

COMMONWEALTH OF KENTUCKY
BEFORE THE PUBLIC SERVICE COMMISSION

DUKE ENERGY KENTUCKY, INC.
RELIABILITY REPORT AND VEGETATION MANAGEMENT PLAN UPDATE FOR
CALENDAR YEAR 2021

May 2, 2022

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I. Introduction

On May 30, 2013, the Commission issued its Order requiring all jurisdictional utilities to file annual reliability reports and to develop vegetation management plans. Pursuant to the Order, jurisdictional utilities were required to report a 5 year average of reliability data. The reports are required to be based upon a calendar year (January to December) and filed by the first business day in May in the year immediately following the reporting year.

Duke Energy Kentucky, Inc. (Duke Energy Kentucky or the Company) submits its Reliability Report and Vegetation Management Plan update for Calendar year 2021 as required by the Commission's May 30, 2013 Order in Case No. 2011-00450.¹

II. Reliability Report Summary

Consistent with the most recent edition of the standard number 1366 "Guide for Electric Power Distribution Reliability Indices," and the Commission's Order,² the following is included in Exhibit A of Duke Energy Kentucky's Reliability Report Summary:

1. Calculate the System Average Interruption Duration Index (SAIDI) system-wide indices including Major Event Days (MEDs) and calculate the SAIDI system-wide indices excluding MEDs;
2. Calculate the System Average Interruption Frequency Index (SAIFI) system-wide indices including MEDs and calculate the SAIFI system-wide indices excluding MEDs;
3. Develop a system-wide rolling five-year average SAIDI excluding MEDs;
4. Develop a system-wide rolling five-year average SAIFI excluding MEDs;
5. Calculate SAIDI excluding MEDs for every circuit within its system;
6. Develop a rolling five-year average SAIDI for each circuit within its system;

¹ *In the matter of An Investigation of the Reliability Measures of Kentucky's Jurisdictional Electric Distribution Utilities, Case No. 2011-00450, Order (May 30, 2013).*

² Id.

7. Compare each circuit to that circuit's rolling five-year average SAIDI;
8. Calculate SAIFI excluding MEDs for every circuit within its system;
9. Develop a rolling five-year average SAIFI for each circuit within its system;
10. Compare each circuit to that circuit's rolling five-year average SAIFI.
11. File a Reliability Report by May 1 of each year, containing the reliability information as outlined in the attached Appendix for the preceding calendar year from January 1 to December 31 that includes the SAIDI and SAIFI system-wide indices, both including and excluding MEDs.
12. For each circuit with either SAIDI or SAIFI value higher than that circuit's respective SAIDI or SAIFI rolling five-year average, excluding MEDs, include in the annual Reliability Report the following information:
 - a. The circuit's SAIDI index for the year;
 - b. The circuit's SAIFI index for the year;
 - c. The circuit's rolling five-year average SAIDI;
 - d. The circuit's rolling five-year average SAIFI;
 - e. The substation name, number and location (i.e., County-Road-Town);
 - f. The circuit name, number and location (Town-Road-General Area);
 - g. The circuit's overall length in miles to the nearest tenth of a mile;
 - h. The number of customers served on the circuit for the year;
 - i. The date of the last circuit trim performed by the utility as part of its vegetation management plan;
 - j. A list of outage causes for the circuit, along with the percentage of total outage numbers represented by each cause;

- k. Circuit five-year average SAIDI;
- l. Reporting year SAIDI;
- m. Circuit five-year average SAIFI;
- n. Reporting year SAIFI;
- o. A Corrective Action Plan which describes any measures the utility has completed or plans to complete to improve the circuit's performance; and
- p. Any other information the utility believes will assist the Commission in understanding the circumstances surrounding the circuit's performance.

III. Vegetation Management Plan Update and Summary

Duke Energy Kentucky filed its initial Vegetation Management Plan with this Commission on December 18, 2007 in Case No. 2006-00494.³ Duke Energy's Midwest Vegetation Management Group is responsible for controlling vegetation growth for approximately 37,000 miles of transmission and distribution overhead electric lines and gas supply lines in Ohio, Indiana, and Kentucky.

Exhibit B is a copy of Duke Energy Kentucky's Vegetation Management Plan. Duke Energy's Transmission Vegetation Management (TVM) strategy has transitioned to a condition-based maintenance program using technology, including remote sensing (currently LiDAR) to monitor and address vegetation growth for all jurisdictions. The attached document has been revised to reflect the change in approach for TVM. There have been no substantive amendments or changes to the Company's distribution vegetation management plan since it was initially filed with the Commission on December 18, 2007.

³ Id.

As part of its 2022 plan, Duke Energy Kentucky plans to trim trees and maintain vegetation along 292 miles of its distribution system. The Company was able to get a good start on its Vegetation Plan for 2022. As of March 31, 2022 Duke Energy Kentucky has completed approximately 23% of its scheduled trimming, or approximately 68 miles of its distribution system. This leaves approximately 224 miles to be trimmed in 2022. The Company does not anticipate any difficulty in completing all planned trimming for 2022. The Company will have sufficient crew coverage throughout the year.

Respectfully submitted,

DUKE ENERGY KENTUCKY, INC.

/s/ Rocco D'Ascenzo

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KENTUCKY PUBLIC SERVICE COMMISSION

Electric Distribution Utility Annual Reliability Report

SECTION 1: CONTACT INFORMATION

UTILITY NAME	DUKE ENERGY KENTUCKY
REPORT PREPARED BY	SHERI L. CAMPBELL
E-MAIL ADDRESS OF PREPARER	SHERI.CAMPBELL@DUKE-ENERGY.COM
PHONE NUMBER OF PREPARER	513-218-3739

SECTION 2: REPORTING YEAR

CALENDAR YEAR OF REPORT	2021
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SECTION 3: MAJOR EVENT DAYS (MED)

TMED	5.5167
FIRST DATE USED TO DETERMINE TMED	January 1, 2016
LAST DATE USED TO DETERMINE TMED	December 31, 2020
NUMBER OF MED IN REPORT YEAR	1

NOTE: Per IEEE 1366 TMED should be calculated using the daily SAIDI values for the five prior years. If five years of data are not available, then utilities should use what is available until five years are accumulated

SECTION 4: SYSTEM RELIABILITY INFORMATION AND RESULTS

System-wide Information

TOTAL CUSTOMERS	145,669	TOTAL CIRCUITS	153
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Excluding MED

5 YEAR AVERAGE		REPORTING YEAR	
SAIDI	105.26	SAIDI	63.48
SAIFI	0.83	SAIFI	0.68

Including MED

5 YEAR AVERAGE		REPORTING YEAR	
SAIDI	194.67	SAIDI	83.52
SAIFI	1.07	SAIFI	0.72

Notes

- 1) All duration indices (SAIDI) are to be reported in units of minutes.
- 2) Reports are due on the first business day of May of each year
- 3) Reports cover the calendar year ending in the December before the reports are due.
- 4) IEEE 1366 (latest version) is used to define SAIDI, SAIFI, and TMED

