# SOUTH DAKOTA



SOUTH DAKOTA SUMMARY (2011 - 2024)									
22	CLIMATE DISASTER DECLARATIONS								
\$300.6 MILLION	FEMA + HUD POST-DISASTER FUNDING								
887.9K PEOPLE	POPULATION TOTAL								
\$339	PER CAPITA SPENDING ON CLIMATE DISASTERS								
LAKE (11 DISASTERS)	COUNTY WITH THE HIGHEST DISASTER OCCURRENCES								
37	COUNTIES HAVE HAD FIVE OR MORE DISASTERS								
45K PEOPLE	LIVE IN AREAS WITH VERY HIGH SOCIAL VULNERABILITY (SVI > 0.75)								
1.3 HOURS	TOTAL OUTAGE DURATION (HOURS PER CUSTOMER PER YEAR)								
N/A	ASCE INFRASTRUCTURE REPORT CARD GRADE								
4	SUPERFUND SITES								
\$1.1 BILLION	CLIMATE INFRASTRUCTURE SUPPORTED THROUGH SMALL INSURANCE SURCHARGE								

25

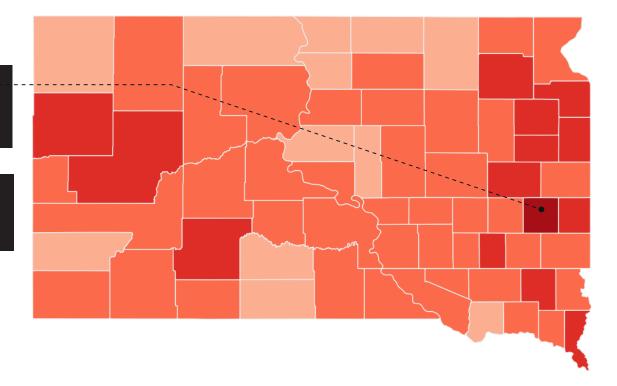
# **DISASTER OCCURRENCES 2011–2024**

FEDERALLY DECLARED CLIMATE DISASTERS BY COUNTY

# disaster declarations

Lake County has had the most recent diasters in South Dakota: 11 disasters.

Every county in South Dakota has experienced at least 2 recent disasters.



## **Number of Disaster Events**

Major Disaster Declarations (2011-2024)

0 occurences

1 occurrence

2-3 occurences

4-6 occurrences

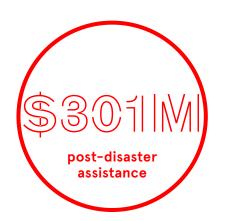
7-9 occurrences

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



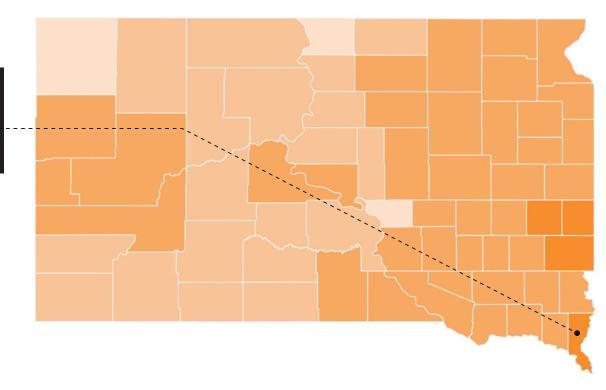
\$285M FEMA obligations

\$15.4 HUD CDBG-DR Funds

\$301M FEMA + HUD assistance

\$339 per capita cost

Union County has received the most post-disaster federal funding in the state: over \$19 million.



### **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

MAP MADE BY REBUILD BY DESIGN FEMA DATA COURTESY OF IPARAMETRICS

255

# **SOCIAL VULNERABILITY INDEX 2022**

# AREAS OF GREATEST SOCIAL VULNERABILITY

# Lincoln County's population grew the most from 2010 to 2024, 47%, while it experienced 6 recent diasters, but it has a low social vulnerability of 0.3.

