years of service. To illustrate, when circumstances such as a plant closing occur, we bring forward special career transition support including job search training/counseling, networking assistance to identify other local employers, and internal job placement and relocation assistance where applicable. These programs benefit the impacted employee, the community in which he/she serves and the overall morale of the workforce.

**Cultural Transformation:** AEP is involved in a cultural transformation designed to help us be even more effective at living our values and getting even better results. Cultural education increases effectiveness at the individual level, improves team performance, and helps people work together across the organization.

**Appendix 22: G4-LA11 – Percentage of employees receiving regular performance and career development reviews**

Gender	Employee's w/Performance Coaching Forms	Total Employees	% of Total Employee's with Forms
Male	9,453	14,418	66%
Female	2,855	3,299	87%
<b>Total</b>	<b>12,308</b>	<b>17,717</b>	<b>70%</b>

**Appendix 23: G4-LA12 – Composition of governance bodies and breakdown of employees per category**

Employee Category	Total Employees	Male	Male %	Female	Female %
Executive/Senior Level Officials	218	182	83.49%	36	16.51%
First/Mid-Level Officials	3,010	2,589	86.01%	421	13.99%
Professionals	5,413	3,980	73.53%	1,433	26.47%
Technicians	1,629	1,479	90.79%	150	9.21%
Administrative Support Workers	1,172	145	12.37%	1,027	87.63%
Craft Workers	5,622	5,461	97.14%	161	2.86%
Operatives	569	519	91.21%	50	8.79%

Laborers and Helpers	60	57	95	3	60
Service Workers	24	6	25	18	24
<b>Total</b>	<b>17,717</b>	<b>14,418</b>	<b>81%</b>	<b>3,299</b>	<b>19%</b>

Employee Category	Total Employees	American Indian	American Indian %	Asian	Asian %	Black	Black %	Hispanic	Hispanic %
Executive/Sr. Level Officials	218	0	0%	6	2.75%	5	2.29%	6	2.75%
First/Mid-Level Officials	3,010	36	1.2%	45	1.5%	116	3.85%	129	4.29%
Professionals	5,413	49	0.91%	250	4.62%	340	6.28%	290	5.36%
Technicians	1,629	30	1.84%	14	0.86%	81	4.97%	108	6.63%
Administrative Support Workers	1,172	18	1.54%	9	0.77%	194	16.55%	102	8.7%
Craft Workers	5,622	97	1.73%	5	0.09%	251	4.46%	535	9.52%
Operatives	569	3	0.53%	2	0.35%	51	8.96%	56	9.84%
Laborers and Helpers	60	1	1.67%	0	0%	8	13.33%	1	1.67%
Service Workers	24	0	0%	0	0%	3	12.5%	1	4.17%
<b>Total</b>	<b>17,717</b>	<b>234</b>	<b>1%</b>	<b>331</b>	<b>2%</b>	<b>1,049</b>	<b>6%</b>	<b>1,228</b>	<b>7%</b>

## AEP Employee Representation\*

as of Dec. 31, 2017	Employees	Females	%	Minorities	%
Total Employment	17,716	3,299	19%	3,014	17%
Officials & Managers	3,228	457	14%	363	11%
Professionals	5,413	1,433	26%	995	18%

as of Dec. 31, 2016	Employees	Females	%	Minorities	%
Total Employment	17,701	3,222	18%	2,712	15%
Officials & Managers	3,176	419	13%	312	10%
Professionals	5,119	1,349	26%	821	16%

\* Does not include all AEP subsidiaries, co-ops and interns, AEP Energy and employees on unpaid leave-of-absence.

## AEP Workforce Demographics



### 2017

- **24%** Millennials (Generation Y, 1982&after)
- **51%** Generation X (1961–1981)
- **25%** Baby Boomers (1943–1960)
- **<1%** Traditionalist (1942&before)

### Appendix 24: G4-LA13 – Ratio of basic salary and remuneration of women to men

Employee Category	State	Female Average Salary	Male Average Salary	Female/Male % Average Salary	Female Average Remuneration	Male Average Remuneration	Female/Male % Average Remuneration
Executive/Sr Level Officials	IN	\$0	\$236,527	0%	\$0	\$783,576	0%
Executive/Sr Level Officials	KY	\$0	\$208,976	0%	\$0	\$608,066	0%
Executive/Sr Level Officials	LA	\$445,000	\$216,460	2.1%	\$2,460,362	\$621,112	4.0%
Executive/Sr Level Officials	MI	\$185,997	\$261,935	0.7%	\$549,820	\$917,304	0.6%
Executive/Sr Level Officials	OH	\$261,337	\$258,350	1.0%	\$930,651	\$954,321	1.0%
Executive/Sr Level Officials	OK	\$0	\$222,405	0%	\$0	\$691,138	0%
Executive/Sr Level Officials	TX	\$272,500	\$213,878	1.3%	\$911,873	\$634,816	1.4%
Executive/Sr Level Officials	VA	\$0	\$237,919	0%	\$0	\$763,737	0%
Executive/Sr Level Officials	WV	\$221,400	\$241,536	0.9%	\$663,822	\$751,834	0.9%