CONFIDENTIAL PROPRIETARY TRADE SECRET

CIRCUIT NUMBER	SUBSTATION NAME	SUBSTATION NUMBER	SUBSTATION COUNTY	SUBSTATION ROAD	SUBSTATION TOWN	CIRCUIT NAME	CIRCUIT ID	CIRCUIT NUMBER	CIRCUIT TOWN
H9322050041	ALEXANDRIA SOUTH	205	CAMPBELL		ALEXANDRIA	ALEXANDRIA SOUTH 41	H9322050041	41	ALEXANDRIA
H9320780045	AUGUSTINE	78	KENTON		COVINGTON	AUGUSTINE 45	H9320780045	45	COVINGTON
H9320860041	BEAVER	86	BOONE		WALTON	BEAVER 41	H9320860041	41	WALTON
H9320860042	BEAVER	86	BOONE		WALTON	BEAVER 42	H9320860042	42	WALTON
H9321310042	BELLEVUE	131	CAMPBELL		NEWPORT	BELLEVUE 42	H9321310042	42	BELLEVUE
H9321470041	CLARYVILLE	147	CAMPBELL		CLARYVILLE	CLARYVILLE 41	H9321470041	41	GRANT'S LICK
H9321470043	CLARYVILLE	147	CAMPBELL		CLARYVILLE	CLARYVILLE 43	H9321470043	43	CLARYVILLE
H9321320049	COLD SPRING	132	CAMPBELL		COLD SPRINGS	COLD SPRING 49	H9321320049	49	COLD SPRINGS
H9320420041	CONSTANCE	42	BOONE		ERLANGER	CONSTANCE 41	H9320420041	41	TAYLORSPOINT
H9322170041	COVINGTON KY	217	KENTON		COVINGTON	COVINGTON 41	H9322170041	41	COVINGTON
H9320700042	CRESCENT	70	KENTON		FT. MITCHELL	CRESCENT 42	H9320700042	42	FT. MITCHELL
H9320700043	CRESCENT	70	KENTON		FT. MITCHELL	CRESCENT 43	H9320700043	43	FT. MITCHELL
H9320700044	CRESCENT	70	KENTON		FT. MITCHELL	CRESCENT 44	H9320700044	44	CRESCENT SPRINGS
H9320700046	CRESCENT	70	KENTON		FT. MITCHELL	CRESCENT 46	H9320700046	46	FT. MITCHELL
H9320760043	DAYTON	76	CAMPBELL		DAYTON	DAYTON 43	H9320760043	43	DAYTON
H9322990041	DECORSEY	299	KENTON		TAYLOR MILL	DECORSEY 41	H9322990041	41	TAYLOR MILL
H9320890041	DIXIE	89	BOONE		FLORENCE	DIXIE 41	H9320890041	41	FLORENCE
H9320890045	DIXIE	89	BOONE		FLORENCE	DIXIE 45	H9320890045	45	FLORENCE
H9320890046	DIXIE	89	BOONE		FLORENCE	DIXIE 46	H9320890046	46	FLORENCE
H9320550041	DONALDSON	55	KENTON		ERLANGER	DONALDSON 41	H9320550041	41	ERLANGER
H9320550048	DONALDSON	55	KENTON		ERLANGER	DONALDSON 48	H9320550048	48	ERLANGER
H9320550045	DONALDSON	55	KENTON		ERLANGER	DONALDSON 45	H9320550045	45	ERLANGER
H9320550047	DONALDSON	55	KENTON		ERLANGER	DONALDSON 47	H9320550047	47	ERLANGER
H9321090042	DRY RIDGE	109	GRANT		DRY RIDGE	DRY RIDGE 42	H9321090042	42	DRY RIDGE
H9321090043	DRY RIDGE	109	GRANT		DRY RIDGE	DRY RIDGE 43	H9321090043	43	DRY RIDGE
H9322410044	FLORENCE	241	BOONE		FLORENCE	FLORENCE 44	H9322410044	44	FLORENCE
H9322410047	FLORENCE	241	BOONE		FLORENCE	FLORENCE 47	H9322410047	47	FLORENCE
H9321520041	HEBRON	152	BOONE		HEBRON	HEBRON 41	H9321520041	41	PETERSBURG
H9321520042	HEBRON	152	BOONE		HEBRON	HEBRON 42	H9321520042	42	PETERSBURG
H9321520043	HEBRON	152	BOONE		HEBRON	HEBRON 43	H9321520043	43	HEBRON
H9321520045	HEBRON	152	BOONE		HEBRON	HEBRON 45	H9321520045	45	HEBRON
H9320090041	KENTON	9	KENTON		LAKEVIEW	KENTON 41	H9320090041	41	FT. WRIGHT
H9320090043	KENTON	9	KENTON		LAKEVIEW	KENTON 43	H9320090043	43	COVINGTON
H9320090044	KENTON	9	KENTON		LAKEVIEW	KENTON 44	H9320090044	44	FT. WRIGHT
H9320090045	KENTON	9	KENTON		LAKEVIEW	KENTON 45	H9320090045	45	LATONIA
H9322870041	KENTUCKY UNIVERSITY	287	CAMPBELL		NEWPORT	KY UNIV 41	H9322870041	41	HIGHLAND HEIGHTS
H9322870042	KENTUCKY UNIVERSITY	287	CAMPBELL		NEWPORT	KY UNIV 42	H9322870042	42	HIGHLAND HEIGHTS
H9322870043	KENTUCKY UNIVERSITY	287	CAMPBELL		NEWPORT	KY UNIV 43	H9322870043	43	HIGHLAND HEIGHTS
H9321890042	LIMABURG	189	BOONE		LIMABURG	LIMABURG 42	H9321890042	42	LIMABURG
H9321890043	LIMABURG	189	BOONE		LIMABURG	LIMABURG 43	H9321890043	43	HEBRON
H9320980041	LONGBRANCH	98	BOONE		FLORENCE	LONGBRANCH 41	H9320980041	41	FLORENCE
H9323580041	MARSHALL	358	CAMPBELL		HIGHLAND HEIGHTS	MARSHALL 41	H9323580041	41	HIGHLAND HEIGHTS
H9323050044	MT ZION	305	BOONE		FLORENCE	MT ZION 44	H9323050044	44	FLORENCE
H9321990043	RICHWOOD	199	BOONE		RICHWOOD	RICHWOOD 43	H9321990043	43	RICHWOOD
H9320620042	SILVER GROVE	62	CAMPBELL		MELBOURNE	SILVER GROVE 42	H9320620042	42	SILVER GROVE
H9321340041	THOMAS MORE	134	BOONE		EDGEWOOD	THOMAS MORE 41	H9321340041	41	EDGEWOOD
H9321250042	VERONA	125	KENTON		CRITTENDEN	VERONA 42	H9321250042	42	CRITTENDEN
H9322430042	VILLA	243	KENTON		EDGEWOOD	VILLA 42	H9322430042	42	CRESTVIEW HILLS
H9322430043	VILLA	243	KENTON		EDGEWOOD	VILLA 43	H9322430043	43	EDGEWOOD
H9323040041	WHITE TOWER	304	KENTON		INDEPENDENCE	WHITE TOWER 41	H9323040041	41	INDEPENDENCE
H9323040042	WHITE TOWER	304	KENTON		INDEPENDENCE	WHITE TOWER 42	H9323040042	42	INDEPENDENCE
H9323040043	WHITE TOWER	304	KENTON		INDEPENDENCE	WHITE TOWER 43	H9323040043	43	INDEPENDENCE
H9320590040	WILDER	59	KENTON		WILDER	WILDER 40	H9320590040	40	NEWPORT
H9320590043	WILDER	59	KENTON		WILDER	WILDER 43	H9320590043	43	COVINGTON
H9320590045	WILDER	59	KENTON		WILDER	WILDER 45	H9320590045	45	WILDER
H9320590048	WILDER	59	KENTON		WILDER	WILDER 48	H9320590048	48	NEWPORT