# Social Vulnerability Index

CDC (2022)

No Value

0.0 - 0.2

0.2 - 0.4

0.4 - 0.6

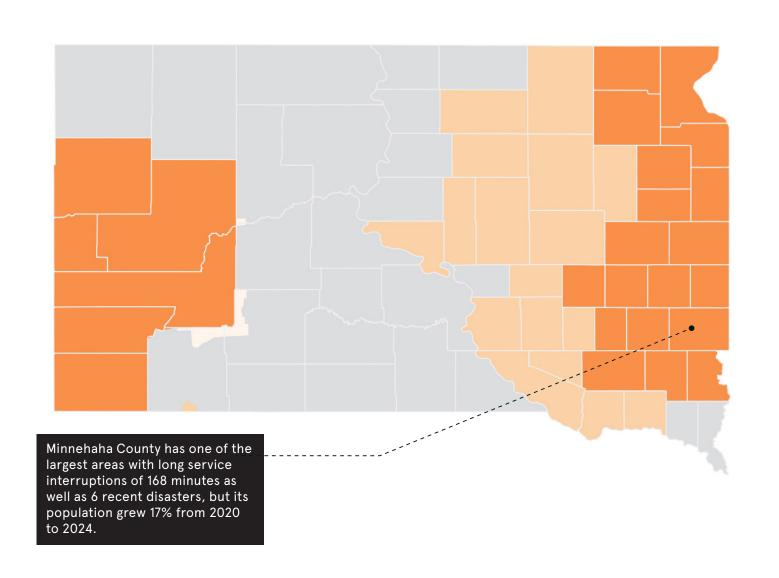
0.6 - 0.8

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**



# 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

56 257

TOTAL: 22 DISASTERS		Total		2011			2013		2014	201	5	2017			2019					2022			2023			2024	
FEMA PA + HM: \$285.3 M					4115: SEVERE \	WINTER 4125: SEVERE STORMS,	4137: SEVERE STORMS,		4186: SEVERE STORMS,	4233: SEVERE STORMS, TORNADOES, STRAIGHT-	4237: SEVERE STORMS,	4298: SEVERE WINTE	-R		VERE WINTER 4463: SEVERE S	STORMS 4467: SEVER	•	4469: SEVERE STORMS,	4656: SEVERE STO	Y STEVICHT I INE WINDS		688: SEVERE WINTER				•	2: SEVERE STORM,
HUD CDBG-DR: \$15.4 M				1984: FLOODING		DWSTORM TORNADO, AND FLOODING	TORNADOES, AND FLOODING	STORM, SNOWSTORM, AND FLOODING	TORNADOES, AND FLOODING	LINE WINDS, AND	STRAIGHT-LINE WINDS, AND FLOODING	STORM	STORM, SNOW FLOOI	,	SNOWSTORM, AND FLOODI FLOODING	TOPRIADO		TORNADOES, AND FLOODING	STRAIGHT-LINE WINTORNADOES, AND FLO	NUS, TOPMADOES AND	STORMS AND SNOWSTORM	STORMS AND SNOWSTORM	STORMS AND SNOWSTORM	4718: FLOODING	STRAIGHT-LIN AND FLOO	,	AIGHT-LINE WINDS, AND FLOODING
FEMA + HUD ASSISTANCE: \$300.6 M	FEMA TOTAL	DA Obligations III	M Obligations - B	A Chilimatiana HM	PA	HM PA HM	PA HM	PA CILITATION HM PA	HM	PA HM	PA HM	PA HM	BA Oblimations	HM PA	HM PA	HM PA	НМ	BA Obligations HM	BA Oblimations	HM PA HM	PA HM	PA HM	PA HM	PA HM	BA Obligations	НМ	PA HM
GEOID COUNTY NAME DISAS 46000 46000: Statewide 22	STERS   FEMA TOTAL	\$26,706,977,53	M Obligations   PA	Obligations 11 338 313 17 \$4 255 152 00	Obligations Ob	bligations	Obligations Obligations \$60,969.58 \$8.305.00	PA Obligations Obligations	Obligation	Obligations Obligations	Obligations Obligations	Obligations Obligat	ions PA Obligations	Obligations Obligatio	ns Obligations Obligations Ob	Obligations Obligations	Obligations	Obligations Obligations	Oblig	gations	Obligations Obligations O	bligations Obligations	Obligations Obligation	ns Obligations Obligations \$109.858.05 \$144.545	ons PA Obligations 5.52 \$599.316.34	Obligations Obli	gations Obligations
46003 46003: Aurora County 6	\$3,481,589.19	\$3,157,326.29	φ.,200,0.20 φ.	\$134,678.91 \$223,758.00	Ψ1, 101, 010.02	\$34,000.00 \$32,332.40 \$6,339.00	\$60,909.30 \$6,303.00	\$37,233,440.00 \$110,343.00 \$	\$4,055,477.76	00 \$1,555,202.72 \$22,015.00	\$0.00 \$0.00 \$	59,074,003.03 \$143,00	\$1,543,230.68	<b>4.</b> ,0.0,000.00 <b>42.</b> ,.20.	\$11,225.23	\$0.00	945,726.03	\$841,334.05 \$33,803.90	φ1,001,200.10	\$0.00	9 \$019,070.02 \$0.00 \$v	ουο,47ο.οο φυ.ου	) \$771,741.45 \$55,771.8	\$109,000.00 \$144,040	\$585,132.37	Ψ0.00	\$0.00