First/Mid-Level Officials	AR	\$107,932	\$110,652	1.0%	\$233,510	\$249,891	0.9%
First/Mid-Level Officials	IN	\$102,640	\$108,680	0.9%	\$232,948	\$254,269	0.9%
First/Mid-Level Officials	KY	\$104,797	\$101,538	1.0%	\$236,774	\$242,118	1.0%
First/Mid-Level Officials	LA	\$111,325	\$117,670	0.9%	\$251,709	\$268,653	0.9%
First/Mid-Level Officials	MI	\$114,789	\$121,609	0.9%	\$258,970	\$291,476	0.9%
First/Mid-Level Officials	OH	\$130,341	\$121,188	1.1%	\$304,271	\$287,680	1.1%
First/Mid-Level Officials	OK	\$125,004	\$118,747	1.1%	\$290,724	\$274,146	1.1%
First/Mid-Level Officials	TX	\$115,792	\$112,641	1.0%	\$268,027	\$263,489	1.0%
First/Mid-Level Officials	VA	\$113,180	\$106,880	1.1%	\$254,745	\$248,441	1.0%
First/Mid-Level Officials	WV	\$104,786	\$106,166	1.0%	\$235,416	\$244,197	1.0%
Professionals	AR	\$84,893	\$93,648	0.9%	\$190,222	\$204,394	0.9%
Professionals	IN	\$72,470	\$87,397	0.8%	\$154,939	\$193,612	0.8%
Professionals	KY	\$72,649	\$86,941	0.8%	\$154,580	\$192,916	0.8%
Professionals	LA	\$79,145	\$91,478	0.9%	\$171,638	\$202,015	0.8%
Professionals	MI	\$84,405	\$103,150	0.8%	\$183,075	\$229,992	0.8%
Professionals	OH	\$84,202	\$94,288	0.9%	\$180,250	\$205,419	0.9%
Professionals	OK	\$77,933	\$90,774	0.9%	\$166,902	\$197,452	0.8%
Professionals	TX	\$79,901	\$86,621	0.9%	\$173,107	\$191,601	0.9%
Professionals	VA	\$74,505	\$87,668	0.8%	\$159,028	\$191,095	0.8%
Professionals	WV	\$75,173	\$92,874	0.8%	\$161,117	\$203,871	0.8%
Technicians	AR	\$78,208	\$78,049	1.0%	\$175,235	\$175,231	1.0%
Technicians	IN	\$69,007	\$69,669	1.0%	\$151,414	\$160,794	0.9%
Technicians	KY	\$80,608	\$71,969	1.1%	\$176,691	\$167,350	1.1%
Technicians	LA	\$56,217	\$69,491	0.8%	\$121,768	\$157,571	0.8%
Technicians	MI	\$68,541	\$81,128	0.8%	\$157,955	\$190,275	0.8%
Technicians	OH	\$60,485	\$69,615	0.9%	\$132,800	\$157,312	0.8%
Technicians	OK	\$64,558	\$72,447	0.9%	\$137,855	\$165,838	0.8%
Technicians	TX	\$56,074	\$73,515	0.8%	\$122,966	\$172,574	0.7%
Technicians	VA	\$61,570	\$68,950	0.9%	\$135,333	\$155,442	0.9%
Technicians	WV	\$68,005	\$73,780	0.9%	\$151,369	\$168,927	0.9%
Administrative Support Workers	AR	\$46,893	\$0	1%	\$98,285	\$0	1%
Administrative Support Workers	IN	\$49,260	\$48,145	1.0%	\$104,739	\$106,870	1.0%
Administrative Support Workers	KY	\$49,284	\$0	1%	\$105,413	\$0	1%
Administrative Support Workers	LA	\$42,612	\$40,855	1.0%	\$90,386	\$86,198	1.0%
Administrative Support Workers	MI	\$49,758	\$0	1%	\$109,853	\$0	1%
Administrative Support Workers	OH	\$45,928	\$40,833	1.1%	\$96,478	\$85,687	1.1%

Administrative Support Workers	OK	\$43,468	\$42,773	1.0%	\$91,668	\$90,000	1.0%
Administrative Support Workers	TX	\$45,596	\$45,434	1.0%	\$98,659	\$97,703	1.0%
Administrative Support Workers	VA	\$51,125	\$41,227	1.2%	\$107,722	\$85,148	1.3%
Administrative Support Workers	WV	\$42,210	\$39,984	1.1%	\$89,169	\$84,099	1.1%
Craft Workers	AR	\$78,936	\$77,258	1.0%	\$172,880	\$178,024	1.0%
Craft Workers	IN	\$61,850	\$68,946	0.9%	\$137,893	\$164,742	0.8%
Craft Workers	KY	\$59,738	\$70,914	0.8%	\$138,500	\$170,756	0.8%
Craft Workers	LA	\$64,177	\$73,454	0.9%	\$143,030	\$175,407	0.8%
Craft Workers	MI	\$63,256	\$72,418	0.9%	\$147,365	\$174,769	0.8%
Craft Workers	OH	\$63,446	\$70,299	0.9%	\$139,247	\$165,953	0.8%
Craft Workers	OK	\$69,959	\$75,068	0.9%	\$163,246	\$177,088	0.9%
Craft Workers	TX	\$61,418	\$72,912	0.8%	\$138,809	\$177,708	0.8%
Craft Workers	VA	\$61,281	\$69,480	0.9%	\$132,665	\$160,531	0.8%
Craft Workers	WV	\$66,833	\$69,745	1.0%	\$151,368	\$164,169	0.9%
Operatives	AR	\$46,717	\$72,760	0.6%	\$98,995	\$168,527	0.6%
Operatives	IN	\$50,849	\$44,181	1.2%	\$105,376	\$92,806	1.1%
Operatives	KY	\$42,786	\$45,153	0.9%	\$86,177	\$98,121	0.9%
Operatives	LA	\$0	\$54,926	0%	\$0	\$126,115	0%
Operatives	MI	\$52,790	\$66,999	0.8%	\$117,256	\$149,399	0.8%
Operatives	OH	\$39,119	\$40,744	1.0%	\$81,602	\$85,836	1.0%
Operatives	OK	\$50,794	\$48,242	1.1%	\$108,734	\$102,261	1.1%
Operatives	TX	\$51,166	\$61,067	0.8%	\$110,532	\$140,025	0.8%
Operatives	VA	\$30,590	\$45,854	0.7%	\$65,713	\$98,838	0.7%
Operatives	WV	\$59,946	\$46,196	1.3	\$126,645	\$100,578	1.3%
Laborers and Helpers	TX	\$39,520	\$39,295	1.0%	\$83,629	\$84,849	1.0%
Laborers and Helpers	WV	\$43,694	\$42,740	1.0%	\$87,388	\$88,679	1.0%
Service Workers	AR	\$49,588	\$0	1.0%	\$104,258	\$0	1%
Service Workers	LA	\$34,324	\$0	1.0%	\$74,951	\$0	1%
Service Workers	OH	\$55,000	\$0	1.0%	\$115,472	\$0	1%
Service Workers	WV	\$43,694	\$43,694	1.0%	\$92,738	\$93,636	1.0%