CONFIDENTIAL PROPRIETARY TRADE SECRET

CIRCUIT ROAD	CIRCUIT GENERAL AREA	TOTAL CIRCUIT LENGTH (miles)	CUSTOMER COUNT FOR THIS CIRCUIT	DATE OF LAST CIRCUIT TRIM (VEGETATION MANAGEMENT)	CIRCUIT 5-YEAR AVERAGE (SAIDI)	REPORTING YEAR (2021) SAIDI	DID SAIDI INCREASE IN 2021?	CIRCUIT 5-YEAR AVERAGE (SAIFI)	REPORTING YEAR (2021) SAIFI	DID SAIFI INCREASE IN 2021?
	Alexandria, Ross and Oneonta	26.958	1,925	2/24/2018	93.053	114.934	YES	0.373	2.205	YES
	Covington	9.393	1,984	3/31/2018	92.976	46.699	NO	0.710	1.165	YES
	Walton	50.724	1,321	12/18/2017	232.858	123.138	NO	1.507	2.298	YES
	Walton	50.709	1,676	12/4/2017	191.902	65.002	NO	0.679	3.607	YES
	Fort Thomas, Dayton and Bellevue	22.817	2,255	5/10/2020	105.629	110.090	YES	1.067	0.944	NO
	Grant's Lick	62.069	1,771	3/19/2020	199.055	196.847	NO	1.324	1.826	YES
	Claryville	1.318	8	11/23/2021	58.253	228.756	YES	0.282	2.222	YES
	Highland Heights	23.711	886	3/3/2018	242.961	297.773	YES	1.320	3.398	YES
	Taylorsport	12.661	129	5/22/2021	155.332	47.975	NO	0.918	1.099	YES
	Covington	6.851	1,024	7/28/2018	37.767	35.078	NO	0.266	0.387	YES
	FT. MITCHELL	12.569	822	11/16/2019	185.348	144.143	NO	1.579	2.984	YES
	Ft. Mitchell	18.166	1,672	11/6/2019	162.756	113.672	NO	0.635	1.433	YES
	Crescent Springs	10.864	673	6/3/2020	233.115	151.214	NO	0.846	1.075	YES
	FT. MITCHELL	19.214	1,075	New Circuit 2021	0.000	185.158	YES	0.000	1.703	YES
	Dayton	8.821	1,712	10/19/2021	63.583	80.248	YES	0.699	1.225	YES
	Taylor Mill	35.362	2,052	12/27/2018	127.442	167.157	YES	1.207	3.081	YES
	Florence	5.743	622	6/12/2021	33.588	119.415	YES	0.136	1.339	YES
	Florence	3.416	38	5/1/2021	0.000	237.625	YES	0.000	0.744	YES
	Florence	2.165	8	4/17/2021	19.442	315.650	YES	0.044	0.250	YES
	Erlanger and Florence	12.757	1,711	5/20/2020	97.471	125.910	YES	0.803	0.518	NO
	Erlanger	7.852	604	5/22/2021	6.893	3.284	NO	0.032	0.047	YES
	Erlanger, Florence, CVG	6.076	49	New Circuit 2020	11.718	123.772	YES	0.243	1.078	YES
	Erlanger, Florence, CVG	5.503	44	New Circuit 2020	0.000	9.090	YES	0.000	0.023	YES
	Dry Ridge	3.23	155	11/28/2016	32.710	200.302	YES	0.238	0.987	YES
	Dry Ridge	7.451	540	New Circuit 2021	0.000	0.423	YES	0.000	0.003	YES
	Florence	17.571	1,149	4/18/2020	14.345	49.420	YES	0.124	0.196	YES
	Florence	7.082	201	4/17/2021	9.900	44.658	YES	0.249	1.005	YES
	Hebron	22.594	1,397	9/7/2019	125.782	112.729	NO	0.739	1.013	YES
	Petersburg	48.022	664	9/23/2019	65.247	108.856	YES	0.624	0.851	YES
	Hebron	6.111	44	Nothing to trim	14.594	124.950	YES	0.087	0.674	YES
	Hebron	20.36	477	8/1/2019	83.452	69.133	NO	1.085	1.414	YES
	Ft. Wright, Ft. Mitchell	19.602	1,528	7/21/2019	94.975	67.687	NO	0.896	1.104	YES
	LATONIA	12.594	1,536	5/28/2020	93.678	67.885	NO	0.412	1.058	YES
	Ft. Wright, Ft. Mitchell	21.867	2,276	7/7/2018	118.803	76.578	NO	1.238	1.438	YES
	Ft. Wright, Latonia	9.009	1,379	2/21/2021	17.404	38.750	YES	0.190	0.393	YES
	Northern Kentucky University	0.031	1	Nothing to trim	0.000	51.000	YES	0.000	1.000	YES
	Northern Kentucky University	15.031	1,818	7/28/2018	51.988	90.643	YES	0.455	1.102	YES
	Highland Heights	17.329	685	10/10/2019	71.945	127.328	YES	1.081	1.351	YES
	Limaburg	55.922	2,811	8/19/2020	72.660	130.159	YES	0.895	0.525	NO
	CVG (Airport)	4.333	2	2/23/2019	37.000	676.350	YES	0.400	1.000	YES
	FLORENCE	19.15	2,279	8/28/2021	7.742	11.987	YES	0.041	0.252	YES
	Highland Heights	19.453	2,246	5/19/2018	28.726	40.331	YES	0.108	1.071	YES
	FLORENCE	3.549	57	New Circuit 2019	0.285	10.690	YES	0.003	0.036	YES
	Union	18.275	1,296	9/7/2019	65.692	218.790	YES	0.562	0.314	NO
	Silver Grove	8.707	433	5/14/2019	245.382	141.591	NO	0.998	1.156	YES
	Edgewood	1.887	9	11/18/2019	7.678	113.890	YES	0.240	0.455	YES
	Walton	29.673	516	12/27/2017	202.972	275.408	YES	1.004	1.785	YES
	Crestview Hills	12.876	884	11/11/2019	67.686	45.352	NO	0.416	1.054	YES
	Edgewood	16.303	952	5/6/2019	132.412	198.810	YES	1.040	2.427	YES
	Independence, Taylor Mill	77.78	1,905	12/31/2021	451.643	182.015	NO	2.128	3.436	YES
	Independence, White Tower	9.959	486	12/31/2021	102.752	42.019	NO	1.295	2.035	YES
	Independence, White Tower	27.999	1,219	4/10/2021	159.361	58.066	NO	1.504	2.107	YES
	Newport	7.324	802	10/16/2021	37.506	81.172	YES	0.143	0.953	YES
	Covington, Latonia	9.984	1,705	12/24/2016	125.027	293.967	YES	1.062	1.455	YES
	Wilder, Southgate, Ft. Thomas	13.639	1,611	12/11/2017	104.461	42.118	NO	0.637	0.776	YES
	Newport	5.513	622	11/21/2020	65.681	176.546	YES	0.531	1.003	YES