46005 46005: Beadle County 4	\$3,270,259.02	\$3,116,207.02	\$154,052.00	\$1,631,318.30 \$134,627.00			\$222,165.26 \$0.00						\$1,182,291.86	\$19,425.00					\$80,431.60	\$0.00							
46007 46007: Bennett County 5	\$948,975.57	\$246,621.57	\$702,354.00			\$0.00 \$0.00	0						\$191,842.04	. ,	\$4,788.83	\$0.00				20.00			\$35,799.61 \$0.0	00	\$14,191.09	· ·	
46009 46009: Bon Homme County 3 46011 46011: Brookings County 6	\$1,743,886.03 \$2.358.263.95	\$1,743,886.03 \$2,267,701,45	\$0.00 \$90.562.50	\$283,871.11 \$0.00	1								\$1,620,289.97 \$713,515.48	·				\$215,669.64 \$0.00	\$83,308.84 \$888.805.22	\$0.00 \$0.00			\$0.00 \$0.0	00 \$165.840.00 \$0	\$40,287.22	\$0.00	
16013 46013: Brown County 3	\$4,104,188.58	\$3,877,987.58	φου,σοΣ.σο	\$1,654,590.57 \$226,201.00									\$1,544,850.22					ψ210,000.04 ψ0.00	ψ000,000.22	ψ0.00			ψ0.00 ψ0.0	, , , , , , , , , , , , , , , , , , , ,	0.00		
46015 46015: Brule County 6	\$1,896,066.97	\$1,886,117.97	\$9,949.00	\$328,529.32 \$0.00						\$20,902.01 \$9,949.00			\$62,550.02	\$0.00	\$1,050,621.07	\$0.00		\$156,568.94 \$0.00							\$266,946.61		
46017 46017: Buffalo County 4	\$32,999.89	\$32,999.89	\$0.00	\$32,999.89 \$0.00						\$0.00 \$0.00			\$0.00	\$0.00											\$0.00	\$0.00	
46019 46019: Butte County 7 46021 46021: Campbell County 3	\$1,343,247.19 \$80.611.03	\$817,577.19 \$80,611.03	\$525,670.00 \$0.00	\$212,122.51 \$0.00 \$3,252.47 \$0.00				\$281,991.63 \$525,670.00	\$117,367.23 \$0.0	00		\$0.00	\$62,003.93	\$0.00	\$102,703.43 \$15,354.63	\$0.00 \$0.00 \$0.00	\$0.00	)		\$103,392.39 \$0.00	)						
16023 46023: Charles Mix County 4	\$6,859,607.96	\$6,168,772.13	*****	\$377,602.58 \$0.00									\$2,616,328.68	·	ψ10,004.00	ψ0.00		\$2,559,693.86 \$435,835.83							\$615,147.01	\$0.00	
46025 46025: Clark County 6	\$1,790,637.56	\$1,750,460.56	\$40,177.00	\$876,684.89 \$0.00								\$0.00 \$40,17	77.00 \$568,761.83	\$0.00				\$135,034.27 \$0.00					\$0.00 \$0.0	00 \$169,979.57 \$0	0.00		
46027 46027: Clay County 6	\$2,236,791.14	\$2,236,791.14	<b>V</b> 0.00	\$107,237.84 \$0.00		\$7,104.44 \$0.00			\$148,216.60 \$0.0	00			\$1,002,483.42	*****					\$10,213.79	\$0.00					\$961,535.05	\$0.00	
46029 46029: Codington County 7 46031 46031: Corson County 3	\$4,039,516.15 \$314.277.78	\$3,755,887.15 \$252.343.78	\$283,629.00 \$61,934.00	\$461,136.29 \$126,578.00		\$124,595.95 \$0.00	\$342,012.94 \$157,051.00	\$0.00 \$61,934.00	\$127 747 83	00		\$50,610.38 \$	\$706,822.98	\$0.00				\$408,475.05 \$0.00	\$865,795.42	\$0.00				\$921,034.09 \$0	0.00		