**Appendix 25: G4-HR2 - Total hours of employee training on policies and procedures concerning aspects of human rights that are relevant to operations, including the percentage of employees trained**

AEP sponsors a wide variety of training programs for employees and contractors who work on company property to insure a workplace that respects the dignity of people. AEP has received numerous awards from organizations, including receiving multiple awards for maintaining policies and procedures that enable working mothers to care for their children, awards from the National Council for Executive Women that recognizes the extent to which AEP has hired and/or promoted female executives, and an award from the Human Rights Campaign Foundation recognizing AEP for its commitment to lesbian, gay, bisexual, and transgender (LGBT) workplace equality.

All employees receive a copy of the Employee Handbook during the on-boarding process. The Employee Handbook contains a variety of policies, such as AEP's Policy Prohibiting Harassment, AEP's Principles of Business Conduct, and policies that relate to diversity and ethics in the workplace. An updated and revised Employee Handbook was issued in early 2014,

which contains these policies. All employees, as part of annual Code of Conduct training, are required to acknowledge responsibility for familiarity and compliance with the handbook and its policies.

The Company also periodically conducts mandatory training programs that address diversity, harassment, and ethics. AEP periodically provides a 30 minute Diversity refresher course to selected business unit employees and contractors.

AEP sponsors periodic harassment training that is designed to educate employees and contractors about the problems associated with workplace harassment issues, and the importance of promptly reporting any conduct that might appear to be objectionable to appropriate supervisory and/or managerial employees. Refresher programs, varying in length from an hour to 90 minutes, are conducted each year to various business unit employees and contractors.

Employees who are promoted to supervisory positions for the first time, are required to complete harassment training and Diversity in the Workplace training.

The AEP Ethics & Compliance (E&C) Department sponsors training programs on a variety of topics under the umbrella of Principles of Business Conduct. All company employees and contractors are required to complete these training programs.

**Number of employees that received training on anti-corruption: 20,113 (100%)**

**Number of employees that received communications on anti-corruption policies and procedures: 20,113 (100%)**

**Number of Governance Body Members that received communications on the Organization's Anti-Corruption Policies and Procedures: 12 (100%)**

#### **Appendix 26: G4-HR3 - Total number of incidents of discrimination and corrective actions taken**

In 2017, a total of seven charges were filed with the EEOC or applicable state agency. Three of the charges were dismissed with "no probable cause" findings; four charges remain pending before the respective agency. The sum of the breakdown exceeds the total number of charges due to the fact that some of the charges allege multiple bases of discrimination.

Disability – 10

Age – 7

Race – 7

Gender – 4

National Origin – 0

Retaliation – 12

Religion - 0

#### **Appendix 27: G4-HR4 – Operations and suppliers identified in which the right to exercise freedom of association and collective bargaining may be violated**

All union-represented AEP employees are covered by collective bargaining agreements which contain clauses prohibiting strikes and lockouts. Disputes between the parties may be submitted to binding arbitration before a neutral arbitrator.

#### **Appendix 28: G4-PR5 – Results of surveys measuring customer satisfaction**

External customer satisfaction tracking for AEP and its seven operating companies is measured throughout the year. Residential, Commercial, Call Center and Web Transactional surveys are fielded continually throughout the year with results available real time. Summary reports are reported quarterly. Larger Commercial & Industrial Managed Accounts surveys are administered and reported semi-annually.

Residential, Commercial, Call Center and Web Transactional surveys are administered via telephone interviews and online surveys conducted by a third party market research vendor. Use of an independent third party to field these surveys adds to the impartiality and credibility of the data collected.

Residential and commercial customer satisfaction surveys are fielded using a random selection of active customer records from AEP's customer information system (CIS). Land line, cellular telephone numbers and customer email addresses are included. National "do not call" lists as well as specific AEP "do not call" lists are also integrated into the research vendor's sample management processes. Quotas are set at the individual operating company and at an individual Call Center level.

Call Center and Web Transactional customer surveys are administered using completed transaction records obtained nightly from each of AEP's six call centers. Quotas are set at the individual AEP call center.