SUBSTATION - CIRCUIT	CIRCUIT NAME	CIRCUIT ID	OUTAGE CAUSE	PERCENT OF TOTAL OUTAGE MINUTES	CORRECTIVE ACTION PLAN
ALEXANDRIA SOUTH - H9322050041	ALEXANDRIA SOUTH	H9320860041	09 Public Accident/Damage	62.02%	The majority of the Public Accident/Damage outage minutes were on the same day from a single public accident that involved a transmission circuit. The Self-Healing Team operated & isolated the fault location. The damaged pole & equipment have been replaced. The majority of the Equipment Failure outage minutes are due to a failed jumper on a piece of transmission equipment. The damaged jumper & equipment have been replaced. No further action required.
			20 Equipment failure	30.25%	
			28 Other Cause	6.54%	
			04 Wildlife	0.83%	
			03 Vegetation	0.18%	
			05 Planned (IEEE)	0.15%	
			11 Unknown Cause	0.03%	
				100%	
AUGUSTINE - H9320780045	AUGUSTINE	H9320780045	28 Other Cause	65.29%	The majority of the Other Cause outage minutes are due to the circuit breaker being opened to make it safe for crews to replace two broken poles from an auto accident. It was a feeder level outage that lasted 19 minutes. Another major contributor to the Other Cause outage minutes was sagging conductors possibly caused by a vehicle accident. All equipment has been replaced. The majority of the Equipment Failure CMI was caused by a 65t fuse clearing an unknown fault. All fuses were replaced. No further action required.
			20 Equipment failure	31.41%	
			04 Wildlife	1.96%	
			11 Unknown Cause	1.05%	
			05 Planned (IEEE)	0.24%	
			03 Vegetation	0.03%	
				100%	
BEAVER - H9320860041	BEAVER	H9320860041	20 Equipment failure	75.72%	The majority of the total outage minutes are due to wildlife in the substation equipment (coded incorrectly). The circuit does have wildlife mitigation. Another major contributor to the total outage minutes was a failed jumper on a piece of transmission equipment. The damaged jumper & equipment have been replaced. No further action required. This circuit will be trimmed in 2022.
			03 Vegetation	19.46%	
			28 Other Cause	2.15%	
			04 Wildlife	1.34%	
			09 Public Accident/Damage	0.78%	
			11 Unknown Cause	0.35%	
			05 Planned (IEEE)	0.20%	
				100%	
BEAVER - H9320860042	BEAVER	H9320860042	41 Loss of transmsn/generation	45.23%	The majority of the Loss of Transmission/Generation outage minutes were on the same day due to a faulty lightning arrester inside the substation. All equipment has been replaced. The majority of the Equipment Failure outage minutes are due to a failed jumper on a piece of transmission equipment. The damaged jumper & equipment have been replaced. No further action required.
			20 Equipment failure	45.15%	
			05 Planned (IEEE)	5.82%	
			04 Wildlife	1.95%	
			03 Vegetation	1.47%	
			11 Unknown Cause	0.26%	
			EA Weather	0.12%	
				100%	
BELLEVUE - H9321310042	BELLEVUE	H9321310042	20 Equipment failure	92.89%	The majority of the outage minutes are due to a public accident (coded incorrectly). All damaged equipment has been replaced. No further action required.
			28 Other Cause	5.65%	
			19 Lightning strike	0.81%	
			05 Planned (IEEE)	0.36%	
			04 Wildlife	0.26%	
			09 Public Accident/Damage	0.03%	
				100%	
CLARYVILLE - H9321470041	CLARYVILLE	H9321470041	03 Vegetation	35.87%	The majority of the Vegetation outage minutes were on the same day when a limb fell into the conductor, breaking the pole & conductor. The damaged pole & all damaged equipment were replaced at the time of restoration. Other major contributors to the total outage minutes include the Self-Healing Team trying to restore customers during a transmission-driven outage, a rear lot pole & equipment failure, a fallover during a system software upgrade & failed cutouts at a capacitor. All damaged/failed equipment has been replaced & the software issue has been resolved. No further action required. This circuit was trimmed in 2020.
			EA Weather	21.15%	
			28 Other Cause	16.70%	
			11 Unknown Cause	13.70%	
			09 Public Accident/Damage	5.56%	
			19 Lightning strike	3.46%	
			05 Planned (IEEE)	1.77%	
			20 Equipment failure	1.33%	
			04 Wildlife	0.46%	
CLARYVILLE - H9321470043	CLARYVILLE	H9321470043	41 Loss of transmsn/generation	88.34%	The majority of the Loss of Transmission/Generation outage minutes are due to loss of transmission feed to the substation for an unknown reason. The majority of the Equipment Failure outage minutes are due to a failed jumper on a transmission circuit. No further action required.
			20 Equipment failure	11.66%	
				100%	
COLD SPRING - H9321320049	COLD SPRING	H9321320049	03 Vegetation	72.60%	The majority of the Vegetation outage minutes were on the same day when a large, live Bradford Pear tree 15 feet from the centerline split above the base & fell across the conductor. All repairs were made at the time of the outage. The majority of the Equipment Failure outage minutes are due to a failed jumper on a piece of transmission equipment. The damaged jumper & equipment have been replaced. No further action required. This circuit was last trimmed in 2018.
			20 Equipment failure	22.40%	
			EA Weather	2.12%	
			04 Wildlife	1.81%	
			05 Planned (IEEE)	0.98%	
			11 Unknown Cause	0.06%	
			28 Other Cause	0.03%	
				100%	
CONSTANCE - H9320420041	CONSTANCE	H9320420041	11 Unknown Cause	71.85%	All of the Unknown Cause outage minutes are due to one event in which the circuit breaker locked out for an unknown reason. All of the Wildlife outage minutes are due to a blown transformer fuse caused by wildlife. All of the Public Accident/Damage outage minutes are due to a line fuse that had to be opened for crews to safely make repairs after a public accident. No further action required.
			04 Wildlife	14.08%	
			09 Public Accident/Damage	14.07%	
COVINGTON - H9322170041	COVINGTON	H9322170041	05 Planned (IEEE)	35.15%	The majority of the Planned outage minutes were on the same day when crews opened a transformer fuse for scheduled work. All of the Wildlife outage minutes are due to wildlife making contact with an unfused transformer. All of the Other Cause outage minutes are due to a failed bushing at a transformer. All equipment was replaced. No further action required.
			04 Wildlife	31.37%	
			28 Other Cause	26.93%	
			20 Equipment failure	5.35%	
			11 Unknown Cause	1.20%	
				100%	
CRESCENT - H9320700042	CRESCENT	H9320700042	05 Planned (IEEE)	75.36%	All of the Planned outage minutes are due to scheduled conductor, pole & other equipment changeouts. The majority of the Public Accident/Damage outage minutes are due to a public vehicle hitting a pole. All equipment has been replaced. No further action required.
			09 Public Accident/Damage	15.13%	
			20 Equipment failure	8.23%	
			03 Vegetation	0.79%	
			28 Other Cause	0.48%	
				100%	
CRESCENT - H9320700043	CRESCENT	H9320700043	28 Other Cause	56.42%	The majority of the Other Cause outage minutes are due to a fallover during a system software upgrade. The issue was identified & corrected. The majority of the Weather outage minutes are due to a recloser lockout during inclement weather. The majority of the Vegetation outage minutes are due to a tree on the line. No further action required. This circuit was last trimmed in 2019.
			EA Weather	21.83%	
			03 Vegetation	18.98%	
			20 Equipment failure	1.45%	
			04 Wildlife	0.87%	
			05 Planned (IEEE)	0.44%	
				100%	
CRESCENT - H9320700044	CRESCENT	H9320700044	09 Public Accident/Damage	49.22%	All of the Public Accident/Damage outage minutes were on the same day when a public vehicle hit a pole. All equipment was repaired or replaced at the time of investigation. All Planned outage minutes were on the same day for scheduled equipment repairs & replacements. All Vegetation outage minutes were on the same day when a tree fell & took down conductor & equipment. All equipment was repaired or replaced at the time of investigation. The majority of the Equipment Failure outage minutes are due to a failed underground cable. The cable has been replaced. No further action required. This circuit was last trimmed in 2020.
			05 Planned (IEEE)	20.70%	
			03 Vegetation	14.83%	
			20 Equipment failure	12.97%	
			04 Wildlife	2.07%	
			11 Unknown Cause	0.21%	
				100%	