16033 46033: Custer County 2	\$134,006.39	\$119,973.39	\$14,033.00			ψ1.24,000.00 ψ0.00		\$52,623.92 \$14,033.00	ψ						\$67,349.47	\$0.00											
46035 46035: Davison County 5	\$3,331,512.11	\$3,177,912.11	\$153,600.00						\$35,535.32 \$0.0	00 \$103,176.45 \$0.00			\$710,831.47					\$1,289,169.64 \$0.00							\$1,039,199.23	\$0.00	
46037 46037: Day County 7	\$4,198,154.00	, ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	. ,	\$1,823,398.53 \$144,131.00								40.00	\$245,287.14					\$15,041.69 \$17,265.54					\$39,452.33 \$0.0		0.00		
46039 46039: Deuel County 7 46041 46041: Dewey County 4	\$1,614,962.91 \$462,660.84	\$1,595,536.91 \$147.832.84	\$19,426.00 \$314.828.00	\$135,914.55 \$0.00			\$210,099.26 \$0.00	\$0.00 \$314,828.00	\$147.832.84	00		\$0.00 \$19,42 \$0.00 \$	\$580,656.48 \$0.00 \$0.00	\$0.00 \$0.00	\$74,216.65	\$0.00			\$165,119.33	\$0.00			\$429,530.64 \$0.0	00			
16043 46043: Douglas County 4	\$1,387,707.01	\$966,964.51	\$420,742.50		\$0.00 \$2	279,585.00		ψυ.υυ ψυ 14,020.υυ	ψ1+1,002.04			Ψυ.υυ τ		\$141,157.50				\$95,422.33 \$0.00							\$265,897.71	\$0.00	
16045 46045: Edmunds County 4	\$1,160,286.20	\$1,123,419.20	\$36,867.00	\$801,375.47 \$0.00								\$59,592.08 \$36,86	\$7.00 \$243,335.93	\$0.00						\$19,115.72 \$0.00							
46047 46047: Fall River County 5	\$460,655.17	\$460,655.17	\$0.00					\$169,518.90 \$0.00		\$166,095.13 \$0.00			\$125,041.14	Ψ0.00	\$0.00	\$0.00											
46049 46049: Faulk County 4 46051 46051: Grant County 7	\$1,065,777.11 \$1,711,566.59	\$871,736.11 \$1,108,219.59		\$284,661.15 \$194,041.00 \$92,859.69 \$603,347.00			\$68,109.08 \$0.00					, , , , ,	\$0.00 \$298,676.40 \$0.00 \$276.981.93	\$0.00 \$0.00					\$41,150.48	\$0.00			\$51,986.33 \$0.0		0.00		
46051 46051: Grant County 7	\$2,539,811.04	\$2,515,279.04		\$63,233.39 \$18,532.00			\$00,109.00					\$0.00	<b>42</b> : 0,00 ::00	\$6,000.00	\$183,107.43	\$0.00 \$803,985.46	\$0.00	\$643,518.89 \$0.00		\$0.00			\$51,900.33 \$0.0	JU \$577,132.00 \$0	\$200,142.84	\$0.00	
46055 46055: Haakon County 5	\$431,419.34	\$431,419.34	\$0.00	, , , , , , , , , , , , , , , , , , , ,				\$0.00 \$0.00		\$112,623.35 \$0.00		\$0.00		(1,711111	\$236,220.91	\$0.00				\$82,575.08 \$0.00					,		
46057 46057: Hamlin County 7	\$4,445,350.81	\$3,947,574.92	\$497,775.89	\$1,014,477.52 \$0.00			\$99,213.38 \$0.00					\$0.00	\$0.00 \$957,993.20		\$4,514.40 \$	90,000.00			\$1,871,376.42 \$124	4,607.00			\$0.00 \$0.0				