Larger Commercial and Industrial Managed Account surveys are fielded via an online survey administered by AEP's Performance Management group and generally consists of 750 kW demand or greater managed commercial and industrial customers.

All four customer satisfaction tracking surveys provide opportunity for those customers to provide feedback to AEP, either anonymously or identified by actual customer. In order to be tagged to a specific account that customer must specifically consent to share their identity with AEP. Customer survey feedback is both in the form of responses to quantitative (scaled) survey items as well as qualitative (open-ended) comments. Residential, Commercial and Transactional surveys contain a 'triage' capability. If the customer wishes AEP to contact them regarding the source of their dissatisfaction, Action Alerts are generated and communicated to AEP overnight for immediate entry into AEP's customer complaint database and follow-up. The Larger Commercial and Industrial Managed Accounts survey also provides a similar feedback mechanism in the event that a dissatisfied customer is surveyed and agrees to share their particular issues with AEP.

Additional channels of capturing customer feedback include comments provided to the company through the [AEP.com](http://AEP.com) internet site, individual AEP operating company internet sites, e-mail communications, social media posts, letters and telephone calls. Complaints or issues needing remediation are entered into a formal complaints tracking database to ensure timely and thorough follow-up.

AEP Customer Satisfaction Results - 2016 Survey Results	
Survey Type	Percent Satisfied
Residential	86.2%
Commercial	86.8%
Larger Commercial and Industrial Managed Accounts	83.8%
Call Center and Web Transactions	82.6%

**Percent Satisfied:**

**Residential and Commercial:** Ratings of 'Somewhat Satisfied' and 'Very Satisfied' on a 5 point scale ('Very Dissatisfied', 'Somewhat Dissatisfied', 'Neither Dissatisfied' nor 'Satisfied', 'Somewhat Satisfied', and 'Very Satisfied') for the question "Based on your overall experience with AEP's service, how satisfied are you with having them as your electric company?"

Larger Commercial and Industrial Managed Accounts: Percent of 'Consistently Good' and 'Excellent' ratings on a five point rating scale for the question "Please rate how your electric utility performed relative to your expectations." The five point rating scale for this study is 'Needs Major Improvement', 'Needs Improvement', 'Satisfactory', 'Consistently Good' and 'Excellent'.

Call Center and Web Transactions: Ratings of ‘Somewhat Satisfied’ and ‘Very Satisfied’ on a 5 point scale (‘Very Dissatisfied’, ‘Somewhat Dissatisfied’, ‘Neither Dissatisfied’ nor ‘Satisfied’, ‘Somewhat Satisfied’, and ‘Very Satisfied’) for the question “In summary, thinking about your most recent call/online experience to AEP from the time you called until your request was completed, how satisfied were you with this experience?”

**Appendix 29: G4-DMA – Demand-side management programs including residential, commercial, institutional and industrial programs.**

Operating Company	Energy Efficiency/Demand Response Program
AEP Ohio	EM&V
AEP Ohio	Efficient Products for Business
AEP Ohio	Process Efficiency
AEP Ohio	New Construction
AEP Ohio	Express
AEP Ohio	Self-Direct
AEP Ohio	Retro-commissioning
AEP Ohio	Continuous Energy Improvement (CEI)
AEP Ohio	Energy Efficiency Auction
AEP Ohio	Data Center
AEP Ohio	Consolidated Outreach
AEP Ohio	Transmission and Distribution (T&D) Loss Reduction Program
AEP Ohio	Combined Heat and Power and Waste Energy Recovery- CHP/WER
AEP Ohio	Business Outreach
AEP Ohio	Efficient Financing Program for Business
AEP Ohio	Efficient Products
AEP Ohio	Appliance Recycling
AEP Ohio	Behavior Change
AEP Ohio	New Home Program
AEP Ohio	e3smartSM
AEP Ohio	Community Assistance
AEP Ohio	Intelligent Home Energy Assistance and Demand Response

AEP Ohio	New Energy Efficient Manufactured Home
AEP Ohio	Efficient Financing Program for Consumers
AEP Ohio	gridSMART Enabled EE/PDR Savings
AEP Ohio	Education and Training
AEP Ohio	Targeted Advertising
AEP Ohio	Agricultural
AEP Ohio	Community Energy Savers Program
AEP Ohio	Net Metering
AEP TX	CoolSaver A/C Tune-Up MTP
AEP TX	CoolSaver A/C Tune-Up MTP
AEP TX	High Performance New Homes MTP
AEP TX	EM&V
AEP TX	Commercial Solutions MTP
AEP TX	Commercial SOP
AEP TX	Load Management SOP
AEP TX	SCORE/City Smart MTP
AEP TX	SMART Source Solar PV MTP
AEP TX	Targeted Small Business MTP (OPEN)
AEP TX	Residential SOP
AEP TX	Hard-To-Reach SOP
AEP TX	Target Low-Income EE Program
AEP TX	SMART Source Solar PV MTP
AEP TX	Net Metering
APCo	Net Metering
APCo	Prescriptive C&I
APCo	PJM Load Management
APCo	Discretionary Buy Through
APCo	Direct Load Control

