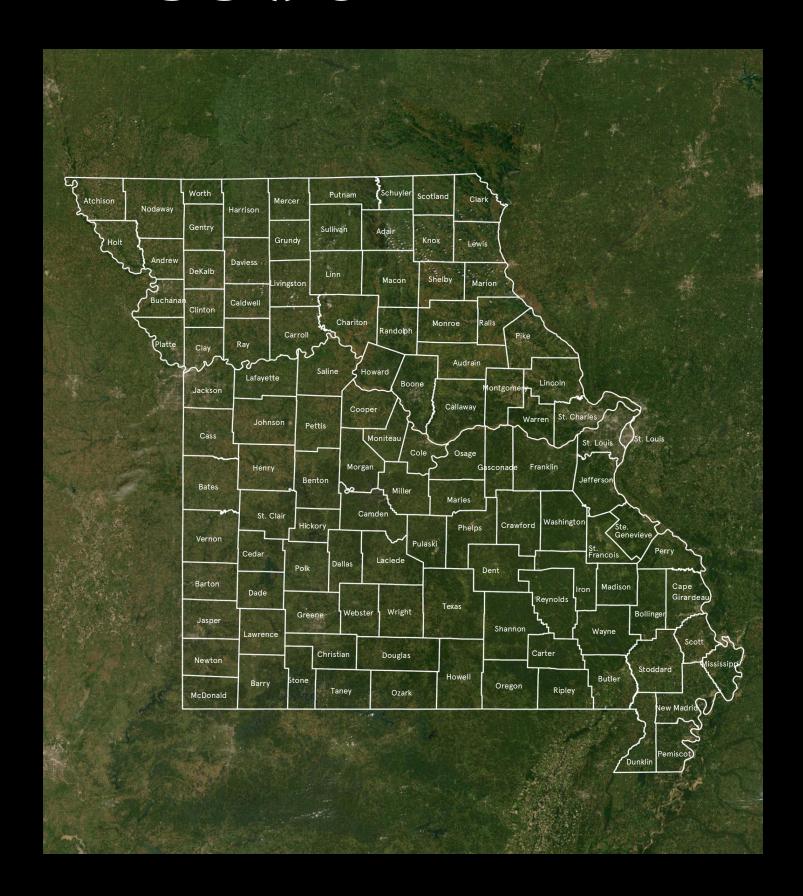
# 

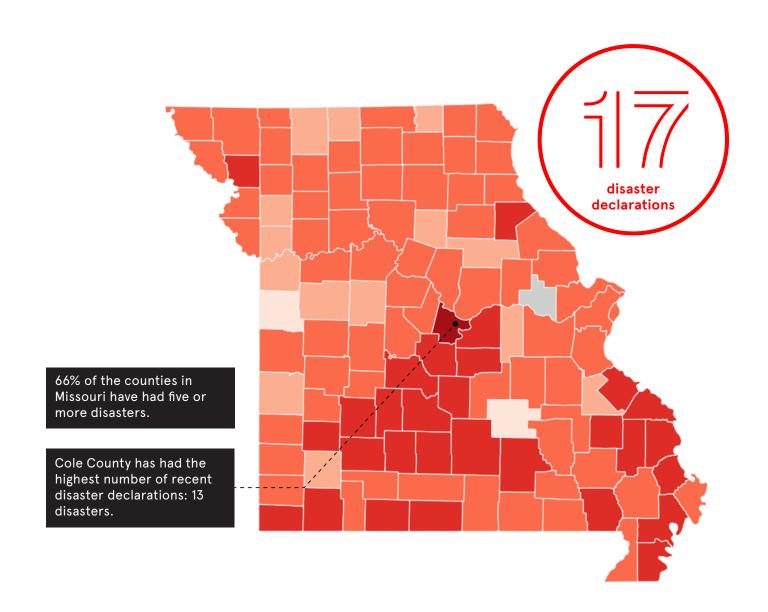


# MISSOURI STATISTICS SUMMARY (2011 - 2024) 17 CLIMATE DISASTER DECLARATIONS \$1.1 BILLION FEMA + HUD POST-DISASTER FUNDING 6.2 MILLION PEOPLE POPULATION TOTAL \$187 PER CAPITA SPENDING ON CLIMATE DISASTERS COLE (13 DISASTERS) COUNTY WITH THE HIGHEST DISASTER OCCURRENCES COUNTIES HAVE HAD FIVE OR MORE DISASTERS 76 828K PEOPLE LIVE IN AREAS WITH VERY HIGH SOCIAL VULNERABILITY (SVI > 0.75) 6.3 HOURS TOTAL OUTAGE DURATION (HOURS PER CUSTOMER PER YEAR) C- (2018) ASCE INFRASTRUCTURE REPORT CARD GRADE 39 SUPERFUND SITES CLIMATE INFRASTRUCTURE SUPPORTED THROUGH SMALL \$5.3 BILLION **INSURANCE SURCHARGE**

CHAPTER NAME 14

# **DISASTER OCCURRENCES 2011–2024**

FEDERALLY DECLARED CLIMATE DISASTERS BY COUNTY



### **Number of Disaster Events**

Major Disaster Declarations (2011-2024)

