



IOWA STATISTICS SUMMARY (2011 - 2024)									
26	CLIMATE DISASTER DECLARATIONS								
\$1.0 BILLION	FEMA + HUD POST-DISASTER FUNDING								
3.2 MILLION PEOPLE	POPULATION TOTAL								
\$329	PER CAPITA SPENDING ON CLIMATE DISASTERS								
BUTLER, CLAY,EMMET, HOWARD, MITCHELL, WINNESHIEK & WRIGHT (9 DISASTERS)	COUNTY WITH THE HIGHEST DISASTER OCCURRENCES								
56	COUNTIES HAVE HAD FIVE OR MORE DISASTERS								
610K PEOPLE	LIVE IN AREAS WITH VERY HIGH SOCIAL VULNERABILITY (SVI > 0.75)								
1.4 HOURS	TOTAL OUTAGE DURATION (HOURS PER CUSTOMER PER YEAR)								
C (2023)	ASCE INFRASTRUCTURE REPORT CARD GRADE								
26	SUPERFUND SITES								
\$2.8 BILLION	CLIMATE INFRASTRUCTURE SUPPORTED THROUGH SMALL INSURANCE SURCHARGE								
4TH HIGHEST	RANK IN TOP 10 STATES WITH HIGHEST NUMBER OF DISASTER DECLARATIONS								

# **DISASTER OCCURRENCES 2011–2024**

FEDERALLY DECLARED MAJOR DISASTERS BY COUNTY

# disaster declarations 56 counties in Iowa have had five or more recent disasters. Butler, Clay, Emmet, Howard, Mitchell, Winneshiek, and Wright County have had 9 recent disasters, the largest amount in the lowa.

### **Number of Disaster Events**

Major Disaster Declarations (2011-2024)

0 occurences

1 occurrence

2-3 occurences

4-6 occurrences

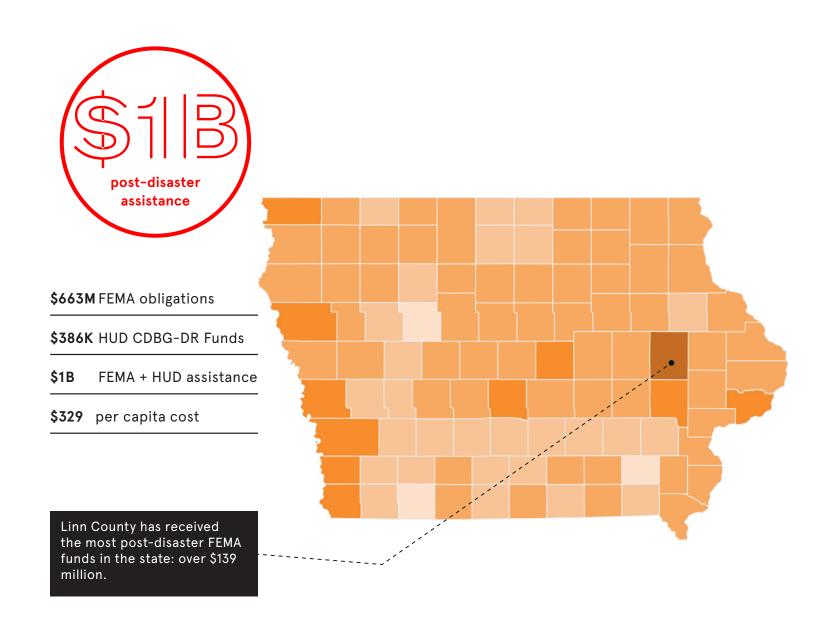
7-9 occurrences

10+ occurrences

MAP MADE BY REBUILD BY DESIGN FEMA DATA COURTESY OF IPARAMETRICS

# FEDERAL ASSISTANCE 2011-2024

POST-DISASTER PUBLIC ASSISTANCE AND HAZARD MITIGATION FUNDS OBLIGATED BY COUNTY FOR CLIMATE DISASTERS



### **FEMA Public Assistance and Hazard Mitigation**

Federal Share Obligated (2011-2024)

\$0 to \$100K

\$100K to \$1M

\$1M to \$10M

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\$10M to \$50M

\$50M to \$100M

\$100M to \$500M

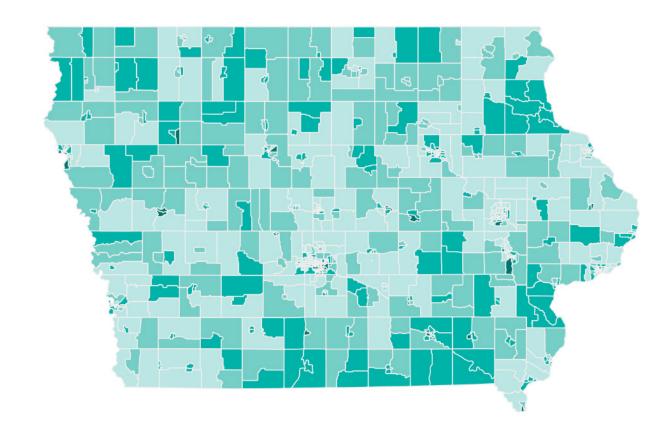
MAP MADE BY REBUILD BY DESIGN FEMA DATA COURTESY OF IPARAMETRICS

90

# **SOCIAL VULNERABILITY INDEX 2022**

# AREAS OF GREATEST SOCIAL VULNERABILITY

Clarke, Wapello, Crawford, and Woodbury County have social vulnerability above 0.7 and their populations changed between -5% and 4% from 2010 and 2024.



## Social Vulnerability Index

CDC (2022)

No Value

0.0 - 0.2

0.2 - 0.4

0.4 - 0.6

0.6 - 0.8

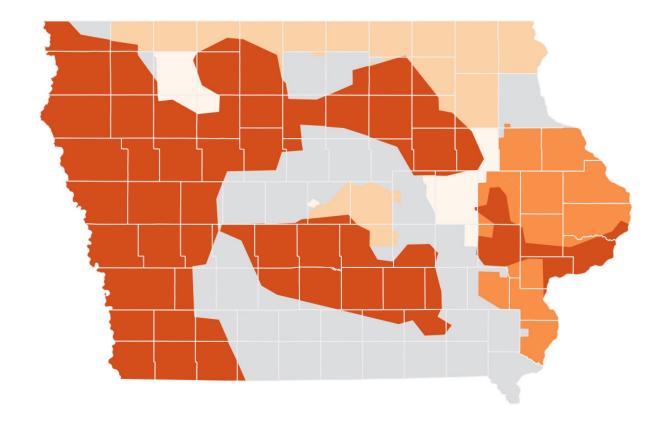
0.8 - 1.0

MAP MADE BY REBUILD BY DESIGN DATA SOURCE: CDC/ATSDR 2022 SVI

# **ENERGY RELIABILITY 2023**

# **COUNTIES AT GREATEST RISK OF POWER OUTAGES**

The majority of counties in the west of lowa have large areas with the third longest service interruptions in the state, 364 minutes total.