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CRESCENT - H9320700046	CRESCENT	H9320700046	03 Vegetation 20 Equipment failure 11 Unknown Cause 04 Wildlife 05 Planned (IEEE)	64.84% 18.06% 16.72% 0.34% 0.04%	The majority of the Vegetation outage minutes are due to a large live locust tree 15 feet from the centerline that uprooted & fell across the conductor. The majority of the Equipment Failure outage minutes & the Unknown Cause outage minutes are due to underground cable failures. A work order has been generated to replace the underground cable. No further action required.
100%					
DAYTON - H9320760043	DAYTON	H9320760043	20 Equipment failure 03 Vegetation 05 Planned (IEEE) 28 Other Cause 04 Wildlife	82.02% 8.34% 7.78% 1.44% 0.43%	All Equipment Failure outage minutes are due to a failed bolted wedge connector, which was replaced at the time of the outage. No further action required.
100%					
DECORSEY - H9322990041	DECORSEY	H9322990041	11 Unknown Cause 20 Equipment failure 03 Vegetation 41 Loss of transmsn/generation 28 Other Cause EA Weather 05 Planned (IEEE) 04 Wildlife	61.18% 17.69% 10.93% 8.95% 0.54% 0.45% 0.22% 0.03%	All Unknown Cause outage minutes are due to a circuit lockout for an unknown reason. The circuit was patrolled & all fault data was analyzed, but nothing was found & there have not been any issues since. The majority of the Equipment Failure outage minutes are due to a failed jumper on a piece of transmission equipment. The damaged jumper & equipment have been replaced. The majority of the Vegetation outage minutes were on the same day when a tree fell & took down conductor & equipment. No further action required. This circuit was last trimmed in 2018.
100%					
DIXIE - H9320890041	DIXIE	H9320890041	20 Equipment failure 05 Planned (IEEE) 04 Wildlife	99.19% 0.73% 0.08%	The majority of the Equipment Failure outage minutes are due to failed underground cable. No further action required.
100%					
DIXIE - H9320890045	DIXIE	H9320890045	04 Wildlife 05 Planned (IEEE)	96.61% 3.39%	All Wildlife outage minutes are due to two different outages on two different days in which fuses cleared faults caused by wildlife. The fuses were replaced. No further action required.
100%					
DIXIE - H9320890046	DIXIE	H9320890046	09 Public Accident/Damage	100.00%	All Public Accident/Damage outage minutes were on the same day when crews opened a fuse to safely make repairs after a public accident. No further action required.
100%					
DONALDSON - H9320550041	DONALDSON	H9320550041	20 Equipment failure 05 Planned (IEEE) 03 Vegetation 04 Wildlife 19 Lightning strike	95.51% 3.88% 0.31% 0.22% 0.09%	The majority of the Equipment Failure outage minutes are due to a failed temporary jumper. No further action required.
100%					
DONALDSON - H9320550045	DONALDSON	H9320550045	20 Equipment failure 05 Planned (IEEE) 09 Public Accident/Damage 11 Unknown Cause	86.56% 7.67% 3.61% 2.17%	The majority of the Equipment Failure outage minutes are due to an animal inside the Amazon Switchgear, resulting in its failure. No further action required.
100%					
DONALDSON - H9320550047	DONALDSON	H9320550047	20 Equipment failure	100.00%	The majority of the total outage minutes are due to a tree on the wire (coded incorrectly). The tree was cleared. No further action required.
100%					
DONALDSON - H9320550048	DONALDSON	H9320550048	04 Wildlife 05 Planned (IEEE)	88.54% 11.46%	The majority of the Wildlife outage minutes are due to a fuse outage caused by wildlife. All of the Planned outage minutes are due to a scheduled livefront transformer replacements. No further action required.
100%					
DRY RIDGE - H9321090042	DRY RIDGE	H9321090042	20 Equipment failure	100.00%	All of the Equipment Failure outage minutes were on the same day when the circuit breaker locked out due to an un-noted equipment failure. No further action required.
100%					
DRY RIDGE - H9321090043	DRY RIDGE	H9321090043	03 Vegetation	100.00%	All of the Vegetation outage minutes were on the same day when vegetation brought down wire & a transformer fuse had to be opened to safely make repairs. No further action required.
100%					
FLORENCE - H9322410044	FLORENCE	H9322410044	04 Wildlife 28 Other Cause 20 Equipment failure 05 Planned (IEEE)	75.90% 11.90% 10.66% 1.55%	All of the Wildlife outage minutes are from one event caused by a squirrel. All Other Cause outage minutes are due to a private tree trimmer cutting down a tree & it falling into the lines. The majority of the Equipment Failure outage minutes are due to a failed hotline clamp, which has been replaced. No further action required.
100%					
FLORENCE - H9322410047	FLORENCE	H9322410047	28 Other Cause	100.00%	All Other Cause outage minutes were on the same day when the circuit locked out while the circuit breaker was in suspect before it was restored. No further action required.
100%					
HEBRON - H9321520041	HEBRON	H9321520041	20 Equipment failure 05 Planned (IEEE) 28 Other Cause 04 Wildlife 09 Public Accident/Damage 03 Vegetation	96.32% 2.41% 0.88% 0.24% 0.14% 0.01%	The majority of the Equipment Failure outage minutes were caused by two events on the same day caused by a failed insulator that locked out the circuit. All equipment was replaced at the time of investigation. No further action required.
100%					
HEBRON - H9321520042	HEBRON	H9321520042	09 Public Accident/Damage 28 Other Cause 03 Vegetation EA Weather 20 Equipment failure 05 Planned (IEEE)	80.11% 9.63% 6.93% 1.62% 0.87% 0.85%	The majority of the Public Accident/Damage outage minutes are due to a public vehicle hitting a pole & locking out B phase. No further action required.
100%					
HEBRON - H9321520043	HEBRON	H9321520043	04 Wildlife 05 Planned (IEEE)	94.99% 5.01%	All Wildlife outage minutes are due to one event caused by birds around a terminal pole resulting in the fuses clearing. The equipment was inspected during restoration. No further action required.
100%					
HEBRON - H9321520045	HEBRON	H9321520045	09 Public Accident/Damage 11 Unknown Cause 19 Lightning strike 05 Planned (IEEE) 28 Other Cause 04 Wildlife	55.65% 34.31% 7.05% 1.61% 1.12% 0.27%	All Public Accident/Damage outage minutes are due to a public vehicle snagging communication lines, breaking our equipment. All equipment was repaired at the time of restoration. All Unknown Cause outage minutes are due to a circuit lockout due to a transmission level event that impacted multiple circuits. No further action required.
100%					
KENTON - H9320090041	KENTON	H9320090041	28 Other Cause 20 Equipment failure 19 Lightning strike 05 Planned (IEEE) 11 Unknown Cause 04 Wildlife 03 Vegetation	74.86% 16.32% 6.00% 1.08% 0.87% 0.47% 0.40%	The majority of the Other Cause outage minutes are due to a fallover during a system software upgrade. The issue was identified & corrected. The majority of the Equipment Failure outage minutes are due to a failed underground cable. All equipment was repaired/replaced at the time of restoration. No further action required.
100%					
KENTON - H9320090043	KENTON	H9320090043	11 Unknown Cause 28 Other Cause EA Weather 05 Planned (IEEE) 20 Equipment failure 03 Vegetation 04 Wildlife	88.56% 3.46% 3.34% 2.09% 1.63% 0.84% 0.09%	The majority of the Equipment Failure outage minutes are due to a failed capacitor. The capacitor is offline & planned to be replaced in the future. No further action required.
100%					