46059 46059: Hand County 4	\$1,812,001.87	\$1,801,876.87	, ,, , , , , , , , , , , , , , , , , , ,	\$591,618.89 \$10,125.00					\$15,642.67 \$0.0	00			\$810,447.10 \$794,570.97	\$0.00	\$34,914.74	<b>CO. OO</b>		\$907,345.95 \$0.00	\$33,183.35 \$336	0,000,00				\$327,435.83 \$0	\$72,375.05 \$345,156.30		
46061       46061: Hanson County       7         46063       46063: Harding County       2	\$2,622,088.35 \$0.00	\$2,286,080.09 \$0.00	\$336,008.26 \$0.00	\$155,266.11 \$0.00				\$0.00 \$0.00	\$15,642.67 \$0.0	00		\$0.00		\$0.00	\$34,914.74	\$0.00		\$907,545.95 \$0.00	\$33,103.35 \$330	0,000.20					\$345,156.30	\$0.00	
16065 46065: Hughes County 4	\$7,183,184.41	75.55	\$154,651.00	\$5,855,628.90 \$0.00			\$44,772.98 \$0.00			\$930,352.26 \$154,651.00		<b>V</b>		\$0.00													
46067 46067: Hutchinson County 6	\$4,670,122.57	\$4,519,839.82	¥ ,		\$15,591.39 \$1	136,512.00							\$2,007,885.30					\$1,291,534.09 \$0.00	\$51,558.25	\$0.00					\$1,037,684.75	\$0.00	
46069 46069: Hyde County 2	\$352,330.38	\$339,205.38	, ,, ,,	\$171,889.15 \$0.00 \$30,117.44 \$0.00				\$0.00 \$1,738.00		\$13,034.04 \$0.00		\$0.00		\$13,125.00	\$129,506.08	<b>#0.00</b>				\$8,000.00 \$0.00	\ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \ \		\$7,794.77 \$0.0	20	<b>#0.00</b>	\$0.00	
46071 46071: Jackson County 9 46073 46073: Jerauld County 4	\$355,169.17 \$1,273,227.73	\$353,431.17 \$1,200,554.73	. ,	\$30,117.44 \$0.00 \$117,796.27 \$13,926.00					\$792,000.15 \$58,747.0			\$0.00	\$164,978.84 \$286.260.27	\$0.00 \$0.00	\$129,500.08	\$0.00				\$8,000.00 \$0.00	J		\$7,794.77 \$0.0	JO	\$0.00	\$0.00	
46075 46075: Jones County 6	\$265,303.94	\$265,303.94	\$0.00	, , , . , . ,					, , , , , , , , , , , , , , , , , , , ,	\$0.00 \$0.00		\$0.00	\$0.00 \$83,684.74	\$0.00	\$166,682.35	\$0.00				\$0.00 \$0.00			\$14,936.85 \$0.0	00			
46077 46077: Kingsbury County 7	\$1,972,312.50	\$1,972,312.50	\$0.00	\$528,243.35 \$0.00			\$48,602.97 \$0.00						\$927,395.49	·		\$210,038.07	7 \$0.00		\$196,717.48	\$0.00			\$17,991.22 \$0.0				
16079 46079: Lake County 11 16081 46081: Lawrence County 5	\$10,119,922.57 \$9,081,017.17	\$9,345,728.28 \$8,263.586.03	\$774,194.29 \$817,431.14	\$239,099.79 \$78,928.00 \$2,419.27 \$0.00	***************************************	\$0.00 \$434.583.71 \$0.00	\$39,908.42 \$0.00	\$1,131,936.52 \$432,996.00		\$24,618.14 \$62,428.00				\$632,838.29 \$384,435.14		\$6,483.35 \$6,690,563.09	40.00	1., . ,	\$2,033,608.77	\$0.00 \$34,321.01 \$0.00			\$530,855.52 \$0.0	00	\$171,970.50	\$0.00	