# **Aggregated Annual Electric Outage Duration** Including major events - SAIDI\_W\_MED

missing electric outage data

0 - 60 minutes

60 - 120 minutes

120 - 240 minutes

240 - 456 minutes

456-7,700 minutes

MAP MADE BY REBUILD BY DESIGN SOURCE: U.S. ENERGY INFORMATION ADMINISTRATION 2023

TOTAL: 26 DISASTERS		Total			2011	2013	3			2014		2015	2016	2017	20	2018	2019	2020	2022	2023	2024	
FEMA PA + HM: \$662.5 M HUD CDBG-DR: \$385.9 M				977: SEVERE STOR TORNADOES, AND	1998: FLOODING STRAIGHT-LINE WINDS, AND FLOODING STORMS 4114: SEVERE WINTER	4119: SEVERE STORMS, STRAIGHT-LINE WINDS,	4126: SEVERE STORM	DING TORNADOES	S, AND	4184: SEVERE STORMS, 4 TORNADOES, STRAIGHT-LINE TOR	RNADOES STRAIGHT-LINE TORNADO	ES, STRAIGHT- INDS, AND 4281: SEVERE STRAIGHT-LINE	4/89' SEVERE STORMS AN	4334: SEVERE STORMS, D TORNADOES, STRAIGHT- LINE WINDS, AND	TORNADOES, STRAIGHT-LIN	NE TORNADOES	421: SEVERE STORMS AND 4430: SEVE FLOODING AND FL	RESTORMS AFF7: SEVEDE STORMS AND STO	ERE STORMS 4642: SEVERE STORMS, AIGHT-LINE WINDS,	4732: FLOODING	4779: SEVERE STORMS AND TORNADOES AND TORNADOES	AND FLOODING, STRAIGHT
FEMA + HUD ASSISTANCE: \$1.0 B			:	STRAIGHT-LINE WIN	DS AND FLOODING AND FLOODING STORM	AND FLOODING	TORNADOES, AND FLOO	FLOODII	ING FLOODING	WINDS, AND FLOODING		DODING FLOOD	NG PLOODING	FLOODING	WINDS, AND FLOODING	TORNADUES	FLOODING AND FL	W	INDS AND TORNADOES		FLOODING	G WINDS, AND TORNAD
GEOID COUNTY NAME # OF DISASTE	RS FEMA TOTAL P	PA Obligations HM	/I Obligations	PA HM Obligations Obliga	PA Obligations Obligations Obligations Obligations Obligations Obligations Obligations Obligations Obligations	PA HM s Obligations Obligations	PA Obligations Obligat	PA ions Obligations C	HM PA HM Obligations Obligations	PA Obligations	Obligations HM PA Obligations Obligatio	HM PA as Obligations Obligations	HM Obligations PA Obligations Obligation	PA HM s Obligations Obligations	PA Obligations	PA HM ns Obligations Obligations	Obligations HM Obligations PA Obligations	HM Obligations PA Obligations HM Obligations Obligations	HM PA HM s Obligations Obligations Obligation	PA F s Obligations Oblig	HM PA HM PA gations Obligations Obligations Obl	HM PA HM Digations Obligations Obliga
19000 19000: Statewide 26 19001 19001: Adair County 4	\$125,337,880.65 \$1 \$246,483.01	100,298,090.90 \$2 \$246,483.01	5,039,789.75 \$1 \$0.00	,792,419.51 \$31,9	80.00 \$16,932,058.61 \$369,975.00 \$1,524,420.29 \$39,446.00 \$356,057.30 \$145,845.00 \$7,369,494.35 \$1,131,241.	00 \$1,270,353.64 \$328,926.00	\$2,265,456.14 \$461,3	\$20.00 \$581,286.99	\$73,890.00 \$2,049,747.41 \$60,497.00	\$1,807,000.87 \$176,084.00 \$	\$995,464.34 \$352,180.00 \$1,289,885	.26 \$73,009.00 \$258,364.84	\$756,369.00 \$1,513,932.63 \$156,673	00 \$499,650.23 \$89,556.2	\$973,798.66 \$308,445.2 \$4,768.47 \$0.0	.20 φ+01,707.00 φ00,027.++ φ	22,428,702.09 \$3,473,747.89 \$545,019.55 \$135,889.32 \$0.00	\$0.00 \$28,116,134.69 \$14,948,251.89 \$1,219,862.8 \$4,310.58 \$0.00	52 \$0.00 \$3,755,177.37 \$107,992.0	90 \$739,682.81 \$79,	,260.00 \$410,919.53 \$13,486.67 \$650,086.15 \$6 \$101,514.64	64,116.87 \$471,357.62 \$1,711, <sup>7</sup> \$0.00
19003 19003: Adams County 3	\$524,856.87	\$524,856.87	\$0.00					0000 745 74	\$137,717.60 \$0.00		0.107.70	57 00 00 04 044 050 00	00.00 0.00 477.00 00	00 044 470 70 000			\$354,743.47 \$0.00			<b>A40.000.70</b>	\$32,395.80	
19005 19005: Allamakee County 8 19007 19007: Appanoose County 5	\$3,166,084.98 \$748,897.49	\$3,166,084.98 \$748,897.49	\$0.00			\$287,240.65 \$0.00	\$65,979.15	\$986,745.71 \$0.00	\$0.00	\$223,973.62 \$0.00	\$127,707 \$343,192	***************************************	\$0.00 \$423,177.22 \$0	00 \$44,476.79 \$0.0	00		\$305,651.29 \$0.00 \$0.00 \$0.00		\$52,484.86 \$0.0	\$42,399.79	\$0.00	
19009 19009: Audubon County 4 19011 19011: Benton County 5	\$853,173.22 \$6.917.142.44	\$853,173.22 \$6,819,936.04	\$0.00 \$97 206 40		\$2,520,970.54 \$60,030.00		\$255.106.01	\$267,629.37 \$0.00 \$26,975.91		9	\$319,737.13 \$0.00		\$242,120.52 \$7,064	40			\$249,942.86 \$0.00	\$3,774,763.06 \$0.00	\$15,863.86 \$0.0	00		