APCo	Efficient Products
APCo	Home Performance
APCo	Manufactured Homes Energy Star
APCo	Appliance Recycling
APCo	Low Income Weatherization
APCo	Net Metering
APCo	Voluntary Wind Service
APCo	Renewable Power Rider
APCo	Green Pricing Option Rider
APCo	EM&V
APCo	C&I Prescriptive
APCo	C&I Custom
APCo	PJM Load Management
APCo	Escore
APCo	Manufactured Homes Energy Star
APCo	Appliance Recycling
APCo	Low Income Weatherization
APCo	Direct Load Control
APCo	Efficient Products
APCo	Volt Var Optimization Pilot
APCo	Net Metering
I&M	EM&V
I&M	Small Business Efficiency Pilot
I&M	Work Custom Rebate Program
I&M	Work Direct Install Program
I&M	Work Prescriptive Rebate Program
I&M	PJM Load Management
I&M	PJM Load Management

I&M	Discretionary Buy Through
I&M	Home Appliance Recycling
I&M	Home Energy Management
I&M	Home Energy Products- Lighting Component
I&M	Home Energy Products- Products Component
I&M	Home Energy Reports
I&M	Income Qualified HER
I&M	UCA & Portal
I&M	Home New Construction
I&M	Home Online Energy Checkup
I&M	Home Weatherproofing Program
I&M	Income Qualified Weatherproofing Program
I&M	School Energy Education
I&M	Electric Energy Consumption Optimization (EECO)
I&M	Net Metering
I&M	Green Power Rider
I&M	Small Business Efficiency Pilot
I&M	Work Custom Rebate Program
I&M	Work Direct Install Program
I&M	Work Prescriptive Rebate Program
I&M	C&I Education
I&M	School Energy Education
I&M	Home Appliance Recycling
I&M	Home Energy Management
I&M	Home Energy Products- Lighting Component
I&M	Home Energy Products- Products Component
I&M	Home Energy Reports
I&M	Home Online Energy Checkup

I&M	Home Weatherproofing Program
I&M	Income Qualified Weatherproofing Program
I&M	Electric Energy Consumption Optimization (EECO)
I&M	Net Metering
KPCO	PJM Load Management
KPCO	Targeted Energy Efficiency
KPCO	Net Metering
KY	Renewable Power Option Rider
PSO	EM&V
PSO	Business Demand Response (Peak Performers)
PSO	High Performance Business
PSO	Special Contract
PSO	Energy Savings Products
PSO	Education
PSO	High Performance Homes
PSO	Home Weatherization
PSO	Power Hours
PSO	Behavior Program
PSO	Conservation Voltage Reduction
PSO	Net Metering
PSO	Green Energy Choice
SWEPCO	EM&V
SWEPCO	Load Management SOP
SWEPCO	Commercial & Industrial Energy Efficiency Program (CIEEP)
SWEPCO	Small Business Direct Install (SBDI) Program
SWEPCO	Special Contract
SWEPCO	Energy Efficiency Arkansas (EEA) - Statewide Program
SWEPCO	Online Audit Tool

SWEPCO	Residential Lighting and Appliance (RLA)
SWEPCO	Residential Energy Improvement Program (REIP)
SWEPCO	Home Performance with ENERGY STAR (HPwES)
SWEPCO	Net Metering
SWEPCO	EM&V
SWEPCO	Commercial Solutions
SWEPCO	Residential Solutions
SWEPCO	Income Qualified
SWEPCO	Net Metering
SWEPCO	EM&V
SWEPCO	Commercial Solutions Pilot MTP
SWEPCO	Commercial SOP
SWEPCO	Load Management SOP
SWEPCO	SCORE MTP
SWEPCO	Open MTP
SWEPCO	Special Contract
SWEPCO	On-Line Home Energy Checkup
SWEPCO	Residential SOP
SWEPCO	Hard-To-Reach SOP
SWEPCO	Net Metering

### Appendix 30: G4-EU12 – Transmission and distribution losses

#### Impacts of Transmission Facilities

The biodiversity impacts of transmission facility installation are often obvious. Construction activity, such as clearing vegetation and moving earth to build new facilities, totally removes or drastically decreases onsite biodiversity. These impacts are typically short-term, lasting only until the vegetation returns to the area, however, siting transmission line corridors can affect biodiversity through habitat fragmentation and alteration. The transmission corridors themselves may fragment the habitat, possibly preventing the movement of certain animals from one side to the other, due to the cleared vegetation. Transmission line rights-of-way often require tree removal for construction and maintenance. A variety of methods are used to maintain transmission corridors, such as mowing, hand cutting, trimming and herbicide use, to keep trees from growing into power lines and causing hazards and service interruptions. This loss of trees is also a loss of habitat for woodland and forest fauna and the biodiversity within these areas is altered, but in the process, new habitats are created that

are favored by a different group of plants and animals. These areas often become habitat for grass and shrub dependent species that have often lost habitat to other development, e.g., residential, commercial, industrial, agricultural, etc.

Transmission lines and related structures can also create collision hazards for birds. Avian interactions with transmission lines and structures are species and site specific and AEP monitors transmission lines in an effort to understand which birds are most susceptible to various lines. For example, the U.S. Fish and Wildlife Service required AEP to install marking devices on some spans of newly constructed transmission lines to prevent avian collisions. A line in the migratory flyway of the whooping crane was marked with aviation balls along approximately 40 miles of its length for this purpose, as was 6 miles of another line in the Attwater's prairie chicken historic habitat. Both bird species are endangered. Spiral markers have been installed on newly built transmission line spans that cross bays, estuaries, wetlands or other water bodies, at the request of the permitting authorities who thought the new lines could pose a collision potential to birds in general. At the request of the USFWS's Whooping Crane Coordinator at the Aransas National Wildlife Refuge, Texas, AEP marked approximately a mile of line that whooping cranes had been observed crossing in their descent to a wildlife feeder. The USFWS sees the resulting collision risk as a significant threat to the slowly recovering and only natural, self-sustaining population of whooping cranes.

