



INDEPENDENT CITIES

- 1. Alexandria City
- 2. Bristol City
- 3. Buena Vista City
- 4. Charlottesville City
- 5. Chesapeake City
- 6. Colonial Heights City
- 7. Covington City
- 8. Danville City
- 9. Emporia City
- 10. Fairfax City

- 11. Falls Church City
- 13. Fredericksburg City
- 14. Galax City
- 15. Hampton City
- 16. Harrisonburg City
- 17. Hopewell City
- 18. Lexington City
- 19. Lynchburg City
- 20. Manassas City

- 12. Franklin City
- 22. Martinsville City 23. Newport News City
 - - 24. Norfolk City
 - 25. Norton City
 - 26. Petersburg City

 - 27. Poquoson City
 - 28. Portsmouth City

21. Manassas Park City

- 29. Radford City
- 30. Richmond City

- 31. Roanoke City
- 32. Salem City
- 33. Staunton City
- 34. Suffolk City
- 35. Virginia Beach City
- 36. Waynesboro City
- 37. Williamsburg City
- 38. Winchester City

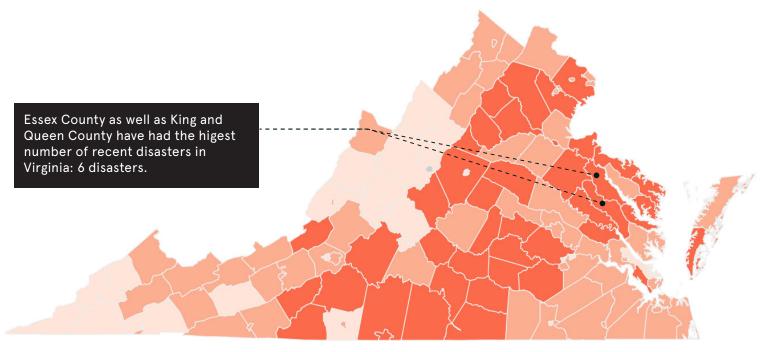
VIRGINIA STATISTICS SUMMARY (2011 - 2024)										
14	CLIMATE DISASTER DECLARATIONS									
\$622.7 MILLION	FEMA + HUD POST-DISASTER FUNDING									
8.6 MILLION PEOPLE	POPULATION TOTAL									
\$72	PER CAPITA SPENDING ON CLIMATE DISASTERS									
ESSEX & KING AND QUEEN (6 DISASTERS)	COUNTY WITH THE HIGHEST DISASTER OCCURRENCES									
25	COUNTIES HAVE HAD FIVE OR MORE DISASTERS									
1.5 MILLION PEOPLE	LIVE IN AREAS WITH VERY HIGH SOCIAL VULNERABILITY (SVI > 0.75)									
4.9 HOURS	TOTAL OUTAGE DURATION (HOURS PER CUSTOMER PER YEAR)									
C (2022)	ASCE INFRASTRUCTURE REPORT CARD GRADE									
36	SUPERFUND SITES									
\$6.2 BILLION	CLIMATE INFRASTRUCTURE SUPPORTED THROUGH SMALL INSURANCE SURCHARGE									