19013 19013: Black Hawk County 2	\$3,411,569.81	\$2,166,801.89 \$	1,244,767.92		Ψ2,020,070.01 ψ00,000.00		Ψ200, 100.01	φ2.00	<b>400</b> ,112.00	3	\$477,928.64 \$0.00		\$1,688,873.25 \$1,244,767									
19015 19015: Boone County 2 19017 19017: Bremer County 5		\$1,511,405.73 \$2,216,869.33	\$0.00 \$624,377.89		\$2,104.26 \$0.00				\$3,911.25 \$0.00				\$277,928.95 \$0	00 \$1,398,062.93 \$608,927.8	39		\$167,726.77 \$0.00 \$534,861.94 \$15,450.00	\$1,343,678.96 \$0.00				
19019 19019: Buchanan County 7 19021 19021: Buena Vista County 8		\$1,733,673.81 \$7,517,038.53		\$7,419.41	20.00			\$0.00 \$162,117.29 \$0.00	\$0.00	\$52,214.46 \$45,203.00 \$428,212.68 \$0.00			\$117,759.08 \$0	00 \$127,054.57 \$0.0	\$243,932.79 \$0.0 \$216,053.38 \$0.0		\$789,370.55 \$0.00 \$5,753,202.38 \$33,001.32		\$29,968.92 \$0.0	00	00.02	\$0.00 \$21,134.22
19023 19023: Butler County 9	\$3,462,978.99	\$2,433,484.69 \$		\$7,419.41			\$171,904.51 \$27,4	* * * * *	\$0.00		\$150,441.82 \$0.00 \$5,232	.62 \$0.00	\$1,223,620.71 \$1,002,008	30	\$11,349.46 \$0.0		\$420,811.19 \$0.00				\$0.00	\$0.00
19025 19025: Calhoun County 3 19027 19027: Carroll County 2	\$4,833.23 \$223,328.49	\$4,833.23 \$223,328.49	\$0.00 \$0.00		\$5,817.02 \$0.00												\$0.00 \$0.00 \$217,511.47 \$0.00		\$0.00 \$0.0	00	\$4,833.23	\$0.00
19029 19029: Cass County 3	\$301,352.71	\$301,352.71	\$0.00		\$10,765.43 \$0.00	M440.047.00 M0.00		0007 440 74	00.00		#400 004 F4						\$204,256.37 \$0.00	M4 540 700 05	\$86,330.91 \$0.0	00	00.000.05	00.00
19031 19031: Cedar County 5 19033 19033: Cerro Gordo County 2	\$2,582,321.46 \$815,483.04	\$2,507,284.35 \$815,483.04	\$0.00			\$149,617.80 \$0.00		\$397,416.74	\$0.00	3	\$438,384.51 \$0.00		\$296,494.71 \$0	00	\$518,988.33 \$0.0	.00		\$1,513,799.05 \$75,037.11			\$8,066.25	\$0.00
19035 19035: Cherokee County 8 19037 19037: Chickasaw County 7		\$7,226,795.27 \$ \$2,445,750.50	1,402,455.38 \$0.00	\$0.00	\$0.00 \$2,788.14 \$0.00		\$2,915,714.55 \$1,363,4 \$81,891.15			\$615,741.63 \$0.00 \$89,149.95 \$0.00		\$218.868.07	\$0.00 \$1.523.121.61 \$0	00 \$423,070.51 \$0.0	\$209,503.21 \$0.0 00 \$106,861.07 \$0.0		\$3,444,053.11 \$39,048.38		\$3,274.20 \$0.0	00	\$0.00	\$0.00 \$38,508.57
19039 19039: Clarke County 2	\$133,209.19	\$133,209.19	\$0.00						\$82,002.20 \$0.00			Ψ2 10,000.01	ψοου ψ.,ο <u></u> ου,	ψο.ο							\$51,206.99 \$0.00	
19041 19041: Clay County 9 19043 19043: Clayton County 8	\$6,829,290.46 \$2,474,878.41	\$4,848,171.46 \$ \$2,459,606.80			\$19,194.48 \$1,981,119.00 \$77,882.22 \$0.00		\$62,654.47 \$157,563.20	\$0.00 \$0.00 \$240,618.06	\$31,877.25 \$0.00 \$0.00	\$984,723.49 \$0.00	\$(	.00 \$0.00 \$149,640.43	\$0.00 \$35,490.62 \$0	00 \$1,181,496.36 \$15,271.6	\$602,025.23 \$0.0 61		\$592,830.26 \$0.00 \$486,706.19 \$0.00			\$208,091.94		\$0.00 \$2,476,984.06
19045 19045: Clinton County 3 19047 19047: Crawford County 4		\$2,526,619.18 \$ \$1,938,692.46				\$154,337.50 \$0.00	\$318,983.70	00.02		d	\$548,473.07 \$0.00						\$1,678,736.02 \$1,118,739.61 \$1,071,235.69 \$0.00	\$693,545.66 \$0.00			\$0.00 \$0.00	
19049 19049: Dallas County 5	\$2,347,727.34	\$2,099,576.75	\$248,150.59							3	\$695,805	.91 \$0.00			\$317,716.24 \$0.0	.00	\$334,847.30 \$0.00	\$751,207.30 \$248,150.59			\$0.00 \$0.00	\$0.00
19051 19051: Davis County 5 19053 19053: Decatur County 3	\$1,595,462.05 \$685,027.38	\$1,595,462.05 \$685,027.38	\$0.00 \$0.00			\$185,785.56 \$0.00 \$237,736.53 \$0.00	\$43,253.07	\$0.00	\$437,944.51 \$0.00		\$1,132,687	.52 \$0.00					\$233,735.90 \$0.00 \$9,346.34 \$0.00		\$0.00 \$0.0	00		
19055 19055: Delaware County 5 19057 19057: Des Moines County 8	\$884,501.42	\$884,501.42 \$5,949,468.94	\$0.00				\$108,568.77 \$624,235,48				\$702,227.20 \$0.00 \$318,216	83 \$14 150 00	\$115,404.83 \$0 \$148,087.15 \$0		\$88,263.75 \$0.0		\$379,432.23 \$0.00 \$2,699,656.74 \$0.00			\$563,738.31	\$0.00	\$480,754.65
19059 19059: Dickinson County 6	\$832,703.30	\$832,703.30	\$0.00		\$196,761.76 \$0.00 \$60,125.50 \$0.		ψυ24,233.40	ψ0.00		\$181,506.15 \$0.00	φι υ <u>ε, εει .ευ</u> φυ.υυ \$318,216	ψ14, 103.00	φ140,U01.15 \$0		\$141,816.14 \$0.0		\$2,699,656.74 \$224,019.07 \$0.00					\$28,474.68