0 occurences

1 occurrence

2-3 occurences

4-6 occurrences

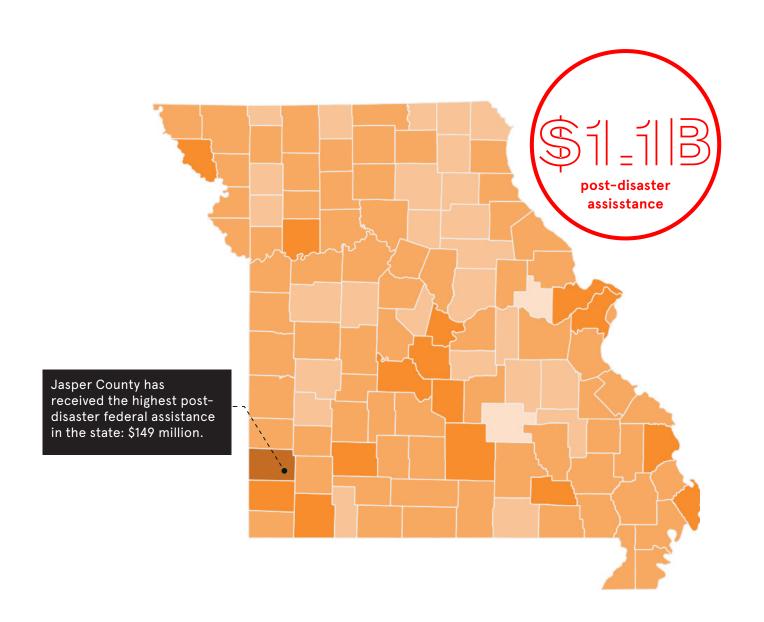
7-9 occurrences

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

\$10M to \$50M

\$50M to \$100M

\$100M to \$500M

\$748M FEMA obligations

\$402M HUD CDBG-DR Funds

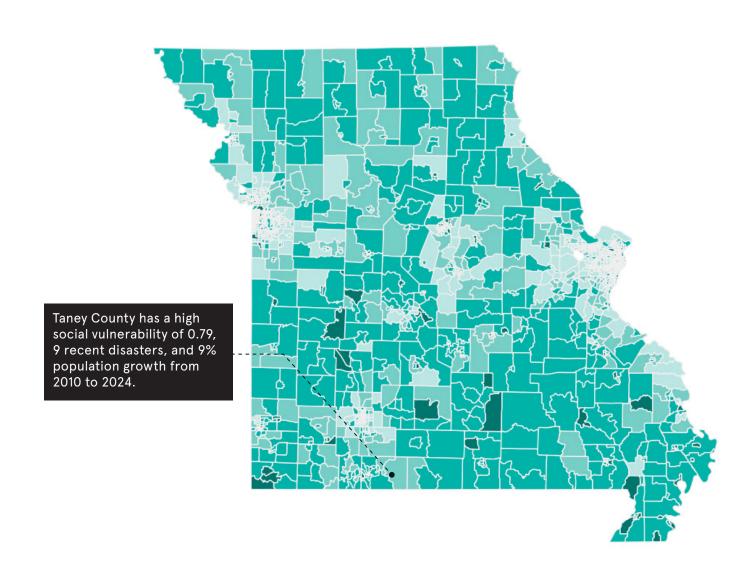
\$1.1B FEMA + HUD assistance

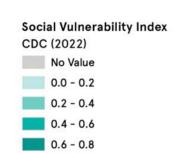
per capita cost

MAP MADE BY REBUILD BY DESIGN FEMA DATA COURTESY OF IPARAMETRICS

# **SOCIAL VULNERABILITY INDEX 2022**

## AREAS OF GREATEST SOCIAL VULNERABILITY



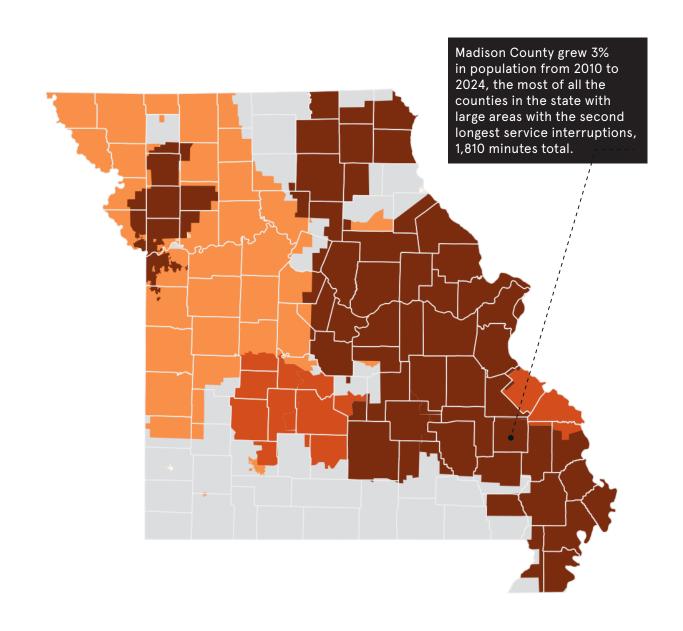


0.8 - 1.0

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

# **ENERGY RELIABILITY 2023**

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



# 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

 $\sim$  10  $\sim$  10

ГОТAL: 17 DISASTERS FEMA PA + HM: \$747.6 M		Total				2011		4130: SEVERE STORMS,	13 4144: SEVERE S		2014 ZERE STORMS.	2015 4238: SEVERE STORM	MS. 4	2016 4250: SEVERE STORMS,	2017 4317: SEVERE STORM	S. 4435; SE\	20 VERE STORMS,	019		2020 4552: SEVERE S		2021 2: SEVERE ST		SEVERE STOR	2022 RMS.	202 4741: SEVER	4803:	2024 B: SEVERE S	STORMS
HUD CDBG-DR: \$402.1 M FEMA + HUD ASSISTANCE: \$1.1 B				1961: SEVERE N STORM AND SNO		1980: SEVERE STORMS, TORNADOES, AND FLOODING	4012: FLOODING	STRAIGHT-LINE WINDS, TORNADOES, AND FLOODING	STRAIGHT-LINE WI	INDS AND TORNADO	ES, STRAIGHT- , AND FLOODING	TORNADOES, STRAIGHT	T-LINE TOF	PRNADOES, STRAIGHT-LINE WINDS, AND FLOODING	TORNADOES, STRAIGHT- WINDS AND FLOODIN	LINE STRAIGHT-L	LINE WINDS, AND LOODING	4451: SEVERE S TORNADOES, AND	EI OODING	TORNADOES, ST LINE WINDS, AND	RAIGHT-	RAIGHT-LINE W TORNADOES, <i>F</i> FLOODING	STRAIGH	HT-LINE WINDS	ARRY SEVEDE STUDING VIII	STRAIGHT-LI TORNADOES, A	NE WINDS, TO	AIGHT-LINE ORNADOES FLOODIN	S, AND
GEOID COUNTY NAME # OF DISASTERS	FEMA TOTAL	PA Obligations H	M Obligations	PA Obligations Ob	HM bligations	PA Obligations   HM Obligations   P	PA Obligations HM Obligations	PA HM Obligations Obligations	PA Obligations O	HM PA Obligations Obligations	HM Obligations	PA Obligations	M ations	Obligations HM Obligations	PA Obligations HM Obliga	ations PA Obligation	ons HM Obligations	PA Obligations HM	Obligations	PA Obligations O	HM pligations	bligations Obl	HM igations PA Obliga	pations Oblig	HM gations PA Obligations Obligations	PA Obligations	HM F Obligations Oblig	PA gations C	HM Obligatio
29000 29000: Statewide 17 29001 29001: Adair County 5	\$61,786,359.46 \$3,751,517.06	\$54,194,646.87 \$3,751,517.06	\$7,591,712.59 \$0.00	\$2,882,525.96 \$55,471.02	\$4,513.00 \$0.00	\$11,816,048.53 \$2,078,133.00	\$5,353,272.26 \$1,011,466.00	\$959,733.78 \$18,458.00	\$796,365.95	\$39,696.00 \$280,776.3 \$282,327.6	\$49,304.00 \$6 \$0.00	\$3,431,032.68 \$853,3 \$1,099,217.77	317.00 \$5, \$0.00	5,074,688.58 \$416,120.30	\$6,503,475.34 \$768,6	\$2,307,478	\$587,579.02	\$9,127,975.26 \$775,272.48	\$742,709.86 \$0.00	\$1,127,042.52	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	368,981.20	\$0.00 \$702,2	275.58 \$244	4,108.92 \$842,131.75 \$331,926.0	\$1,293,273.01 \$1,539,228.13	\$283,222.66 \$827 \$0.00	27,569.57	\$0.
29003 29003: Andrew County <b>7</b> 29005 29005: Atchison County <b>5</b>	\$2,259,633.41 \$8,610,378.06	\$823,350.46 \$7,903,224.06	\$1,436,282.95 \$707,154.00	\$30,651.21	\$0.00		\$470,587.72 \$1,364,746.00 \$3,649,782.68 \$0.00			\$20,421.7 \$93,845.6	\$0.00 \$0.00 \$0.00	400,0000	\$0.00 \$0.00			\$14,811 \$3,416,074	\$0.00 \$1.02 \$707,154.00	,	\$71,536.95 \$0.00		\$^	162,680.30	\$0.00						
29007 29007: Audrain County 3 29009 29009: Barry County 8	\$391,278.31 \$11,984,910.68	\$391,278.31 \$6,732,864.54	\$0.00 \$5,252,046.14	\$64,003.58	\$0.00	\$547,042.55 \$3,575,297.00			\$441,092.72	\$0.00		\$318,061.72 \$588,917.34	\$0.00 \$0.00 \$2,	2,191,854.10 \$1,184,250.00	\$1,053,337.16 \$492,4	199.14		\$476,269.05	\$0.00			\$9,213.01	\$0.00			\$479,150.82	\$0.00 \$955	55,200.80	\$0.