46083 46083: Lincoln County 6	\$9,061,017.17 \$7.525.816.05	\$6,125,295,40		\$2,419.27	\$43,644.02	\$0.00 \$363.618.71 \$0.00			\$1,710,255.30 \$0.0	00			\$1,581,248.16			\$6,690,363.08	φυ.υυ	\$0.00 \$0.00							\$2,426,529.21	\$0.00	
46085 46085: Lyman County 4	\$712,572.96	+5,1=5,=55115	* 1, 100, 100	\$171,661.95 \$134,820.00						\$7,801.05 \$0.00				\$23,448.50	\$340,098.05	\$0.00											
46087 46087: McCook County 6	\$2,055,930.38	* **	\$26,719.27		\$1,576.11	\$0.00				\$0.00 \$0.00			\$941,419.52					\$414,930.78 \$0.00	\$235,432.50 \$26						\$435,852.20	\$0.00	
46089 46089: McPherson County 3 46091 46091: Marshall County 4	\$197,693.17 \$1,522,398.42	\$107,478.17 \$1.522.398.42	\$90,215.00 \$0.00	\$280,908.84 \$0.00								\$22,414.56 \$90,21 \$30,658.24 \$	5.00 \$85,063.61 60.00 \$477.978.65	7						\$0.00 \$0.00				\$732,852.69 \$0	0.00		
46093 46093: Meade County 7	\$1,522,398.42 \$2,158,684.95	\$1,522,398.42	\$0.00 \$51,843.75	\$2,793.29 \$33,480.00		\$1,370.48 \$0.00		\$658,710.32 \$0.00	\$6,601.88 \$0.0	00		\$30,658.24 \$	, ,, ,,	φυ.υυ	\$405,531.89	\$0.00 \$1,031,833.34	\$0.00	0						ψ132,032.09 \$0	7.00		
16095 46095: Mellette County 3	\$176,660.33	\$163,535.33	\$13,125.00											\$13,125.00	\$5,672.18								\$8,368.72 \$0.0	00			
46097 46097: Miner County 5	\$1,040,260.46	\$1,040,260.46		\$266,613.04 \$0.00									\$363,820.63					\$281,185.74 \$0.00		\$0.00					\$113,363.72		
46099 46099: Minnehaha County 6 46101 46101: Moody County 7	\$16,241,068.07 \$10.114.695.83	\$14,528,094.92 \$9,986,291.83	\$1,712,973.15 \$128,404.00	\$194,043.36 \$128,404.00	\$6,216,746.91	\$0.00 \$0.00		\$	\$1,929,284.28 \$0.0	00			\$2,506,068.87 \$5,275,755.85					\$2,543,928.04 \$13,012.24 \$670,443.91 \$0.00		9,517.00 \$0.00			\$43,876.88 \$0.0	00	\$645,489.59 \$42,754.40		
46101 46101: Moody County / 46102 46102: Oglala Lakota County 6	\$10,114,695.83 \$882,354.40	\$882,354.40	\$128,404.00	\$120,4U4.0U	\$3,350.78	\$0.00		\$51,428.65 \$0.00		\$24,846.06 \$0.00			\$5,275,755.85		39 \$0.00			φυτυ,443.81 φυ.υυ	ψ0,042,000.00	ψ0.00			\$8,512.55		Ψ42,734.40	φυ.υυ	
46103 46103: Pennington County 4		\$3,748,980.90	\$0.00					\$3,309,754.47 \$0.00					\$0.00	\$0.00	\$439,226.43	\$0.00											
46105 46105: Perkins County 5	\$891,798.51	\$891,798.51		\$216,148.41 \$0.00				\$258,846.89 \$0.00	\$189,329.80 \$0.0	00		\$0.00	\$227,473.41														