KENTON - H9320090044	KENTON	H9320090044	11 Unknown Cause 09 Public Accident/Damage 03 Vegetation 04 Wildlife 05 Planned (IEEE) 28 Other Cause 20 Equipment failure	42.00% 38.55% 17.76% 1.03% 0.53% 0.08% 0.04% 100%	The majority of the Unknown Cause outage minutes are due to a fallover during a system software upgrade. The issue was identified & corrected. The majority of the Public Accident/Damage outage minutes are due to a public vehicle hitting & breaking a pole & a malfunctioning tripsaver that failed to interrupt the fault. The tripsaver has been replaced. No further action required.
KENTON - H9320090045	KENTON	H9320090045	20 Equipment failure 03 Vegetation 04 Wildlife	73.18% 26.70% 0.12% 100%	The majority of the Equipment Failure outage minutes are due to defective transformers that have all been replaced. The majority of the Vegetation outage minutes are due to a tree that fell into a pole. No further action required. This circuit was trimmed in 2021.
KY UNIV - H9322870041	KY UNIV	H9322870041	11 Unknown Cause	100.00% 100%	All Unknown Cause outage minutes are due to a bus outage caused by vibration when opening a panel door. The bus was put back into service after crews were able to investigate further & found no other issues present. No further action required.
KY UNIV - H9322870042	KY UNIV	H9322870042	11 Unknown Cause 03 Vegetation 05 Planned (IEEE) 20 Equipment failure 09 Public Accident/Damage 04 Wildlife EA Weather	90.17% 5.51% 1.92% 1.42% 0.72% 0.17% 0.08% 100%	The majority of the Unknown Cause outage minutes are due to a bus outage caused by vibration when opening a panel door. The bus was put back into service after crews were able to investigate further & found no other issues present. Another major contributor of the Unknown Cause outage minutes are due to a fallover during a system software upgrade. The issue was identified & corrected. No further action required.
KY UNIV - H9322870043	KY UNIV	H9322870043	20 Equipment failure 11 Unknown Cause 04 Wildlife 03 Vegetation EA Weather 05 Planned (IEEE)	67.85% 23.30% 5.58% 0.69% 0.30% 0.27% 100%	The majority of the Equipment Failure outage minutes are due to an unfused transformer that locked out the circuit. A reliability investigation was conducted & multiple unfused taps were found on the mainline. A work order has been generated to have them all fused. All Unknown Cause outage minutes are due to a fallover during a system software upgrade. The issue was identified & corrected. No further action required.
LIMABURG - H9321890042	LIMABURG	H9321890042	03 Vegetation 11 Unknown Cause EA Weather 09 Public Accident/Damage 20 Equipment failure 04 Wildlife 28 Other Cause 05 Planned (IEEE) 19 Lightning strike	63.26% 15.19% 10.43% 10.40% 0.30% 0.21% 0.13% 0.05% 0.04% 100%	The majority of the Vegetation outage minutes are due to a tree taking down multiple spans. All equipment was replaced at the time of restoration. All Unknown Cause outage minutes are due to a C to ground fault caused by an unknown source. All Weather outage minutes were on the same day when two different disconnects opened during inclement weather. All Public Accident/Damage outage minutes are due to a vehicle hitting & breaking a pole. A recloser had to be opened for crews to safely make repairs. All equipment was replaced at the time of investigation. No further action required.
LIMABURG - H9321890043	LIMABURG	H9321890043	20 Equipment failure	100.00% 100%	All Equipment Failure outage minutes are due to a defective LEAD cable that was repaired/replaced at the time of investigation. No further action required.
LONGBRANCH - H9320980041	LONGBRANCH	H9320980041	05 Planned (IEEE) 28 Other Cause 20 Equipment failure	93.77% 3.34% 2.89% 100%	All Planned outage minutes were on the same day caused by a scheduled retrofit of a terminal pole. No further action required.
MARSHALL - H9323580041	MARSHALL	H9323580041	20 Equipment failure 28 Other Cause 05 Planned (IEEE) 19 Lightning strike	61.45% 38.23% 0.19% 0.13% 100%	The majority of the Equipment Failure outage minutes are due to a failed jumper on a piece of transmission equipment. The damaged jumper & equipment have been replaced. The majority of the Other Cause outage minutes are due to a structure fire in which a line fuse had to be opened for safety. No further action required.
MT ZION - H9323050044	MT ZION	H9323050044	09 Public Accident/Damage	100.00% 100%	The majority of the total outage minutes are due to a failed underground cable (coded incorrectly). Another major contributor of the total outage minutes was when a vehicle hit a padmount transformer. No further action required.
RICHWOOD - H9321990043	RICHWOOD	H9321990043	09 Public Accident/Damage 04 Wildlife 20 Equipment failure 05 Planned (IEEE) 28 Other Cause	99.14% 0.34% 0.28% 0.13% 0.10% 100%	All Public Accident/Damage outage minutes are due to a construction crew destroying a box pad for a future transformer as well as damaging the primary cable. Specialized crews were required to make repairs. No further action required.
SILVER GROVE - H9320620042	SILVER GROVE	H9320620042	03 Vegetation 09 Public Accident/Damage 04 Wildlife 05 Planned (IEEE) 20 Equipment failure 28 Other Cause	97.06% 1.91% 0.45% 0.32% 0.13% 0.13% 100%	The majority of the Vegetation outage minutes are the result of a tree falling across all three phases, resulting in a circuit lockout. No further action required. This circuit was last trimmed in 2019.
THOMAS MORE - H9321340041	THOMAS MORE	H9321340041	05 Planned (IEEE) 03 Vegetation	93.91% 6.09% 100%	All Planned outage minutes are due to two different scheduled livefront transformer replacements. No further action required.
VERONA - H9321250042	VERONA	H9321250042	09 Public Accident/Damage 04 Wildlife 03 Vegetation 20 Equipment failure 05 Planned (IEEE)	77.24% 13.50% 6.41% 2.81% 0.03% 100%	All Public Accident/Damage outage minutes are from 8 different public accidents at various locations. All repairs were made at the time of restoration. The majority of the Wildlife outage minutes are from a burned jumper (coded incorrectly). No further action required.
VILLA - H9322430042	VILLA	H9322430042	11 Unknown Cause 19 Lightning strike 05 Planned (IEEE) 20 Equipment failure 09 Public Accident/Damage	74.88% 19.19% 2.07% 2.07% 1.78% 100%	All Unknown Cause outage minutes are from a sustained outage at the Villa Substation, which was determined to be caused by a squirrel. The bus was restored with the exception of one circuit breaker that was isolated so repairs can be made. All of the Lightning Strike outage minutes are from one outage caused by Vegetation (coded incorrectly). All repairs were made at the time of restoration. No further action required.
VILLA - H9322430043	VILLA	H9322430043	03 Vegetation 20 Equipment failure 19 Lightning strike 05 Planned (IEEE) 11 Unknown Cause 28 Other Cause 04 Wildlife	67.08% 23.37% 4.20% 3.38% 1.16% 0.69% 0.11% 100%	The majority of the Vegetation outage minutes are from a circuit lockout caused by a tree falling on a pole. All of the Equipment Failure outage minutes were caused by a burned jumper. The circuit breaker had to be opened to make it safe for crews to make temporary repairs. A work order was generated to have the phase restrung. The location requires permits & flagging. No further action required. This circuit was last trimmed in 2019.