Bird electrocutions occur on utility poles and towers as birds use these structures for perching, roosting and nesting. Fulfilling a commitment made in 2008 and to address situations such as those described above, AEP has completed the development of a system-wide Avian Protection Plan (APP). The intent of the APP is to comply with federal regulations, reduce the incidences of bird electrocutions and collisions with AEP-energized equipment, and to reduce the frequency of bird-caused outages. AEP applies protective devices to structures when outages have been caused by bird electrocutions and is building a database that will enable the identification of high risk structures so preventive measures may be taken.

#### Thermal Discharges

AEP operates coal-fired power plants that utilize once-through cooling of heated condenser water formed by waste heat in the steam cycle. The condenser water is cooled by passive heat transfer as water withdrawn from a river or lake is pumped into the condenser and returned (at a higher temperature) to the source waterbody. The potential ecological impacts of this heated water are addressed in each plant's NPDES permit. Many of the AEP plants utilizing once-through cooling have an approved Clean Water Act Section 316(a) variance, which signifies that a state regulatory agency has concluded that a balanced, indigenous biological community will be maintained in the source waterbody despite the discharge of cooling water at temperatures in excess of applicable water quality temperature criteria. Routinely, state agencies require that AEP provide a re-justification of this finding, based on recent water quality and biological studies.

The potential impacts of heated cooling water on biodiversity range from insignificant to temporarily significant, depending on prevailing river flow and ambient temperature conditions. During extreme drought events, the heated water can cause a temporary displacement of thermally-sensitive fish species in the immediate area where the thermal discharge mixes with the source waterbody. Typically, the biodiversity "balance" is restored after the extreme river flow and temperature conditions are removed. It should be noted that a long-term balanced biodiversity condition (despite temporary displacement of some species during rare environmental conditions) is one of the conditions that a discharger must demonstrate to a state agency in order to receive an approved 316(a) variance.

As an outcome of the final 316(b) and other rulemakings, AEP has closed several once-through cooled facilities and may be required to retrofit improved fish protection equipment at the remaining once-through cooled facilities. Such changes will reduce or eliminate potential impacts to thermally sensitive fish.

**Source Information** - FERC hydro relicensing studies; AEP Corp of Engineer 404 compliance programs (wetland mitigations); AEP Avian Protection Program. Cooling water intake impacts determined from plant 316(b) studies.

**Appendix 31: G4-EU13 – Biodiversity of offset habitats compared to the biodiversity of the affected areas**

If forested, freshwater or wetland ecosystem areas must be disturbed during the construction of new facilities, efforts are made to minimize the amount of habitat that is impacted. Once construction starts, disturbed areas that are of ecological value are replaced through compensatory mitigation.

AEP is required by the Clean Water Act to restore and maintain wetlands or habitat near lakes and rivers that are lost or destroyed due to the construction of new facilities. In the past, no data were available on the biodiversity of replacement forested or landscape areas, however, the Ohio Environmental Protection Agency (OEPA) conducted a comparison of mitigation and natural wetlands during 1995 (Fennessy and Roehrs 1997). In this assessment, the 20-acre wetland mitigation site at the former AEP Gavin Plant in Gallia County, OH, was assessed.

The Gavin mitigation wetlands were created in 1993 to replace those that were lost due to the construction of an FGD landfill. The OEPA reported that, “there was not a single case where a wetland impact had occurred and a corresponding mitigation project had not been done” (Fennessy and Roehrs 1997). This is consistent with how AEP mitigates disturbed habitats. It was also noted that there has been a surplus acreage for every acre of wetland impact. In other words, there is a net gain of wetland acreage; however, the minimum required mitigation acres were not always achieved. AEP was required to create 15 acres of wetlands at the Gavin site, while only 7.6 acres were achieved. It is believed that excess open-water areas decreased the amount of available wetlands.

While no significant differences were found in the diversity of wetland plants, there was a decrease in the diversity of native plants associated with the mitigation projects (Fennessy and Roehrs 1997). The Gavin site had 76 percent native plant species, while the average percent native species at the natural wetlands was 88 percent. In addition, the Gavin site is 50 percent open water, as compared to an average of 25 percent open water for the natural sites.

The study also found that mitigation projects, in general, do not measure up to natural sites with respect to flood-water retention, water quality improvement and habitat provision (Fennessy and Roehrs 1997). For example, at the Gavin site, 60 percent of soil samples were indicative of hydric soils, while an average of 80 percent of natural wetland samples indicated hydric or wetland-type soils. This could have been due to the young age of the mitigation wetlands (only 2 to 5 years old) at the time of the study and it was believed that this condition would improve as the wetlands age.

**Source Information** - Fennessy, S. and J. Roehrs. 1997. A functional assessment of mitigation wetlands in Ohio: Comparisons with natural systems. State of Ohio Environmental Protection Agency, Division of Surface Water. Columbus, OH.

**Appendix 32: G4-DMA – Programs and processes to ensure availability of a skilled workforce**

AEP's operations require a highly skilled workforce to perform a wide range of roles in a safe and efficient manner. To ensure the availability of the skilled workforce required, AEP uses a variety of programs and processes. Uses of these are dependent on individual business unit / department needs.