29011 29011: Barton County 6 29013 29013: Bates County 6	\$2,757,045.77 \$2,474,276.30	\$1,367,865.77 \$2,474,276.30	\$1,389,180.00 \$0.00	\$89,632.77 \$251,933.98	\$0.00 \$0.00		\$108,806.25 \$0.00	\$210,120.43 \$0.00				\$373,525.75	\$0.00	\$0.00 \$0.00	\$157,615.31 \$1,389, <i>°</i>	180.00		\$805,622.73 \$1,138,173.33	\$0.00 \$0.00	\$401,692.85	\$0.00					\$104,874.53 \$200,144.14	\$0.00 \$0.00		
29015 29015: Benton County 4 29017 29017: Bollinger County 7	\$1,233,390.47 \$6,455,113.94	\$1,233,390.47 \$812.389.94	\$0.00 \$5,642,724.00	\$65,767.72	\$0.00	\$358,406.33 \$0.00							\$0.00	\$133,073.23 \$0.00	\$170,117.68 \$1,055,2	250.00		\$622,639.85 \$137,396.17 \$2	\$0.00 2.282.754.00					\$0.00 \$2,304	4.720.00	\$0.00 \$13,396.53	\$0.00	\$0.00	\$0.
29019 29019: Boone County 4	\$1,994,252.15	\$1,994,252.15	\$0.00	\$542,572.35	\$0.00									\$1.00,010.E0		\$0.00		\$409,159.56	\$0.00				\$0.00	ψο.σσ ψ2,σσ	1,720.00	<b>\$10,000.00</b>	ψο.σσ	ψ0.00	ψ0.
29021 29021: Buchanan County 6 29023 29023: Butler County 7	\$8,036,476.64 \$9,780,972.51	<b>,</b>	\$1,344,209.00 \$3,252,448.00	\$89,569.22	\$0.00	\$2,065,988.74 \$3,252,448.00	\$2,820,329.93 \$1,344,209.00					\$457,589.53	\$0.00		\$1,814,597.82	\$1,675,698 \$0.00	3.27 \$0.00	\$1,245,636.29 \$53,791.15	\$0.00 \$0.00	\$1,629,017.49	\$0.00	103,444.40	\$0.00	520.85	\$0.00	\$11,177.60	\$0.00 \$151	51.430.86	\$0.
29025 29025: Caldwell County 5 29027 29027: Callaway County 4	\$3,108,430.23 \$722,367.85	\$3,108,430.23 \$703,261.04	\$0.00	\$172,692.43 \$113,402.87	\$0.00 \$0.00	<u> </u>		\$80,001.40 \$0.00		\$8,482.3	\$0.00	\$614,207.76	\$0.00		<b>4</b> ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	40.00		\$1,049,666.15 \$251,435.97	\$0.00 \$19.106.81		\$1,2	263,381.55 258,420.80	\$0.00 \$0.00		V	<b>4</b> 1, 11 100	<b>V</b> 0.00	,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	73.
29029 29029: Camden County 7	\$10,278,269.65	*******	\$3,303,750.00	· · ·	\$0.00				\$1,120,069.99	\$0.00		\$2,084,611.45	\$0.00	\$388,382.91 \$0.00	\$197,895.52 \$1,110,0	000.00		\$3,020,363.25	\$0.00		Ψ2	230,420.00	φυ.υυ			\$32,430.06	\$2,193,750.00		
29031: Cape Girardeau 7 County 29033 29033: Carroll County 5	\$11,029,327.83 \$4,453,287.81	\$3,274,229.10 \$4,453,287.81	\$7,755,098.73 \$0.00	\$85,489.58	\$0.00	\$681,370.18 \$3,545,203.00	\$621,166.73 \$0.00	\$19,943.05 \$0.00					\$	\$174,559.72 \$2,936,958.00	\$428,486.16 \$66,4	\$111,937 \$522,534	••••	\$1,830,851.33 \$ <sup>2</sup> \$2,859,170.67	1,206,519.90 \$0.00		•	364,926.46	00.02			\$27,080.84	\$0.00		
29035 29035: Carter County 4	\$11,732,934.34	\$10,983,460.75	\$749,473.59	, ,		\$321,609.90 \$0.00	\$021,100.73								\$10,146,477.39 \$749,4		4.37 \$0.00	\$2,009,170.07	φ0.00	\$515,373.46	\$0.00	504,920.40	\$0.00					\$0.00	\$0.
29037 29037: Cass County 1 29039 29039: Cedar County 5	\$1,966,634.90 \$893,045.74	\$339,970.90 \$893,045.74	\$1,626,664.00 \$0.00	\$339,970.90 \$1, \$39,304.83	\$0.00				\$89,980.67	\$0.00				\$195,774.11 \$0.00	\$308,537.00	\$0.00		\$259,449.13	\$0.00										
29041 29041: Chariton County 6 29043 29043: Christian County 4	\$2,683,934.32 \$9,423,975.84	\$2,683,934.32 \$2,391,911.84	\$0.00 \$7,032,064.00	\$85,148.37	\$0.00	\$145,601.20 \$5,215,189.00		\$103,120.60 \$0.00				\$396,342.27 \$1,334,655.74 \$1,816,8	\$0.00 875.00		\$417,827.82	\$30,785	5.12 \$0.00	\$1,664,007.32	\$0.00		\$4	104,530.64	\$0.00			\$493,827.08	\$0.00		
29045 29045: Clark County 5 29047 29047: Clay County 3	\$911,509.50 \$1,298,762.91	\$911,509.50 \$1,201,654.42	\$0.00 \$97,108.49	\$22,015.76 \$4,269.86	\$0.00 \$0.00			\$28,836.78 \$0.00				\$86,193.27 \$1,197,384.56 \$97,1	\$0.00 108.49					\$750,714.52 \$0.00	\$0.00 \$0.00							\$23,749.17	\$0.00		