WHITE TOWER - H9323040041	WHITE TOWER	H9323040041	03 Vegetation	43.90%	The majority of the Vegetation outage minutes are from three different events caused by vegetation. Two of the events occurred on the same day. The majority of the Equipment Failure outage minutes are due to a failed jumper on a piece of transmission equipment. The damaged jumper & equipment have been replaced. The majority of the Other Cause outage minutes are due to a transmission circuit relaying while crews were restoring a transformer bank. Several Distribution Circuits were affected. Crews later determined that the fault was caused by a failed lightning arrester. The lightning arrester was replaced. No further action required. This circuit was trimmed in 2021.
			20 Equipment failure	34.96%	
			28 Other Cause	12.56%	
			11 Unknown Cause	5.68%	
			D4 Wildlife	1.37%	
			05 Planned (IEEE)	1.33%	
			EA Weather	0.21%	
				100%	
WHITE TOWER - H9323040042	WHITE TOWER	H9323040042	20 Equipment failure	59.40%	The majority of the Equipment Failure outage minutes are due to a failed jumper on a piece of transmission equipment. The damaged jumper & equipment have been replaced. The majority of the Other Cause outage minutes are due to a transmission circuit relaying while crews were restoring a transformer bank. Several Distribution Circuits were affected. Crews later determined that the fault was caused by a failed lightning arrester. The lightning arrester was replaced. No further action required.
			28 Other Cause	28.34%	
			41 Loss of transmsn/generation	7.49%	
			D4 Wildlife	2.36%	
			09 Public Accident/Damage	1.66%	
			05 Planned (IEEE)	0.51%	
			03 Vegetation	0.24%	
				100%	
WHITE TOWER - H9323040043	WHITE TOWER	H9323040043	20 Equipment failure	43.77%	The majority of the Equipment Failure outage minutes are due to a failed jumper on a piece of transmission equipment. The damaged jumper & equipment have been replaced. The majority of the Other Cause outage minutes are due to a transmission circuit relaying while crews were restoring a transformer bank. Several Distribution Circuits were affected. Crews later determined that the fault was caused by a failed lightning arrester. The lightning arrester was replaced. All of the Unknown Cause outage minutes are due to a fuse outage from an unknown/unsustained fault. All Planned outage minutes are due to scheduled equipment changeouts. No further action required.
			41 Loss of transmsn/generation	25.85%	
			11 Unknown Cause	15.31%	
			05 Planned (IEEE)	13.97%	
			EA Weather	0.43%	
			03 Vegetation	0.24%	
			D4 Wildlife	0.22%	
			19 Lightning strike	0.21%	
WILDER - H9320590040	WILDER	H9320590040	EA Weather	99.20%	The majority of the Weather outage minutes are due to a large oak tree branch that broke & fell into the phases causing a circuit lockout. Vegetation has trimmed the tree back & cleared it out of the way. No further action required.
			05 Planned (IEEE)	0.48%	
			28 Other Cause	0.18%	
			20 Equipment failure	0.13%	
				100%	
WILDER - H9320590043	WILDER	H9320590043	03 Vegetation	57.89%	All Vegetation outage minutes are from a large live oak tree 35 feet from the centerline that uprooted & fell across all three phases, breaking a pole & a cross arm on another pole, resulting in a recloser lockout. The pole & cross arm were replaced at the time of investigation. The majority of the Public Accident/Damage outage minutes are due to a vehicle hitting & breaking a double circuit pole & damaging an adjacent pole, causing both circuits to lockout. Both poles & damaged equipment were replaced at the time of restoration. No further action required. This circuit is planned to be trimmed this year (2022).
			09 Public Accident/Damage	39.34%	
			20 Equipment failure	2.05%	
			05 Planned (IEEE)	0.72%	
				100%	
WILDER - H9320590045	WILDER	H9320590045	11 Unknown Cause	65.83%	All Unknown Cause outage minutes are due to a fallover during a system software upgrade. The issue was identified & corrected. The majority of the Equipment Failure outage minutes are due to an equipment failure on a single phase tap. All equipment was repaired or replaced at the time of restoration. The majority of the Vegetation outage minutes are due to a tree that came down on the lines. No further action required. This circuit is planned to be trimmed this year (2022).
			20 Equipment failure	12.12%	
			03 Vegetation	11.46%	
			05 Planned (IEEE)	6.16%	
			D4 Wildlife	2.49%	
			19 Lightning strike	1.94%	
				100%	
WILDER - H9320590048	WILDER	H9320590048	09 Public Accident/Damage	99.94%	All Public Accident/Damage outage minutes are due to a vehicle hitting & breaking a double circuit pole & damaging an adjacent pole, causing both circuits to lockout. Both poles & damaged equipment were replaced at the time of restoration. No further action required.
			28 Other Cause	0.06%	
				100%	

Duke Energy Kentucky's Vegetation Management Plan

Goals

Duke Energy Kentucky's vegetation management goal is to balance the need for safe and reliable utility service with safe and cost-effective vegetation management practices.

The primary objective of the Duke Energy Kentucky Vegetation Management Program is to control the growth of incompatible vegetation along its electric lines to help provide safe and reliable service to our customers. This is accomplished by using qualified personnel to monitor the condition of the utility rights-of-way and by initiating various vegetation control practices to reduce, manage or eliminate incompatible growth. This integrated vegetation management (IVM) program is essential in providing safe and reliable electric service by ensuring that trees and brush near or within rights-of-way are periodically trimmed or removed to help reduce potential outages and hazards near our facilities.

The consistent implementation of industry accepted vegetation management practices reduces the likelihood of tree and power line conflicts, as well as service interruptions, and allows for the full utilization of the operating system.

Safety

Our goals are to work safely at all times to achieve a zero-injury culture and to minimize the safety risk of vegetation and conductor contacts. Serious or fatal shocks can occur when working in trees near power lines. Duke Energy Kentucky strives to minimize that risk by performing the Integrated IVM work properly in accordance with industry vegetation management safety standards.

Reliability

Duke Energy Kentucky's electric service reliability, as measured by total tree System Average Interruption Frequency Index "SAIFI" and System Average Interruption Duration Index "SAIDI", has improved in recent years due in part to the continuous and preventive approach to IVM practices. Duke Energy Kentucky strives to perform maintenance on its Kentucky distribution circuits every five years. Transmission vegetation management is based upon a threat and condition-based analysis with vegetation management to be performed consistent with Kentucky regulations.