46107 46107: Potter County 4 46109 46109: Roberts County 6	\$241,389.91 \$2,302,527.22	\$231,264.91 \$1,947,141,22		\$45,436.96 \$10,125.00 \$178,140.04 \$343,591.00								\$0.00 \$11.70	\$22,154.00 95.00 \$319,874.61						\$50,167.09	\$0.00			\$0.00 \$0.0 \$43,275.61 \$0.0		0.00		
46111 46111: Sanborn County 5	\$2,302,527.22 \$1,909,434.79	\$1,947,141.22		\$178,140.04 \$343,591.00 \$516,799.69 \$0.00								φυ.υυ φτι,79	\$1,064,164.67		\$135,426.89	\$0.00		\$130,750.15 \$0.00		ψ0.00			ψ+υ,210.01 φυ.(	φ1,000,000.0 <i>1</i> \$0.	\$62,293.39	\$0.00	
46115 46115: Spink County 4	\$2,683,492.62	\$2,587,311.62		\$920,719.61 \$96,181.00			\$23,367.64 \$0.00						\$1,643,224.37							\$0.00 \$0.00							
46117 46117: Stanley County 4	\$6,592,027.69	\$6,592,027.69		\$6,450,069.42 \$0.00						\$117,284.91 \$0.00			60.00										\$24,673.36 \$0.0	00			
46119 46119: Sully County 3 46121 46121: Todd County 3	\$342,443.15 \$409,709.34	\$202,365.15 \$409,709.34	\$140,078.00 \$0.00	\$58,798.62 \$126,953.00								\$0.00	\$143,566.53 \$337,734.18	\$13,125.00 \$0.00	\$7,332.38	\$0.00							\$64,642.78 \$0.0	00			
46123 46123: Tripp County 5	\$409,709.34 \$1,054,481.12	\$1,054,481.12	\$0.00										\$337,734.18		\$7,332.38 \$59,974.95		\$0.00	0					\$127,803.23 \$0.0		\$159,567.60	\$0.00	
46125 46125: Turner County 7	\$4,176,585.68	¥ 1,00 1, 10 11 1	\$71,066.20		\$11,075.37	\$0.00			\$156,749.17 \$0.0	00			\$2,131,636.02		\$143,755.88 \$			\$53,517.23 \$0.00	\$57,585.11 \$11	1,250.00					\$1,551,200.70		
46127 46127: Union County 7	\$19,796,121.51		\$674,087.84 \$1	13,033,614.32 \$0.00		\$232,079.59 \$0.00		3	\$1,510,980.43 \$0.0	00			\$1,684,103.30		\$146,277.40	\$0.00		\$337,801.38 \$0.00							\$2,177,177.25	\$0.00	
16129 46129: Walworth County 2	\$402,120.82 \$6.704.826.53		\$115,217.30 \$394,945.06	¢221 504 00										\$115,217.30 \$304.045.06	\$87,906.92	\$0.00		\$24.270.75 \$0.00							\$244 F20 40	<b>CO. CO.</b>	
46135 46135: Yankton County 4 46137 46137: Ziebach County 6	\$6,794,826.53 \$160,330.11		\$394,945.06	\$321,584.08 \$0.00				\$0.00 \$22,500.00	\$137.830.11 \$0.0	00		\$0.00	\$5,699,479.18 \$0.00 \$0.00	\$394,945.06 \$0.00	\$0.00	\$0.00		\$34,279.75 \$0.00					\$0.00 \$0.0	00	\$344,538.46	\$0.00	
Fotal Total 22				52,123,254.99 \$6,902,900.00	\$8,231,034.66 \$4	470,905.00 \$1,215,685.36 \$8,359.00	\$1,159,221.51 \$165,356.00				\$0.00 \$0.00 \$	\$9,837,358.31 \$360,73		\$9,505,778.40 \$971,209.			\$45,728.03	3 \$19,648,731.68 \$972,743.51	\$12,907,215.36 \$1,198	8,119.98 \$1,642,321.05 \$41,202.69	9 \$819,070.62 \$0.00 \$3	303,475.35 \$0.00		95 \$5,690,121.85 \$144,545	5.52 \$14,173,748.59	\$0.00	\$0.00 \$0.00