29049 29049: Clinton County 3 29051 29051: Cole County 13	\$716,034.41 \$10,202,465.14	\$716,034.41 \$9,928,715.14	\$0.00 \$273,750.00	\$55,247.37 \$461,980.52	\$0.00 \$0.00	\$851,686.23 \$0.00	\$1,013,153.81 \$0.00	\$364,395.70 \$0.00	\$223,116.61	\$0.00 \$44,821.2	\$0.00		\$0.00 \$0.00	\$0.00 \$0.00	\$3,087,102.41	\$0.00 \$115,113	3.56 \$0.00	\$3,381,070.67	\$273,750.00	\$21,626.14			\$0.00 \$0.00						
29053 29053: Cooper County 4 29055 29055: Crawford County 5		\$1,854,179.66 \$893,469.95	\$0.00	\$92,277.39	\$0.00	\$15,528.22 \$0.00	\$403,665.47 \$0.00	73.00		,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	75.00			,,,,,,		\$0.00	75.50	\$44,697.99	\$0.00			,	\$0.00			\$157,512.03	\$0.00		
29057 29057: Dade County <b>7</b>	\$3,444,280.16	\$2,205,345.62	\$1,238,934.54	\$35,399.33 \$44,904,25	\$0.00	\$10,020.22 \$U.UU			\$589,579.44 \$108,422.99	\$0.00		\$193,561.96	\$0.00	\$370,026.29 \$0.00	\$351,278.19	\$0.00		\$623,550.79 \$1 \$62,413.18		00.00	20.00					\$157,512.03			
29059 29059: Dallas County 7 29061 29061: Daviess County 4		\$835,395.50 \$3,268,027.71	\$270,663.00	\$44,904.25	\$0.00		011-0		\$108,422.99	\$0.00 \$289,681.4	\$0.00	\$584,955.06	\$0.00	\$239,834.92 \$0.00	\$80,428.58	\$0.00		\$2,012,673.92	\$270,663.00	\$0.00	\$0.00	380,717.25	\$0.00						
29063 29063: DeKalb County 4 29065 29065: Dent County 1	\$254,184.30 \$86,754.59	\$254,184.30 \$86,754.59	\$0.00 \$0.00	\$9,136.19	\$0.00		\$44,787.66 \$0.00						\$0.00			\$177,523. \$0.00	3.85 \$0.00												
29067 29067: Douglas County 6 29069 29069: Dunklin County 6	\$6,248,253.70	\$1,877,486.73 \$3,120,363.70	\$133,178.72 \$3,127,890.00			\$245,324.46 \$0.00 \$316,493.92 \$0.00						\$301,147.16	40.00	\$412,913.32 \$0.00 \$80,624.48 \$29,997.00	<b>4.000</b> ,	\$0.00		\$49,754.24 \$489,292.05 \$3	\$0.00 3,097,893.00	\$0.00 \$856,632.95	\$0.00 \$0.00		\$884,7	776.91	\$0.00				
29071 29071: Franklin County 4 29073 Gasconage 3	\$4,880,463.49 \$385,449.47	\$3,464,644.51 \$385,449.47	\$1,415,818.98 \$0.00				\$256,009.79 \$0.00						7.7	1,994,564.65 \$0.00 \$160,884.77 \$0.00	\$555,645.74 \$1,415,8 \$94,359.04	\$18.98 \$658,424 \$0.00	\$0.00	\$130,205.66	\$0.00										
29075 29075: Gentry County 5 29077 29077: Greene County 7	\$1,291,985.31	\$1,291,985.31 \$14,490,169.22	\$0.00 \$10,324,852.38	\$3,486.38	\$0.00	\$989,667.27 \$7,230,035.00				\$178,562.	\$0.00	\$585,509.84	\$0.00			\$0.00		\$394,159.99 \$110,820.38 \$3	\$0.00		\$0.00		\$11,916,4	467.41	\$0.00	\$130,266.54 \$109,896.28	\$0.00 \$0.00		
29079 29079: Grundy County 5 29081 29081: Harrison County 3		\$2,155,220.91 \$2,989,618.92		\$156,584.26	\$0.00					\$526,688.° \$553,561.6			\$0.00	, , , , , , , , , , , , , , , , , , , ,				\$1,230,970.51 \$1,668,731.02	\$0.00			661,937.93	\$0.00			\$179,040.06			
29083 29083: Henry County 5 29085 29085: Hickory County 5	\$1,025,401.42 \$1,863,847.38	\$987,500.56	\$37,900.86 \$1,572,393.00	\$143,903.53	\$0.00 \$0.00					φοσο,σσ11X	φο.σσ	\$258,856.60	\$0.00 \$0.00	\$0.00 \$0.00				\$578,108.37 \$6,175.42	\$37,900.86	¥3,332.33	\$0.00 \$0.00					\$0.00	\$0.00		
29087 29087: Holt County 6	\$20,097,414.20	\$20,097,414.20	\$0.00	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,			\$2,406,370.77 \$0.00	\$440.070.07		\$398,224.8	\$0.00		\$0.00	\$0.00		\$9,725,563	3.58 \$0.00	\$6,464,980.49	\$0.00		\$1,0	014,662.51	\$0.00						
29089 29089: Howard County 5 29091 29091: Howell County 6	\$8,270,680.64	\$3,467,277.01 \$6,937,290.72	\$0.00 \$1,333,389.92	\$40,853.77	\$0.00	\$586,372.18 \$342,830.00	\$124,187.22 \$0.00	\$116,676.67 \$0.00						ψ 100,000.00	\$4,463,899.37 \$129,6			\$491,384.71 \$232,487.57	\$0.00 \$404,024.75		\$26,370.90	594,174.64	\$0.00					27,534.79	\$0.
29093 29093: Iron County 6 29095 29095: Jackson County 3	, =, ==, ==, =====	\$934,624.46 \$2,084,052.02	\$0.00 \$266,967.06	\$207,457.50	\$0.00	\$304,839.54 \$0.00		\$89,341.49 \$0.00				\$1,235,874.22 \$41,7		\$100,790.36 \$0.00		\$0.00		\$640,720.30						\$0.00	\$0.00	\$213,636.91	\$0.00		