**Attraction programs or processes:**

- Troops to Energy – AEP participates in an effort to link veterans leaving military service to job openings in the energy industry.
- Recruiting friendly policies
- Pre-employment skill development through training alliances / school partnerships and co-op /internship programs
- College relations and recruiting
- Recruiting
- Utilization of our Employee Resource Group (ERG) members at diversity recruitment venue
- Connection with the Center for Energy Workforce Development and involved some state consortium
- Leverage or our membership in DirectEmployers, an employment network that reaches a diverse workforce

**Development programs or processes:**

- Skill / knowledge development (including technical training programs, apprenticeships and professional licenses and certificates)
- Tuition assistance – encourages employees to grow their knowledge and expertise
- Knowledge transfer / management (including communities of practice)
- Development opportunities (through development planning, job rotations, special assignments, online learning)
- Leadership Development
- Succession planning & targeted development programs
- Mentoring programs including our Legacy of Knowledge program
- Employee Resource Group (ERG) professional development programs

**Retention programs or processes:**

- Performance coaching
- Culture improvement activities
- Total compensation package
- Employee activities
- Company benefits including Health & Wellness and Work/Life programs
- Various recognitions programs

**Technical School Alliances**

<http://aep.com/careers/collegerelations/techschool.aspx>

AEP has training alliances with various vocational and technical schools across our [11 state service territory](#). We work with these institutions to develop academic programs needed to prepare students for high-paying jobs in the utility industry. Internships may be available in partnership with some technical schools, depending on opportunities in each AEP location. Found below are academic programs offered:

- Alliance Railcar program prepares you to become a railcar car mechanic, performing various all-position welding operations and truck component rebuilds.
- Line Training program prepares you to work as lineman in the construction, maintenance, and repair of electric utility overhead and underground systems.
- Power Plant Technology program prepares you to perform basic equipment operating and maintenance functions required in electric utility power plants and other related industries.
- Transmission programs prepare you to become a transmission line mechanic, station electrician, station equipment specialist or electronic controls technician.
- Electrical Power Generation/Transmission/Distribution Dispatch program prepares you to become an electrical power generation dispatcher, transmission dispatcher, or distribution dispatcher. This program provides you with the basic concepts of the national power system, including production, transmission, distribution, and the power market.
- Nuclear Uniform Curriculum program prepares you for an entry level position in Radiation Protection, Operations, or Maintenance (Electrical, Mechanical, or Instrumentation and Controls).

### School Alliances

For more information, please contact the admissions counselor at your desired campus.

#### Arkansas

- [University of Arkansas at Hope](#), Power Plant Technology Program
- [University of Arkansas at Fayetteville](#), Engineering Program

#### Indiana

- [Project Lead the Way](#), Engineering and Manufacturing Programs
- [Ivy Tech Community College](#), Power Plant Technology Program

#### Kentucky

- [Ashland Community College](#), Transmission and Line Training Programs

#### Michigan

- [ITT Technical Institute](#), Transmission and Line Training Programs
- [Lake Michigan College](#), Nuclear Uniform Curriculum

#### Nebraska

- [Northeast Community College](#), Alliance Railcar Program
- [Western Nebraska Community College](#), Alliance Railcar Program

#### Ohio

- [Belmont College](#), Power Plant Technology Program
- [Career & Technical Education Center \(C-Tec\)](#), Line Training Program
- [Delaware Career Center](#), Line Training Program
- [Eastern Gateway Community College](#), Power Plant Technology and Distribution Line Training Programs
- [Mid-East Career & Technical Center](#), Line Training Program
- [Owens Community College](#), Transmission and Line Training Programs
- [Pickaway-Ross Vocational School](#), Line Training Program
- [Scioto County Career Technical Center](#), Line Training Program
- [Stark State](#), Engineering Technology Program (Transmission-Station)
- [The Career Center at Marietta](#), Power Plant Technology Program
- [Tri-County Career Center](#), Line Training Program (High School Program)
- [University of Rio Grande](#), Power Plant Technology & Maintenance Programs
- [Warren County Career Center](#), Line Training Program
- [Washington State Community College](#), Power Plant Operator Program
- [Zane State](#), Engineering Technology Program (Transmission-Station and Power Generation)

#### Oklahoma

- [Oklahoma State University Institute of Technology](#), Power Plant Technology and Line Training Programs

Texas

- [Texas A&M - Texarkana](#), Engineering Program
- [Texas State Technical College](#), Transmission, Line Training, and Power Plant Technology

West Virginia

- [Mid-Ohio Valley Center \(Marshall University\)](#), Power Plant Maintenance Program
- [New River Career Center](#), Transmission and Line Training Programs
- [West Virginia Northern Community College](#), Power Plant Technology Program

Wyoming

- [Eastern Wyoming College](#), Alliance Railcar Program

**Appendix 33: G4-EU15 – Percentage of employees eligible to retire in the next 5 and 10 years broken down by job category and by region**

Employees’ eligible to retire in the next 10 years attaining age 55 and ten years of service. This is based on our retiree medical eligibility.