19061 19061: Dubuque County 4 19063 19063: Emmet County 9		\$3,958,346.67 \$1,709,714.88	\$0.00 \$40,944.53	\$297,368.99	\$3,412,065.81 \$0.00 \$0.00 \$37,336.58 \$0.00 \$133,444.23 \$0.	00	\$47,355.20	\$0.00		\$338,769.71 \$0.00				\$316,031.39 \$0.0	\$35,702.24 \$0.0	.00	\$693,619.45 \$17,941.97		\$126,118.48 \$23,002.5	\$230,249.47 56	\$0.00	\$0.00 \$0.00
19065 19065: Fayette County 7	\$7,805,931.40	\$7,781,072.40	\$24,859.00				\$228,749.53	\$0.00 \$18,945.00		\$1,830,942.36 \$24,859.00		\$188,144.87 \$50,633.56		00 \$1,319,444.90 \$0.0	00		\$4,058,503.00 \$0.00		\$84,275.71			
19067       19067: Floyd County       7         19069       19069: Franklin County       6	\$1,177,725.01	\$1,949,845.70 \$1,177,725.01	\$0.00 \$0.00				\$537,136.78 \$132,908.33	\$0.00 \$0.00		\$91,715.82 \$0.00		\$50,633.56	\$0.00 \$734,420.06 \$0 \$53,075.82 \$0		\$504,739.69 \$0.0		\$38,639.90 \$0.00 \$900,025.04 \$0.00		\$84,275.71 \$0.0 \$0.00 \$0.0		\$0.00	\$0.00
19071 19071: Fremont County 2 19073 19073: Greene County 5	\$24,283,168.13 \$2,653,996.82	\$19,083,493.13 \$ \$2,653,996.82	5,199,675.00 \$0.00		\$5,754,713.00 \$0.00  \text{\$0.00}	\$19,012.30 \$0.00	\$232.395.01	\$0.00									13,328,780.13 \$5,199,675.00 \$821,334.40 \$0.00	\$1,332,971.24 \$0.00	\$248,283.87 \$0.0	00		
19075 19075: Grundy County 5	\$2,816,968.73	\$2,218,950.73	\$598,018.00		\$351,394.20 \$598,018.00		\$472,514.27		\$0.00	9	\$612,376.81 \$0.00							\$273,450.89 \$0.00				
19077 19077: Guthrie County 4 19079 19079: Hamilton County 5		\$1,128,869.40 \$1,276,676.70	\$48,813.75 \$0.00							3	\$233,342 \$218,981.31 \$0.00	.11 \$0.00			\$216,224.77 \$0.0		\$833,208.83 \$48,813.75 \$841,470.62 \$0.00	\$43,686.26 \$0.00	\$18,632.20 \$0.0 \$0.00 \$0.0		\$0.00	\$0.00
19081 19081: Hancock County 5 19083 19083: Hardin County 4		\$782,674.64 \$2,768,169.78	\$0.00 \$0.00				\$122,179.36	90.00		\$192,259.86 \$0.00	\$183,038.71 \$0.00				\$125,380.54 \$0.0	.00	\$292,887.99 \$0.00 \$2,026,764.87 \$0.00	\$436,186.84 \$0.00	\$0.00 \$0.0		\$172,146.25	
19085 19085: Harrison County 5	\$15,386,028.15	\$15,386,028.15	\$0.00		\$1,057,977.66 \$0.00					1	\$165,036.71 \$0.00					\$	14,138,330.79 \$0.00	\$430,100.04 \$0.00			\$0.00 \$0.00 \$0.00	\$0.00 \$189,719.70
19087 19087: Henry County 2 19089 19089: Howard County 9	\$1,058,796.88 \$1,419,603.71	\$1,058,796.88 \$1,419,603.71	\$0.00 \$0.00				\$274,889.15 \$34,462.30	\$0.00 \$0.00 \$42,000.22	\$0.00		\$136,232	.50 \$0.00 \$833,472.11	\$0.00 \$85,128.47 \$0	00	\$102,328.55 \$0.0		\$783,907.73 \$0.00 \$118,566.35 \$0.00		\$67,413.21 \$0.0	00		\$0.00
19091 19091: Humboldt County 7	\$2,607,717.40	\$2,607,717.40	\$0.00	Ф0.00			\$10,362.60	\$0.00		\$143,704.84 \$0.00	<b>CO. OO. CO. OO.</b>				\$173,030.11 \$0.0	.00	\$2,277,152.92 \$0.00		\$0.00 \$0.0		\$0.00	\$0.00 \$3,466.93
19093 19093: Ida County 5 19095 19095: Iowa County 6		\$1,193,132.91 \$968,725.37	\$0.00 \$166,249.70	\$0.00		\$64,295.11 \$0.00		\$0.00 \$0.00			\$0.00 \$0.00 \$245,382.28 \$0.00						\$970,981.80 \$0.00 \$427,622.40 \$0.00	\$112,855.06 \$166,249.70			\$3,750.00	
19097 19097: Jackson County 7 19099 19099: Jasper County 5		\$1,135,324.85 \$2,563,181.36	\$0.00 \$0.00		\$309,091.39 \$0.00		\$332,980.48	\$0.00			\$234,937.24 \$0.00 \$223,196.99 \$0.00						\$270,531.40 \$0.00 \$699,840.34 \$0.00	\$169,308.90 \$0.00 \$1,243,893.06 \$0.00		\$131,527.95	\$0.00 \$19,927.97 \$63,270.49	
19101 19101: Jefferson County 2	\$0.00	\$0.00	\$0.00			\$0.00 \$0.00					\$0	.00 \$0.00										
19103 19103: Johnson County 4 19105 19105: Jones County 7	\$11,065,538.16 \$2,606,909.56	\$9,693,246.56 \$			\$55,494.94 \$0.00 \$5,961.43 \$0.	\$716,891.14 \$0.00 00		\$0.00 \$0.00 \$186,779.97	\$0.00	\$1,	1,692,083.50 \$1,041,907.00 1,243,570.13 \$0.00						\$80,835.34 \$0.00	\$4,497,307.41 \$330,384.60 \$961,977.08 \$28,600.68				