29097 29097: Jasper County 5 29099 29099: Jefferson County 4	***************************************		\$33,524,392.00 \$3,221,130.47	\$32,517.98	\$0.00 \$	\$115,453,571.45 \$30,896,557.00						\$1,452,766.85		\$207,951.59 \$2,625,000.00 2,556,642.12 \$1,277,967.00	1			\$179,450.23 \$0.00	\$0.00 \$0.00										
29101 29101: Johnson County 2 29103 29103: Knox County 6	\$684,071.64 \$873,658.79	\$684,071.64 \$853,573.79	\$0.00 \$20,085.00	\$311,905.80 \$11,002.72	\$0.00 \$0.00			\$39,977.62 \$0.00		\$38,673.3	\$0.00		\$0.00 \$0.00					\$25,063.57	\$0.00							\$273,663.15	\$20,085.00		
29105 29105: Laclede County 8 29107 29107: Lafayette County 4	\$9,252,034.98 \$1,692,163.62	\$4,707,308.75 \$1,692,163.62	\$4,544,726.23 \$0.00	\$121,853.11 \$158,142.68	\$0.00 \$0.00		\$76,071.01 \$0.00		\$1,575,230.87	\$0.00		\$468,911.80 \$1,468,1 \$921,689.80	125.00 \$0.00	\$0.00 \$1,208,625.00	\$90,401.31	\$0.00		\$403,122.17 \$1 \$536,260.13	1,867,976.23 \$0.00	\$1,961,658.87	\$0.00					\$86,130.62	\$0.00		
29109 29109: Lawrence County 3 29111 29111: Lewis County 5	\$2,893,059.04 \$1,714,511.30	\$857,978.04 \$1,714.511.30	\$2,035,081.00 \$0.00	\$55.027.27	\$0.00	\$0.00 \$2,035,081.00		\$64,160.26 \$0.00		\$83,787.8	\$0.00	\$905.317.75	\$0.00	\$484,078.13 \$0.00	\$373,899.91	\$0.00		\$606,218.18	\$0.00										
29113 29113: Lincoln County 5 29115 29115: Linn County 4	\$7,217,403.29	\$4,353,781.83 \$1,484,633,88	\$2,863,621.46	\$138,512.50	\$0.00			\$135,783.39 \$1,809,123.00		\$651,757.7		\$2,408,672.21 \$900,4		\$478,858.35 \$66,519.00					\$87,570.75 \$0.00		\$3	861,965.91	\$0.00						
29117: Livingston 5 29119: McDonald County 8		\$1,795,945.87 \$2,590,577.04	· ·	\$97,199.74 \$29,472.14	\$0.00 \$0.00	\$288,380.56 \$5,510,932.00			\$185,682.50	\$99,832.2		\$622,580.78	\$0.00	\$368.387.78 \$0.00	\$1,109,254.03 \$910,7	718 80		\$549,551.45 \$507,762.03	\$0.00 \$0.00		\$4	126,781.65	\$0.00					\$0.00	\$0.
29121 29121: Macon County 4	\$996,278.09	\$996,278.09	\$0.00	\$167,093.75	\$0.00				\$100,002.00	\$181,426.6	\$0.00	, , , , , , , , , , , , , , , , , , , ,	\$0.00	\$300,307.70 \$0.00				\$533,885.64	\$0.00				0.47.6	070.50	20.00	<b>#</b> 000 544 45	<b>#</b> 0.00		
29123 29123: Madison County 7 29125 29125: Maries County 8	\$2,395,032.66 \$994,636.23	\$2,395,032.66 \$994,636.23	\$0.00	\$51,442.99 \$24,945.43	\$0.00	\$1,231,264.76 \$0.00		\$17,066.47 \$0.00	\$55,408.95	\$0.00		¥,	\$0.00	\$0.00 \$0.00		\$0.00 \$0.00		\$130,027.06 \$80,899.72	\$0.00 \$0.00				\$47,8	976.58	\$0.00	\$398,541.15 \$36,104.70	\$0.00 \$0.00	\$0.00	\$0.
29127 29127: Marion County 4 29129 29129: Mercer County 2	\$898,374.40	\$4,333,402.70 \$898,374.40	\$16,125.00 \$0.00	\$138,982.56	\$0.00			\$158,190.75 \$0.00		\$379,612.	\$0.00		\$0.00					\$518,762.21	\$16,125.00 \$0.00										
29131 29131: Miller County 7 29133 29133: Mississippi 6	\$11,563,065.09 \$12,261,149.91	\$8,007,488.09 \$10,022,414.91	\$3,555,577.00 \$2,238,735.00	\$123,415.68	\$0.00	\$467,080.47 \$2,309,431.00 \$8,633,003.70 \$2,238,735.00		\$166,363.46 \$0.00	\$1,979,966.68	\$0.00		\$3,381,575.76	\$0.00	\$61,105.65 \$0.00		\$0.00 \$0.00 \$133,352		\$1,606,913.23 \$7 \$891,937.18	1,246,146.00 \$0.00							\$106,981.33			
29135 29135: Moniteau County 5 29137 29137: Monroe County 4	\$687,492.51 \$332,466.75	\$548,673.51 \$316,341.75	\$138,819.00 \$16,125.00	\$53,959.70 \$ \$54,258.12	\$138,819.00								\$0.00 \$0.00		\$76,836.22 \$220,634.70	\$0.00 \$0.00		\$0.00	\$16,125.00		5	524,336.79	\$0.00			\$191,482.93	\$0.00		
29139: Montgomery 6 29141: Morgan County 5	\$1,307,285.70 \$1,857,576.45	\$1,283,977.20 \$507,576.45	\$23,308.50 \$1,350,000.00	\$60,381.27 \$60,857.33	\$0.00 \$0.00			\$51,746.04 \$0.00				\$384,267.02 \$273,121.93 \$1,350,0	\$0.00 000.00	\$0.00 \$0.00	\$151,559.09	\$0.00		\$65,320.73	\$0.00		\$6	634,581.15	\$0.00		\$87,680.99 \$23,308.	\$22,038.10	\$0.00		