# **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.

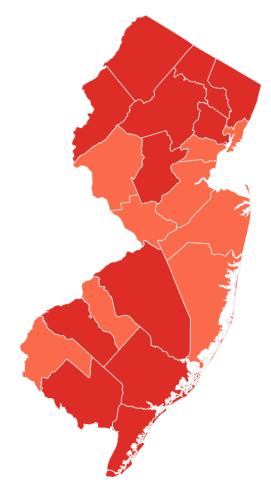


GEOGRAPHIC MAP. SOURCE: ESRI WORLD IMAGERY BASEMAP

# **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."

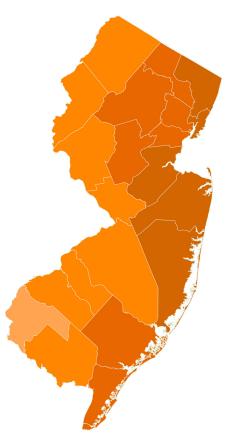
Importantly, extreme heat waves do not fit the criteria for federal disaster declarations despite being the leading cause of deaths among climate hazards. Likewise, sea level rise is not included in this definition despite the threat it poses to numerous communities, including damage to property, loss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

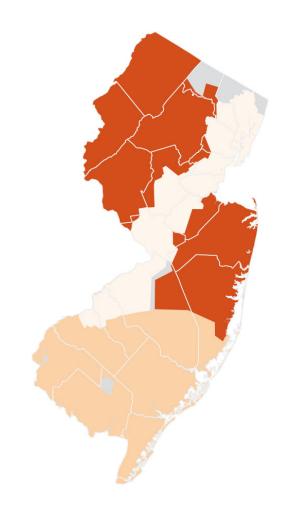
- Socioeconomic Status (below poverty, unemployed, income, no high school diploma);
- Household Composition & Disability (aged 65 or older, aged 17 or younger, older than age 5 with a disability, single-parent households);
- Minority Status & Language (minority, speak English "less than well"); and
-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

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

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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