19107 19107: Keokuk County 4 19109 19109: Kossuth County 7	\$606,336.69 \$3,452,345.67	\$606,336.69 \$3,452,345.67	\$0.00 \$0.00		\$97,819.64 \$0.00	\$7,249.83 \$0.00	\$36,791.24	\$0.00	\$383,692.95 \$0.00		\$154,273.22 \$0.00				\$439,951.08 \$0.0		\$408,022.40 \$0.00 \$2,361,463.09 \$0.00				\$43,889.85	\$0.00 \$0.00
19111 19111: Lee County 7	\$4,969,762.69	\$4,969,762.69	\$0.00			\$1,066,745.88 \$0.00	\$123,657.66		V ,	\$	\$338,417.77 \$0.00 \$139,253	.79 \$0.00	AT TOT 074 00		,,		\$3,085,060.84 \$0.00	0.000.010.700.00		\$128,367.71		,,,,,
19113 19113: Linn County 4 19115 19115: Louisa County 2	\$139,275,643.54 <b>\$1</b> \$1,060,102.03	\$1,060,102.03	\$0.00					\$0.00 \$0.00		\$4,	\$0.00		\$7,797,371.00 \$0	00			\$764,825.56 \$0.00	\$123,846,788.98 \$2,890,444.50				
19117 19117: Lucas County 3 19119 19119: Lyon County 6	\$600,250.64 \$11,690,411.36	\$600,250.64 \$10,467,108.36 \$	\$0.00 1,223,303,00		\$4,183,638.97 \$0.	\$192,890.07 \$0.00 00	\$201,104.51	\$0.00		\$4,569,157.05 \$1,223,303.00	\$124,046	.20 \$0.00			\$573,244.79 \$0.0		\$283,314.37 \$0.00 \$939,963.04 \$0.00					\$0.00
19121 19121: Madison County 1	\$202,766.89	\$202,766.89	\$0.00								244-244-2						\$202,766.89 \$0.00					
19123       19123: Mahaska County       3         19125       19125: Marion County       3	\$401,734.37 \$316,353.47	\$401,734.37 \$316,353.47	\$0.00 \$0.00			\$67,404.52 \$0.00	\$136,907.20	\$0.00		3	\$145,311.37     \$0.00	.95 \$0.00				\$0.00 \$0.00	\$119,515.80 \$0.00					
19127 19127: Marshall County 6 19129 19129: Mills County 5	\$14,869,901.91 \$ \$41,711,640.82 \$				\$486,396.53 \$0.00 \$1,339,940.60 \$0.00		\$430,583.64	\$0.00	\$101,584.77 \$0.00								\$39,975.93 \$0.00 19,407,610.93 \$20,829,787.00	\$8,505,845.86 \$3,215,807.10	\$32,717.52 \$0.0	00	\$0.00	\$0.00
19131 19131: Mitchell County 9	\$2,602,493.95	\$2,351,018.95	\$251,475.00	<b>1</b>			\$1,569,414.66		, 10 s, 10 s s s s s s s s s s s s s s s s s s		\$328,483	.41 \$0.00 \$201,515.03	\$0.00 \$77,233.85 \$0	00 \$0.00 \$0.0	00		\$129,984.91 \$251,475.00		\$44,387.09 \$0.0		\$0.00	
19133 19133: Monona County 5 19135 19135: Monroe County 4		\$4,814,847.80 \$1,184,024.25	\$0.00 \$0.00	\$531,288.67	\$0.00 \$1,168,476.41 \$0.00 \$0.00 \$1,168,476.41 \$0.00 \$1,168,476.41 \$0.00 \$1,168,476.41	\$95,709.54 \$0.00		\$0.00 \$0.00			\$842,43	.72 \$0.00					\$2,705,414.65 \$0.00 \$184,003.29 \$0.00					\$0.00
19137 19137: Montgomery County 3 19139 19139: Muscatine County 6	\$638,882.43 \$2,938,619.50	\$638,882.43 \$2,532,451.00	\$0.00 \$406.168.50			\$592,734.92 \$0.00	\$221,517.94	\$0.00	\$372,856.41 \$0.00		\$366,170.43 \$0.00						\$237,365.58 \$0.00 \$1,206,620.24 \$406,168.50	\$126,657.47 \$0.00			\$28,660.44 \$18,750.00	
19141 19141: O'Brien County 5	\$1,770,580.51	\$1,770,580.51	\$0.00		\$257,209.44 \$0.	00	\$111,597.61				φυ.ου				\$1,146,006.34 \$0.0	.00	\$255,767.12 \$0.00	\$125,551.11 \$0.00			Ψ10,730.00	\$0.00
19143 19143: Osceola County 5 19145 19145: Page County 1	\$1,110,186.78 \$362,718.96	\$1,110,186.78 \$362,718.96	\$0.00 \$0.00		\$263,819.23 \$0.	00				\$131,391.60 \$0.00					\$540,171.90 \$0.0		\$174,804.05 \$0.00 \$362,718.96 \$0.00					\$0.00
19147 19147: Palo Alto County 8 19149 19149: Plymouth County 4	\$2,258,564.77	\$1,932,365.02 \$1,888,134.49	\$326,199.75 \$0.00		\$1,942.73 \$0.00		\$68,584.76 \$625,721.78		\$3,911.25 \$0.00	\$361,329.39 \$0.00 \$137,116.20 \$0.00					\$748,991.81 \$0.0	.00	\$740,014.20 \$326,199.75 \$1,103,456.24 \$0.00		\$0.00 \$0.0	00		\$7,590.88 \$21,840.27
19151 19151: Pocahontas County 7	\$610,424.73	\$563,659.73	\$46,765.00	\$14,778.48	\$0.00 \$5,817.02 \$46,765.00		ψ020,121.10	V0.00		\$137,116.20 \$154,135.04 \$0.00					\$148,894.62 \$0.0	.00	\$215,730.61 \$0.00		\$0.00 \$0.0	00		\$24,303.96
19153 19153: Polk County 5 19155 19155: Pottawattamie County 6	\$13,711,731.27 \$ \$40,699,612.28 \$	\$12,312,107.57 \$ \$33,617,887.75 \$			\$16,754,698.29 \$2,907,087.00				\$1,339,622.48 \$0.00						\$3,841,883.06 \$1,335,455.9		\$1,385,202.84 \$64,167.75 15,523,566.98 \$4,174,637.53	\$7,081,022.68 \$0.00			, , , , , , , , , , , , , , , , , , , ,	\$0.00 \$0.00 \$0.00