Work State	Executive/Sr Level Officials	First/Mid-Level Officials	Professionals	Technicians	Office and Clerical	Craft Workers (Skilled)	Operatives (Semi-Skilled)	Laborers (Unskilled)	Service Workers
AR		78%	67%	63%	53%	47%	20%		
IN	100%	79%	66%	58%	73%	51%	23%		
KY	67%	93%	64%	80%	87%	58%	53%		
LA	100%	80%	60%	75%	39%	58%	30%		100%
MI	88%	67%	66%	57%	84%	42%	80%		
OH	83%	69%	54%	54%	63%	50%	28%		
OK	100%	78%	62%	49%	59%	45%	43%		
TN		79%	73%	42%	75%	48%	50%		
TX	89%	80%	61%	59%	70%	53%	46%	100%	
VA	100%	93%	62%	65%	83%	56%	44%	100%	
WV	100%	85%	68%	51%	56%	55%	14%	20%	90%

Employee’s eligible to retire in the next 5 years attaining age 55 and ten years of service. This is based on our retiree medical eligibility.

Work State	Executive/Sr Level Officials	First/Mid-Level Officials	Professionals	Technicians	Office and Clerical	Craft Workers (Skilled)	Operatives (Semi-Skilled)	Laborers (Unskilled)	Service Workers
AR		67%	55%	31%	40%	27%	2%		
IN	80%	66%	56%	45%	60%	41%	19%		
KY	67%	84%	55%	61%	80%	52%	40%		
LA	100%	70%	48%	59%	26%	41%	13%		100%
MI	56%	48%	52%	44%	68%	27%	65%		
OH	65%	54%	37%	40%	46%	39%	18%		
OK	89%	62%	44%	32%	34%	34%	25%		
TN		71%	60%	33%	75%	30%	50%		

TX	89%	67%	51%	48%	55%	43%	37%	100%	
VA	50%	79%	49%	53%	65%	45%	34%	100%	
WV	100%	72%	53%	38%	32%	45%	11%	11%	76%

**Appendix 34: G4-DMA – Policies and requirements regarding health and safety of employees and employees of contractors and subcontractors**

We have more than 70 Safety & Health policies and procedures all of which are listed on a Safety & Health intranet web page for easy reference. Employees are educated/trained in these policies and procedures which are applicable based on job classification and/or work assigned. Employee training is managed and tracked in a Learning Management System (LMS). Contractors’ training requirements are addressed in our Service Agreements and Contracts as terms and conditions. Contractors have to acknowledge the training their employees receive as they are being considered for work for American Electric Power. In some situations that require specialty requirements, such as, asbestos abatement, the contractors’ have to present certification that their training has taken place and is up-to-date.

Safety & Health continues to review these on an annual basis and works with the business units to assure contractors are aware of these requirements.

**Appendix 35: G4-DMA – Approach to managing the impacts of displacement**

When, in the course of expanding or creating new generation or transmission facilities, AEP finds it necessary to acquire property, the company seeks to ensure that no economic displacement occurs. If properties are purchased for company use, AEP endeavors to enter into purchase agreements that compensate property owners in a fashion that precludes economic displacement.

**Appendix 36: G4-EU22 – Number of people physically or economically displaced**

Grantee	Section	Number Of People Displaced
I&M	Transmission	8
ApCo	Transmission	13
OpCo	Transmission	1
WV Transmission Co	Transmission	1
<b>Total</b>		<b>23</b>

*We consider a person/people displaced once the purchase transaction has closed and the property is in AEP's name. In many cases, AEP continues to allow the property owner to continue living on or use the premises (with a lease agreement) up to the date we begin actually utilizing the site. Nevertheless, we consider the landowner/family displaced as of the date the property changes hands.*

**Appendix 37: G4-DMA – Practices to address language, cultural, low literacy and disability related barriers to accessing and safety using electricity and customer support services**

AEP utilizes multiple communication channels to address the needs of all customer classes. For example, AEP provides a toll free TDD (Telecommunications Device for the Deaf) service that is available 24/7 for hearing impaired. All customers are able to access their AEP operating company website to perform a variety of functions: view bill, sign up for paperless billing, account balance information, payment and usage history, start/stop service, update phone number, mailing address, report power outages and make payments on their

accounts. AEP allows for multiple payment options. Customers take advantage of our Third Party vendors offering translation in a variety of languages. AEP also prints Braille bills and Large Print bills for the visually impaired. The monthly customer bill messaging and inserts notify customers of many energy efficiency programs and other products and services.

- Customers are able to communicate with AEP via online, social media, IVR, phone, email, mail and fax
- A TDD message is displayed on bills and bill backer forms.
- All websites give access to the above stated functions.
- Customers are able to make payments by phone, mail, at authorized paystations, electronically through their financial institution, through their operating company website or by participating in a checkless payment plan.
- Our Third Party Vendor translating a variety of languages is Language Select. Braille bills are processed through a vendor; The League of the Blind and Disabled. Large Print Bills are handled in-house.
- The Regulatory, Marketing, Energy Efficiency Programs and Corporate Communications groups submit bill messages and inserts.

**Appendix 38: G4-EU27 – Number of residential disconnects for non-payment**

Category	Number	Percentage
Less than 48 hours	255,863	66.6%
48 hours to 1 week	25,196	6.6%
More than 1 week	103,227	26.9%
<b>Total</b>	<b>384,286</b>	<b>100.0%</b>

Residential disconnects for non-payment Jan thru Dec 2017, regulated companies, routine disconnects (excludes disconnects at pole, service, transformer, etc). Note: the category ">1 Week", represents accounts that were 1) final because AEP automatically closes an account that has been disconnected for 1 week or 2) a "new" customer applied for service which results in a "new" account being established when service was connected. All accounts are from regulated companies.