Tree Care Standards

Duke Energy Kentucky requires its employees and contractors to perform IVM in accordance with American National Standards Institute (ANSI) and Tree Care Industry Association (TCIA) standards. The relevant standards are ANSI Z133 Safety Requirements for Arboriculture Operations, and ANSI A300 for tree care practices. Duke Energy Kentucky received recognition as Tree Line USA utility by the Arbor Day Foundation for the second consecutive year in 2021.

Contracting Vegetation Management

A competitive bid event took place previously to award work in the Midwest market. Multiple vendors were given the opportunity to provide pricing on various types of vegetation work. During this event, the Duke Energy Kentucky service area was one of multiple small geographical areas identified to receive separate pricing and award work.

Distribution Vegetation Management

Primary- All Conductors

- Side clearances will be a minimum of 10 ft. from the nearest primary conductor. If vegetation is not encroaching the line and will hold until the next cycle, then the tree will be bypassed.
- Minimum accepted height clearance above the conductor will be fifteen (15) feet above the conductors. All hazardous overhang (dead, dying, diseased, structurally unsound) shall be removed ground to sky.
- For conventional and bucket work, under the primary clearances will be a minimum of 10 ft. from the lowest primary conductor or 5 ft. below all neutrals, open wire and wrapped secondary. For conventional and bucket work, if vegetation is not encroaching the line and will hold until the next cycle, then the tree will be bypassed. Where mechanical tree trimmers are used – the Right-of Way (ROW) will be mowed to the whole width of the ROW.

Secondary Lines:

- Secondary, including open wire secondary distribution conductors (without a primary distribution line and excluding a service drop), shall be trimmed on an as needed basis. Any scheduled work shall require a minimum of 5 ft. of clearance on all sides.
- Multiplex cables and guy wires (without a primary distribution line and excluding a service drop), shall be trimmed on an as needed basis. Any scheduled reactive work shall require the removal of load bearing limbs that are in contact with conductors and have a size and weight that causes tension on the conductor or interference with the normal sag or alignment of the conductor. When pruned, 12 inches of clearance shall be obtained.

Services Lines:

- Street light wires and Services shall be trimmed on an as needed basis. Any scheduled work shall require the removal of load bearing limbs that are in contact with conductors and have a size and weight that causes tension on the conductor or interference with the normal sag or alignment of the conductor. When streetlight wires are pruned, 12 inches of clearance shall be obtained.

Brush/Wood Removal:

- In areas with low customer/property owner impact (i.e., non-landscaped areas, wooded areas) brush and debris can be windrowed along the side of the ROW corridor and cut into smaller pieces to lay flat to the ground. Contractor shall not leave any debris in ditches, waterways, or drains. Wood shall be cut into manageable lengths (18"-24") and stacked along the ROW edge.
- In areas with customer/property owner impact (i.e., landscaped areas, maintained areas, high use areas) brush and debris should be chipped, captured, and removed from site. No brush is to be left overnight without the consent of the property owner or their agent. Wood shall be cut into manageable pieces (typically 18"-24") and left on-site. Lawn areas and hardscapes (patios, sidewalks, driveways, etc.) shall be cleaned up and returned to the condition prior to Work at time of entry on the property.
- Customer may request off-cycle maintenance in accordance with the clearance standards above - brush and wood is customer's responsibility.
- Storm Work - no brush or wood removal.

Determination of Need to Perform Maintenance/Evaluation of Plan Effectiveness

Duke Energy Kentucky regularly monitors its SAIFI and SAIDI measures. If SAIFI or SAIDI were to significantly decline, Duke Energy Kentucky will evaluate whether to modify its IVM practices, including its right-of-way clearing cycle, in order to improve SAIFI and SAIDI performance. Duke Energy Kentucky also monitors the performance of individual circuits. If an individual circuit has a significant number of outages, Duke Energy Kentucky will perform off-cycle tree trimming as needed. Duke Energy Kentucky also monitors industry tree trimming standards and modifies its IVM practices as necessary to meet or exceed industry standards.

Customer Notification

- Duke Energy Kentucky notifies customers of tree trimming on their property by door hanger cards.
- Duke Energy Kentucky requires its contractors to contact local government officials prior to beginning work in the community.

Transmission Vegetation Management

Duke Energy Kentucky's program is designed on an IVM strategy that targets removals of incompatible vegetation to minimize potential outages to the Transmission system and ensure necessary access within all transmission line corridors. The reason for IVM is to create, promote, and conserve sustainable plant communities that are compatible with the intended use of the site, and manage incompatible plants that may conflict with the intended use of the site. This approach is recognized as an industry best management practice and is in alignment with ANSI A300 Part 7 standard.

As part of the IVM strategy, Duke Energy Kentucky utilizes a threat and condition-based approach for planned work. This approach of identifying threats as triggers to determine incompatible vegetation within and outside the Transmission Right of Way. Duke Energy Kentucky utilizes a process to define compatible and incompatible vegetation to balance the needs of public and worker safety as well as the reliable operation of the Transmission system. A time-based herbicide program is used to further manage the ROW of incompatible vegetation and support IVM.

Threat/Condition-Based triggers

For planned work, threat trigger distances are used by Company representatives responsible for implementing vegetation management to identify vegetation threats that do not allow for safe operation of the transmission facilities, under all operating conditions (designed blowout and designed maximum operating sag). These threat triggers are radial distances based on engineering design criteria for the conductor sag and blowout operating locations and are voltage dependent.

These threat trigger distances are voltage specific and provide for approximately 6 years of typical vegetation re-growth and supports minimum safe worker distances. Once vegetation has been identified as a threat, the vegetation will be evaluated to determine a mitigation strategy through the work planning process.

Threat/Condition-Based Action

During the work planning and marking process, many factors and criteria are considered when developing the mitigation strategy. A Duke Energy Kentucky utility vegetation management professional will evaluate the vegetation based on arboricultural, regulatory/safety standards, legal ROW rights and criteria such as size,

age, location, growth rate, maintained/landscaped vs. non-maintained/non-landscaped, etc. All incompatible vegetation identified during these evaluations and are targeted for removal. For property owners that communicate concern with the proposed mitigation strategy to Duke Energy Kentucky personnel an alternative mitigation strategy may be considered. One mitigation strategy includes herbicide application.

Special/Specific Situations

Roadside: For situations such as roadside, overhead Transmission lines built within public road right of way with limited Transmission Right of Way rights, a Wire Zone / Border Zone approach will be utilized with property owners to manage vegetation threats within and outside of the public road right of way.

Off ROW Danger Tree: Duke Energy Kentucky personnel will focus on removing danger tree threats for reliability and storm hardening purposes on narrow corridors or rural areas where rights outside of the easement allow.

Storm: During storm events, debris in maintained or landscaped areas associated with emergency operations restoration efforts will be left on site and is the responsibility of the property owner.

Property Notification

Duke Energy Kentucky attempts to notify property owners of tree work on their property by door hanger cards.

Potential Outage Risk: When a Transmission outage risk is identified, Duke Energy Kentucky will attempt to notify the affected property owner if practical and possible. However, Duke Energy Kentucky may need to take immediate action, such as remove the vegetation, to protect the reliability and security of the Transmission system.

Duke Energy Kentucky complies with all state statutes, municipal codes, commission rules, regulations, orders, and approved tariffs as it pertains to notification.

Right Tree in The Right Place

Duke Energy Kentucky will cooperate in tree removal with local government officials as needed.