19157 19157: Poweshiek County 7		\$4,603,105.74 \$1,291,386.97	\$401,498.90 \$0.00		\$2,104.26 \$0.00 \$67,450.72 \$0.00	\$524,556.33 \$0.00	\$313,232.00	\$0.00	\$14,915.25 \$17,819.00 \$440,905.77 \$0.00	9	\$195,285.79 \$0.00						\$325,924.87 \$0.00	\$3,994,776.22 \$383,679.90			\$0.00 \$0.00 \$15,341.50	\$0.00
19159 19159: Ringgold County 4 19161 19161: Sac County 5	\$369,709.06	\$369,709.06	\$0.00	\$58,839.02	SO.00	\$524,556.33 \$0.00	\$0.00	\$0.00	\$440,905.77 \$0.00	\$118,569.91 \$0.00							\$163,648.17 \$0.00		\$28,651.96 \$0.0			
19163 19163: Scott County 4 19165 19165: Shelby County 4	\$10,732,030.09 \$598,219.08	\$7,605,504.81 \$ \$598,219.08	3,126,525.28 \$0.00							9	\$215,791.24 \$0.00						\$4,267,925.26 \$0.00 \$382,427.84 \$0.00	\$2,965,005.65 \$3,126,525.28		\$372,573.90	\$0.00 \$0.00 \$0.00 \$0.00	\$0.00
19167 19167: Sioux County 6	\$4,380,705.34	\$4,169,676.41 \$4,278,872.74	\$211,028.93		\$206,372.37 \$0.	00		\$0.00 \$0.00		\$2,093,138.76 \$197,757.00					\$852,765.07 \$13,271.9 \$418,392.97 \$0.0	.93	\$771,585.31 \$0.00	\$2,020 F20 04				\$6,538.54
19169 19169: Story County 5 19171 19171: Tama County 6		\$4,278,872.74 \$5,573,852.98	\$24,052.50		\$67,548.61 \$0.00 \$413,430.37 \$0.00			\$0.00		9	\$189,685.35 \$0.00				\$418,392.97 \$0.0		\$388,198.86 \$0.00	\$2,938,529.81 \$24,052.50 \$4,099,482.13 \$0.00				\$0.00 \$0.00
19173 19173: Taylor County 1 19175 19175: Union County 2	\$95,457.65 \$1,121,216.09	\$95,457.65 \$1,105,676.09	\$0.00 \$15,540.00						\$95,457.65 \$0.00								\$1,105,676.09 \$15,540.00				\$0.00 \$0.00	
19177 19177: Van Buren County 3	\$151,851.51	\$151,851.51	\$0.00			\$98,346.49 \$0.00										\$53,505.02 \$0.00			\$0.00 \$0.0	00	ψυ.ου	
19179 19179: Wapello County 3 19181 19181: Warren County 3		\$2,058,169.49 \$724,251.27	\$0.00 \$0.00			\$873,302.77 \$0.00 \$5,576.18 \$0.00	\$16,915.76	\$0.00			\$456,703	.12 \$0.00			\$261,971.97 \$0.0		\$1,167,950.96 \$0.00					
19183 19183: Washington County 2	\$121,958.13	\$121,958.13	\$0.00						\$26,004,00		\$74,140.96 \$0.00						\$387,890,52	\$47,817.17 \$0.00				
19185       19185: Wayne County       4         19187       19187: Webster County       4	\$7,441,680.28	\$1,132,248.59 \$7,441,680.28	\$0.00			\$453,562.31 \$0.00		\$0.00	\$36,021.23 \$0.00		\$254,775	.53 \$0.00			\$855,355.44 \$0.0	.00	\$387,889.52 \$0.00 \$6,487,114.02 \$0.00		\$34,670.64 \$0.0	00		
19189 19189: Winnebago County 5 19191 19191: Winneshiek County 9	\$385,396.70 \$5,789,423.62	\$385,396.70 \$4,606,761.20 \$	\$0.00 1.182.662.42					\$0.00 \$618,699.69	\$0.00	\$135,894.17 \$0.00 \$357,613.14 \$0.00	¢272.20	39 \$0.00 \$2.485.826.63	\$271,340.75 \$163,903.32 \$882,168	00 \$40 176 63 \$20 153 6	\$140,186.07 \$0.0 67 \$263,416.23 \$0.0		\$0.00 \$0.00 \$299,645.64 \$0.00					\$38,671.51 \$5,092.53
19193 19193: Woodbury County 5	\$20,894,088.27	\$20,894,088.27	\$0.00		\$3,223,782.36 \$0.00					\$2,182,871.92 \$0.00	ψ312,301	φυ.συ ψε,του,σευ.συ	ψους, 100	φ29, 100.0	\$311,070.00 \$0.0		15,176,363.99 \$0.00					\$0.00
19195 19195: Worth County 4 19197 19197: Wright County 9	\$244,729.43 \$3,059,309.86	\$212,374.43 \$3,059,309.86	\$32,355.00 \$0.00					\$0.00 \$0.00		\$177,029.98 \$0.00	\$29,205	.06 \$0.00	\$129,714.09 \$0	00	\$208,760.94 \$0.0	.00	\$0.00 \$0.00 \$449,597.31 \$0.00		\$8,089.33 \$32,355.0 \$1,935,449.14 \$0.0		\$0.00	\$37,670.13 \$0.00 \$0.00
197 19197. Wright County			2 424 400 05 00	702 114 08 \$31 0	30.00 \$46.379.999.91 \$5.304.946.00 \$5.743.591.82 \$697.494.00 \$4.132.709.44 \$145.845.00 \$12.480.065.52 \$1.131.241.	00 \$7,475,901.65 \$349,926.00	\$20,498,516.19 \$1,852,2	213.00 \$4,516,082.08 \$	\$104,002.00 \$5,532,167.98 \$78,316.00		4,114,715.69 \$1,394,087.00 \$7,078,538		1,027,709.75 \$16,783,200.63 \$3,292,681	62 \$5,349,464.31 \$742,909.3	\$15,343,544.92 \$1,657,173.1	.13 \$2,814,814.41 \$86,327.44 \$1	69,531,388.21 \$36,014,393.45 \$545,019.55	\$0.00 \$198,875,002.01 \$25,437,183.85 \$1,219,862.	52 \$0.00 \$6,571,789.27 \$163,349.5		,260.00 \$462,126.52 \$13,486.67 \$1,776,974.01 \$6	