29143: New Madrid 9 29145: Newton County 6	\$3,843,219.66 \$11,627,822.23	42,000,000.00	\$1,487,130.00 \$8,414,782.00	\$453,946.79		\$1,446,117.00 \$0.00 \$485,231.09 \$6,614,782.00			\$19,096.22	\$0.00		\$150,856.11	\$0.00	\$23,693.40 \$0.00 \$577,520.94 \$0.00		\$0.00 \$4,940 \$0.00	0.55 \$0.00	\$528,156.78 \$7 \$807,763.73 \$7	,	\$180,676.29	\$0.00					\$21,649.53	\$0.00	\$0.00	\$0.
29147 29147: Nodaway County 4 29149 29149: Oregon County 5		, , , , , , , , , , , , , , , , , , , ,	\$1,149,170.00 \$49,990.50			\$150,921.86 \$0.00	\$27,993.65 \$0.00				\$1,149,170.00	· ·	\$0.00 \$0.00			\$0.00		\$523,410.59	\$0.00	\$0.00	\$49,990.50							\$0.00	\$0.
29151 29151: Osage County 8 29153 29153: Ozark County 7	\$1,492,173.20	\$1,492,173.20	\$0.00 \$1,927,791.88	\$30,524.65	\$0.00	\$381,152.96 \$0.00		\$312,644.43 \$0.00	\$62,211.52 \$373,115.30	\$0.00 \$0.00			\$0.00	· ·	\$223,750.60	\$0.00 \$0.00		\$610,535.53 \$217,718.84	\$0.00 \$0.00							\$17,815.58 \$2,208,117.69	\$0.00 \$60,723.33	, 3.00	Ψ0.
29155 29155: Ozark County 7 29155 29155: Pemiscot County 8 29157 29157: Perry County 8		\$2,550,611.67	\$0.00 \$2,438,739.00			\$802,960.14 \$0.00 \$654,605.60 \$0.00		\$146,867.52     \$0.00	<b>43.3,113.30</b>	<b>\$0.00</b>		\$336,300.01	\$0.00	\$33,725.41 \$0.00		\$0.00 \$196,013		\$1,162,944.73	\$0.00		\$0.00		\$18,6	667.73	\$0.00	\$2,208,117.69			
29159 29159: Pettis County 3	\$349,429.01	\$282,829.01	\$66,600.00	\$66,437.74	\$0.00	\$98,640.66 \$66,600.00			¢4 004 040 40	<b>CO.</b> CO.		\$117,750.61	\$0.00				3.22 \$0.00	ψ900,000.59	\$0.00							Φ0.00	\$0.00		
29161 29161: Phelps County 5 29163 29163: Pike County 6	\$4,382,553.23 \$3,028,467.83	\$3,543,686.38 \$2,383,755.83	***************************************	\$170,159.40	\$0.00	\$0.00 \$618,558.00	A0 012-114	\$78,012.61 \$0.00	\$1,221,948.46	\$0.00		\$1,408,242.02	\$0.00	1,124,160.37 \$0.00	\$605,443.15 \$220,3 \$146,680.30	\$0.00 \$89,513	3.94 \$628,587.00		\$16,125.00										
29165 29165: Platte County 5 29167 29167: Polk County 7	\$3,623,552.05	\$6,955,763.03 \$1,061,394.05	\$406,386.96 \$2,562,158.00	\$26,633.26 \$82,509.57	\$0.00 \$0.00	\$63,440.28 \$1,060,544.00	\$2,010,810.79 \$0.00					\$4,447,745.21 \$406,3 \$266,056.03	\$0.00	\$0.00 \$0.00		\$470,573	\$0.00	\$312,025.93		\$219,465.50 \$1,	501,614.00					\$117,896.74	\$0.00		
29169 29169: Pulaski County <b>7</b> 29171 29171: Putnam County <b>5</b>	<del>+</del>	\$23,225,111.05 \$3,112,725.10	\$6,143,956.40 \$0.00	\$80,531.56 \$65,924.86	\$0.00 \$0.00	\$0.00 \$2,048,359.00		\$210,844.95 \$0.00	\$4,938,824.07	\$209,805.00 \$332,697.6			\$0.00	\$542,934.20 \$0.00	\$17,612,228.49 \$261,7	108.40		\$37,605.20 \$3 \$1,127,145.75	3,624,684.00 \$0.00							\$12,987.53	\$0.00		
29173 29173: Ralls County <b>7</b> 29175 29175: Randolph County <b>2</b>	\$1,377,291.16 \$130,081.30	\$1,361,841.16 \$130,081.30		\$35,048.90 \$108,066.43	\$0.00 \$0.00			\$143,050.75 \$0.00		\$88,639.8	\$0.00	\$355,923.40	\$0.00		\$271,505.20 \$15,4	450.00		\$361,949.19 \$22,014.87	\$0.00 \$0.00		\$1	105,723.92	\$0.00						
29177 29177: Ray County 6 29179 29179: Reynolds County 5	\$11,056,741.40	\$8,189,563.40 \$3,046,518.28	\$2,867,178.00	\$160,409.27	\$0.00	\$815,960.00 \$0.00	\$1,347,425.26 \$0.00					\$1,770,770.56	\$0.00	\$432,361.99 \$0.00	\$1,771,813.35	\$928,278 \$0.00	3.21 \$2,867,178.00		\$0.00		\$1,	180,112.74	\$0.00 \$26,3	382.94	\$0.00			\$0.00	\$C
29181 29181: Ripley County 4 29183 29183: St. Charles 4	\$4,678,042.14	\$1,757,087.79 \$12,085,110.54	\$2,920,954.35 \$262.50			\$703,441.15 \$2,618,544.00		\$2,640,751.14 \$0.00						1,171,303.13 \$0.00	\$998,506.67 \$302,4	110.35		\$4,185,053.00	\$262.50	\$55,139.97	\$0.00		,		\$4,088,003.27 \$0.	00		\$0.00	
29185 29185: St. Clair County 5 29186 29186: Ste. Genevieve 8	\$246,125.22	\$146,375.22	\$99,750.00 \$110,094.86	\$26,407.20	\$0.00	\$458,684.26 \$0.00							\$0.00	\$20,299.51 \$0.00	\$4.467.272.05 \$76.6	078 00 \$125 813		\$36,879.78	\$0.00 \$0.00						ψτ,000,000.21 ψσ.	\$30,891.28 \$52,337.98	· · · · ·		