# **APPENDIX**

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## **DATA VISUALIZATION TOOLS**

It is evident the U.S. is already paying a steep price for this challenge. Rebuild by Design partnered with APTIM and iParametrics to create the following visual tools to demonstrate how climate events have affected each state. The set of six maps depicts which areas have been hit the hardest by recent climate events, where recovery funds are focused, where those individuals with high social vulnerabilities live, and which areas have the least energy reliability.

The U.S. needs to change the way it is making funding decisions. Where we make priority investments is equally important to what we invest in. Returns on investments (ROI) in the form of social benefits to communities needs to be part of grant evaluations. The U.S. need to utilize new decision-making frameworks that are forward-looking. The final map in the set includes an example of a new decisionmaking framework that takes into account current vulnerabilities and future climate risks. This is one example of how physical and social vulnerability indicators could inform where investments in adaptation infrastructure can yield high returns in social benefits to the most impacted communities. Our team recognizes, however, that there are other decision-making frameworks to explore, and further research is needed to understand which indicators should be included in any state-specific model. Given the ever-present constraints on funding availability, the intent of presenting these maps together is to prompt investments that address multiple known vulnerabilities simultaneously within projects, furthering comprehensive climate adaptation planning.

The following data are designed as a tool to help communities understand their risks to make better-informed choices with higher returns on investment, though each state should determine their own framework for investment.

There are always many ways to present these data. For the purposes of this report, we chose to analyze the years 2011–2024. The following six maps and two tables are presented in this format with the following considerations and limitations:

### **GEOGRAPHIC MAP**

The map provides topographic and geographic context for each state and its surrounding areas, indicating whether the state encompasses coastal, riverine, lake, alpine, or desert land.

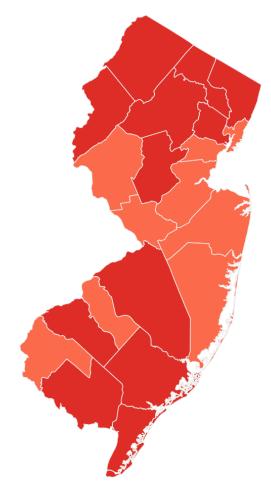


GEOGRAPHIC MAP. SOURCE: ESRI WORLD IMAGERY BASEMAP

# **DISASTER DECLARATIONS (RED)**

This map shows federally declared climate disasters by county from 2011-2024 – providing a snapshot of the magnitude of climate disasters across the country in recent history. This report only identifies federally declared disasters, as there is no entity that collects and publishes state disaster declarations. It should be noted that the declarations shown in this report do not reflect every climate event that has occurred between 2011-2024; the report instead only shows those which have met the cost threshold for a federal disaster declaration. Therefore, the findings overall underestimate the number of occurrences and the suffering that some communities have experienced.

According to the Stafford Act, as amended in May 2021, a "major disaster" includes "any natural catastrophe (including any hurricane, tornado, storm, high water, winddriven water, tidal wave, tsunami, earthquake, volcanic eruption, landslide, mudslide, snowstorm, or drought), or, regardless of cause, any fire, flood,



DISASTER OCCURRENCES SOURCE: FEMA 2011-2024 MAP MADE BY REBUILD BY DESIGN

or explosion, in any part of the United States, which in the determination of the President causes damage of sufficient severity and magnitude to warrant major disaster assistance under this Act to supplement the efforts and available resources of States, local governments, and disaster relief organizations in alleviating the damage, loss, hardship, or suffering caused thereby."

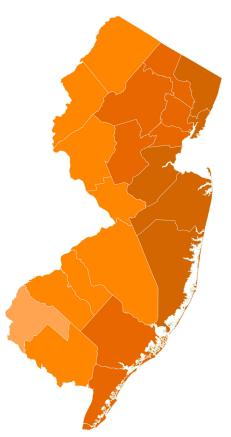
Importantly, extreme heat waves do not fit the criteria for federal disaster declarations despite being the leading cause of deaths among climate hazards. Likewise, sea level rise is not included in this definition despite the threat it poses to numerous communities, including damage to property, loss of land, and displacement.

It should be noted that while most disaster declarations are due to climate events, there are a few instances of disasters due to other natural hazards, such as earthquakes and volcanic eruptions. Though these events are not increasing in magnitude or frequency due to climate change, the severity of their impact may be connected. As climate impacts degrade household and critical infrastructure, communities may become more vulnerable to other natural hazards. Retrofitting infrastructure after these events often requires the same measures as floods, tornadoes, fires, etc., so these events were included in the report to demonstrate the need to prioritize multi hazard adaptation approaches.

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# FEDERAL ASSISTANCE (ORANGE)

The map shows the amount of federal dollars allocated to counties through FEMA's Public Assistance and Hazard Mitigation Grant Programs between 2011-2024 which allocates funding to individual counties and statewide. The map does not show where "statewide" allocations were spent within the state, but rather only shows county allocations. However, these statewide allocation amounts are included in the Disaster Declaration table at the end of each chapter and included in the "FEMA Total" provided next to the map. The adjacent table adds HUD's Community Development Block Grant Disaster Recovery funds – which are only available to states after a disaster – to the FEMA Total for an estimate of federal post-disaster spending in each state.



FEDERAL ASSISTANCE SOURCE: FEMA (HA+PM) 2011-2024 MAP MADE BY REBUILD BY DESIGN

The Disaster Declaration tables provided at the end of each chapter show all federal Disaster Declarations declared between 2011-2024 and the corresponding FEMA obligations associated with those events.

However, in some instances, FEMA continues to obligate funds for years following a declaration. Some states have received funds for events that took place

between 2011-2024 after 2024, so the total sum of funds associated with that event are not captured. All FEMA funds allocated to counties between 2011-2024 are shown in the federal assistance map; however, they do not show up in the Disaster Declaration table if their corresponding event took place prior to 2011. For example, counties in the State of Illinois are still receiving funds from a 1960s storm. The funds obligated to those counties are included in the map, but that event is not included in the Disaster Declaration table at the end of the chapter.

There are additional sources of federal funding made available to governments or individuals in response to disasters, such as the U.S. Army Corp of Engineers (USACE) projects, Small Business Administration (SBA) loans, and private insurance payouts, which are not included in this report because they are harder to uniformly track and/or must be paid back. Therefore, our findings underestimate the total support available to states and individuals post-disaster.

Since disaster aid is allocated to repair physical damage to property, events such as extreme heat, which largely creates physical damage to persons and not property, rarely qualify for federal disaster recovery aid. Additionally, there is only a shallow understanding of the economic impact of social and health-related costs and environmental degradation after a disaster.

# **SOCIAL VULNERABILITY INDEX (GREEN)**

Social vulnerability refers to the potential negative effects on communities caused by external stresses on human well-being. Such stresses include natural or human-caused disasters or disease outbreaks. The factors that determine social vulnerability are directly tied to social determinants of health or the social, economic, and physical factors - such as race, socioeconomic status, and environmental conditions - that influence health. Socially vulnerable populations fare the worst during a disaster and often take longer to recover. The Center for Disease Control/ Agency for Toxic Substance and Disease Registry Social Vulnerability Index (CDC/ATSDR SVI) uses 15 U.S. census variables to help local officials identify communities that may need support before, during, or after disasters. The map presents the SVI on a census block



SOCIAL VULNERABILITY SOURCE: CDC/ATSDR 2022 MAP MADE BY REBUILD BY DESIGN

level, indicating where the most socially vulnerable populations within each county live. The 15 indicators are grouped into four themes:

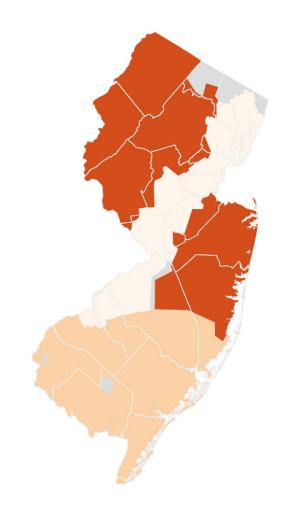
- Socioeconomic Status (below poverty, unemployed, income, no high school diploma);
- Household Composition & Disability (aged 65 or older, aged 17 or younger, older than age 5 with a disability, single-parent households);
- Minority Status & Language (minority, speak English "less than well"); and
- Housing Type & Transportation (multi-unit structures, mobile homes, crowding, no vehicle, group quarters).

Social Vulnerability Index data are not being used to make post-disaster assistance funding decisions. HUD only requires Low and Moderate Income for a portion of their funding. FEMA does not consider it in their allocations.

# **ENERGY RELIABILITY (BROWN)**

Climate events often lead to energy disruptions for hours, days, or weeks. This map shows the annual average interruption time (in minutes) across the different energy utility providers within a state. Regions (or utility territories) in the darkest shade, on average, experience longer energy outages. These data are aggregated by utility territory, not county, meaning more than one provider can serve a county or group of counties.

Viewing the Energy Reliability Map next to the SVI Map, one can begin to infer which regions have the most socially vulnerable residents and are served by the least reliable energy providers. Energy reliability is increasingly becoming related to climate disasters and weather events. Inclusion of these maps is to support evaluation of need for concurrent flood and energy resilience projects.



ENERGY RELIABILITY SOURCE: US ENERGY INFORMATION ADMINISTRATION 2023 MAP MADE BY REBUILD BY DESIGN

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### System Average Interruption Duration Index (SAIDI)

is one of the performance metrics used to measure the reliability of an electric utility's service. This metric measures the total time (in minutes) an average customer experiences a non-momentary power interruption over a one-year (calendar) period.

A Major Event Day (MED) is another metric which occurs when the SAIDI exceeds a specific threshold within a given day and tends to reflect outages on the longer end of the spectrum. The data presented in this report shows a metric of SAIDI combined with MED to highlight and report electric reliability in areas (utility territories) irrespective of the root cause of the interruption. The Energy Reliability Map displays the SAIDI\_W\_MED metric for utility territories and highlights areas that are susceptible to electric system vulnerabilities based on reliability performances. These vulnerabilities serve as an indicator as to where investments and improvements in the distribution grid should be focused.

Electric utilities experience power interruptions due to a variety of issues. Those issues include inclement weather, vegetation management practices, utility practices, maintenance patterns, and capital investment strategy, among others, which all play a part in a utility's overall reliability performance. The U.S. Energy Information Administration produces an Annual Electric Power Industry Report which utilizes data collected from U.S. electric utilities reflecting their reliability performance against certain industry standards and performance metrics. Utilities have the flexibility to report interruptions according to duration and frequency either with major events, without major events, or both.

The annual SAIDI is the summation of the individual SAIDIs for each non-momentary interruption event over the entire year (2023):

 $SAIDI = \frac{\sum (Duration of Interruption \times No. of Sustained Customer Interruptions)}{Total No. of Customers Served}$ 

For utilities that report SAIDI metrics using the Institute of Electrical and Electronics Engineers (IEEE) standards, "non-momentary" interruptions are those lasting

longer than five minutes. A Major Event Day (MED) is another metric which occurs when the SAIDI exceeds a specific threshold within a given day and tends to reflect outages on the longer end of the spectrum.

Utilities have certain flexibilities when reporting with these metrics. Including MED in the SAIDI metric (SAIDI\_W\_MED) provides an overall picture of the electric reliability experienced by customers. Excluding MED from the SAIDI metrics (SAIDI\_WO\_MED) tends to separate power interruption events by their durations, which provides an indicator of the source of the power interruption (i.e., distinguishes a Major Event vs. Systematic Operation interruption).

Our methodology utilizes SAIDI\_W\_MED as the primary measurement indicator for the electric reliability experience of the end user (customer). Our SAIDI\_W\_MED metric highlights the reported electric reliability in areas (utility territories, counties, and states) irrespective of the root cause of the interruption. Our metric does not exclude interruptions categorized as MEDs.

This report endeavors to highlight areas across the national electric distribution network (utility territories) that are susceptible to electric system vulnerabilities based on historical reliability of performance. We view vulnerabilities caused by major events (longer duration outages) on par with vulnerabilities caused by systematic failures (shorter duration outages) and believe they should equally drive electric grid investment and improvement decisions. These investments should also incorporate solutions aimed at mitigating systemic vulnerabilities that stem from issues like vegetation management practices, distribution automation improvements to major event vulnerabilities with root causes embedded in grid hardening, distribution generation schemes, and Automated Metering Infrastructure (AMI) upgrades aimed at minimizing customer interruption numbers and durations.

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