29187 29187: St. Francois 2	\$3,644,239.05 \$2,048,036.58		\$1,974,892.00			\$73,144.58 \$1,974,892.00						\$846,050.76		\$314,369.90 \$0.00 \$0.00 \$0.00		ψ120,010	3.00 \$34,010.80	\$427,107.91	\$0.00								\$0.00		
29189 29189: St. Louis County 5 29195 29195: Saline County 5	\$4,910,189.46	\$4,910,189.46		· · ·	\$0.00	\$2,301,162.71 \$0.00	\$1,133,816.94 \$0.00	\$1,618,719.21 \$0.00					\$0.00	5,461,660.20 \$0.00	\$2,396,368.86 \$382,9	321.50		\$1,261,222.76	\$0.00		\$2,	146,825.20	\$0.00		\$15,758,234.80 \$8,786,664.	00			
29197 29197: Schuyler County 3 29199 29199: Scotland County 5	\$297,194.60 \$348,798.60	\$297,194.60 \$348,798.60	\$0.00 \$0.00	\$0.00 \$12,064.72	\$0.00 \$0.00			\$42,507.32 \$0.00					\$0.00 \$0.00					\$17,375.23 \$107,811.87	\$0.00 \$0.00							\$0.00			
29201 29201: Scott County <b>7</b> 29203 29203: Shannon County <b>8</b>	. ,	\$3,050,199.62 \$5,533,840.13	\$1,030,785.00 \$1,041,148.58			\$1,174,228.01 \$0.00 \$1,069,801.93 \$0.00			\$49,229.02	\$0.00		\$463,190.28 \$22,3		7-00, 1-000	\$159,086.79 \$3,661,240.72 \$1,018,7	ψσσ ψστ.,σσσ.	3.39 \$1,030,785.00	\$292,490.88 \$0.00	\$0.00 \$0.00	\$0.00	\$0.00					\$971,241.86	\$0.00 \$86	\$6,219.97 \$0.00	\$0. \$0.
29205 29205: Shelby County 6 29207 29207: Stoddard County 6	\$700,295.61 \$1,538,583.76	\$700,295.61 \$1,538,583.76	\$0.00 \$0.00	\$39,418.33	\$0.00	\$1,369,162.32 \$0.00		\$102,203.56 \$0.00 \$41,474.74 \$0.00		\$68,112.	\$0.00	\$185,478.08	\$0.00	\$62,047.10 \$0.00				\$305,083.51 \$33,404.53	\$0.00 \$0.00	\$0.00	\$0.00					\$0.00		2,495.07	\$0.
29209 29209: Stone County 4 29211 29211: Sullivan County 5	\$896,685.74	\$896,685.74 \$2,121,330.26	\$0.00	\$124,508.00	\$0.00	\$54,534.15 \$0.00		\$269,114.70 \$0.00		\$413,629.0	\$0.00					\$0.00		\$513,494.19	\$0.00										
29213 29213: Taney County <b>7</b>	\$7,178,511.64	\$4,373,067.38	\$2,805,444.26 \$1,940,363.46	, _ 1,000.00	ψ0.00	\$927,274.18 \$2,371,825.00 \$352,089.26 \$941,250.00			\$206,122.17 \$1,218,221.95	\$0.00	ψ0.00	\$280,229.78	· ·		\$1,416,757.90 \$433,6 \$3,847,543.42 \$71,0			\$178,496.31	\$0.00		00.02					\$817,478.97	\$0.00	2 000 00	\$0.
29215 29215: Texas County 9 29217 29217: Vernon County 3 29221: Wasnington	\$1,480,622.01	\$1,480,622.01	\$0.00	\$187,144.24	\$0.00			\$0.00	ψ1,210,221.95 \$	φ1 30, 30 1.00		, , , , , , , , , , , , , , , , , , , ,						\$1,172,043.82 \$1,140,975.69	\$78,597.69	ψ101,279.73	\$0.00					\$152,502.08		2,000.00	<b>\$</b> 0.
29221 Washington 4 29223 29223: Wayne County 6	\$809,256.29 \$4,651,545.86	+=,===,====	\$0.00 \$2,381,595.00			\$350,555.15 \$0.00 \$631,210.97 \$2,381,595.00									\$946,697.94	\$0.00 \$0.00		\$37,245.55	\$0.00		\$0.00			\$0.00	\$0.00	\$654,796.40	· ·		
29225 29225: Webster County 9 29227 29227: Worth County 4	\$9,557,937.83 \$810,458.91	\$6,654,722.83 \$595,308.90	\$2,903,215.00 \$215,150.01	\$0.00	\$0.00	\$173,461.60 \$223,091.00		\$169,187.44 \$0.00	\$1,302,799.16	\$690,321.00 \$112,383.0	\$0.00		\$0.00 \$1, \$0.00	1,969,221.19 \$0.00	\$860,773.63 \$844,6	694.00		\$1,315,065.65	1,145,109.00	\$107,299.74	\$0.00					\$22,995.18 \$333,880.50	\$0.00 \$215,150.01		
9229 29229: Wright County 7 9510 29510: St. Louis city 4	\$1,527,371.23	\$1,466,430.23	\$60,941.00 \$697,678.87			\$101,685.63 \$0.00 \$212,106.11 \$0.00			\$94,851.81	\$0.00			\$0.00	\$0.00 \$0.00 \$419,064.21 \$0.00	\$256,246.27 \$60,9	941.00		\$400,331.23 \$945,808.75	\$0.00 \$0.00	\$297,797.31	\$0.00				\$5,217,552.21 \$697,678. <sup>-</sup>				
tal Total 17				\$9,807,841.22 \$1,	,769,996.00 \$	\$160,170,851.79 \$89,149,911.00 \$	\$21,868,237.94 \$3,720,421.00	\$8,741,694.98 \$1,827,581.00	\$16,651,337.05 \$1,	,738,803.00 \$5,668,467.8	\$1,198,474.00	\$50,780,811.67 \$8,873,9				956.43 \$21,522,873	\$5,855,299.88				740,485.76 \$15,	108,531.77	\$0.00 \$14,399,0	068.00 \$2,548	\$3,217,352.21 \$697,676.0 8,828.92 \$25,993,603.02 \$9,839,578.0		A0 070 004 00 A0 000	0.454.00	

# **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.

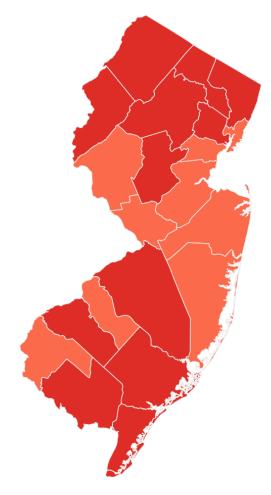


GEOGRAPHIC MAP. SOURCE: ESRI WORLD IMAGERY BASEMAP

### **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."

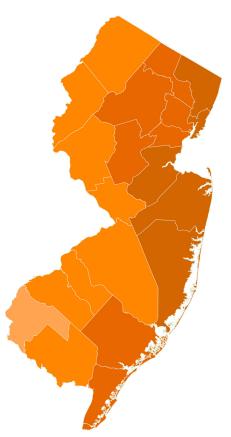
Importantly, extreme heat waves do not fit the criteria for federal disaster declarations despite being the leading cause of deaths among climate hazards. Likewise, sea level rise is not included in this definition despite the threat it poses to numerous communities, including damage to property, loss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

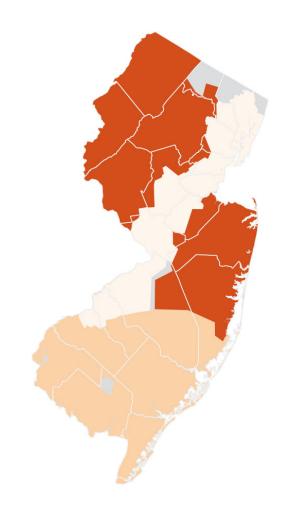
- Socioeconomic Status (below poverty, unemployed, income, no high school diploma);
- Household Composition & Disability (aged 65 or older, aged 17 or younger, older than age 5 with a disability, single-parent households);
- Minority Status & Language (minority, speak English "less than well"); and
- 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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