285

DISASTER OCCURRENCES 2011–2024

FEDERALLY DECLARED CLIMATE DISASTERS BY COUNTY

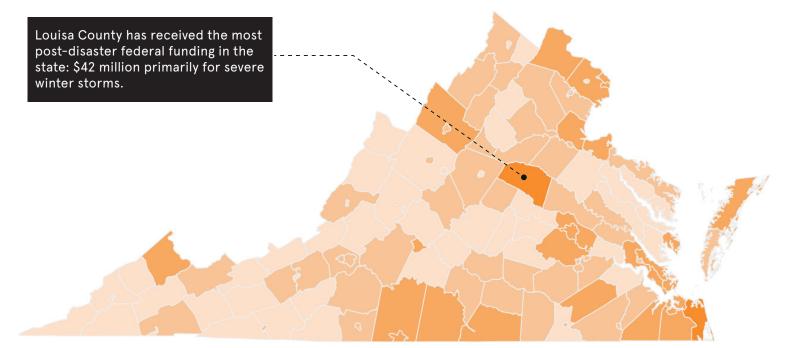




FEDERAL ASSISTANCE 2011-2024

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

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

\$502M FEMA obligations

\$121M HUD CDBG-DR Funds

\$623M FEMA + HUD assistance

per capita cost

MAP MADE BY REBUILD BY DESIGN FEMA DATA COURTESY OF IPARAMETRICS

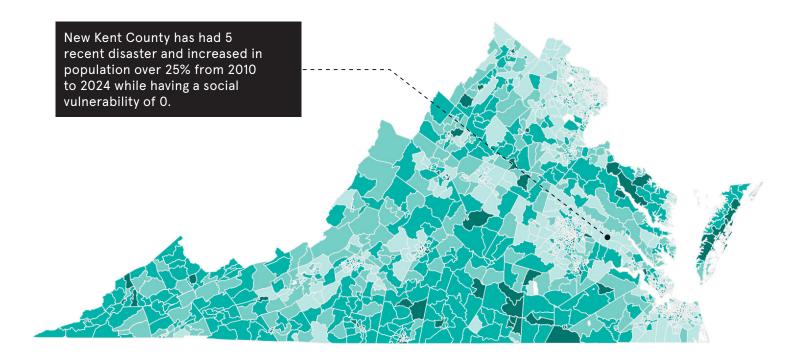
287

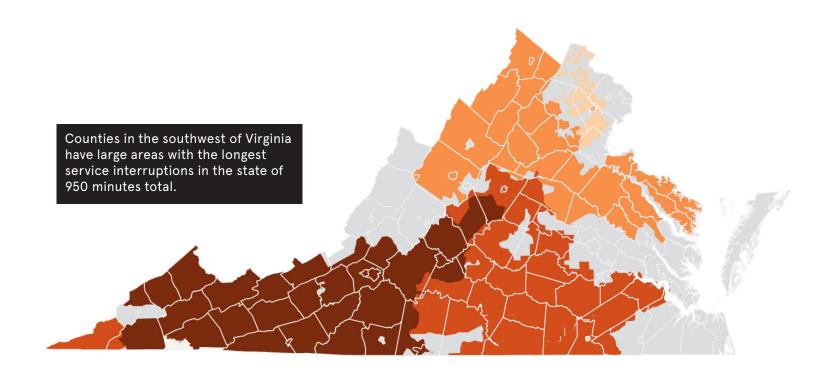
SOCIAL VULNERABILITY INDEX 2022

AREAS OF GREATEST SOCIAL VULNERABILITY

ENERGY RELIABILITY 2023

COUNTIES AT GREATEST RISK OF POWER OUTAGES





Social Vulnerability Index

CDC (2022)



0.0 - 0.2

0.0 - 0.

0.2 - 0.4

0.4 - 0.6

0.6 - 0.8

0.8 - 1.0

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

88 289

MAP MADE BY REBUILD BY DESIGN

DATA SOURCE: CDC/ATSDR 2022 SVI

TOTAL: 14 DISASTERS FEMA PA + HM: \$502.1 M			Total			2011			20	2012			2016	16		2018				2021		2022			2024	
HUD CDBG-DR: \$120.5 M FEMA + HUD ASSISTANCE	: \$622.7 M				4024: HURRICA	ANE IRENE 4042: EARTHQUAKE	4045: THE REMNANTS OF TROPICAL STORM LEE			4092: HURRICA	ANE SANDY	4262: SEVERE WINTE STORM AND SNOWSTO		RICANE MATTHEW	4401: HURRICAN	NE FLORENCE	4411: TROPICAL MICHAEL		4602: SEVERE WINTI STORMS	:R LANDS	FLOODING, LIDES, AND DSLIDES	4: SEVERE V AND SNOV	WINTER STORM 4674: FLOO WSTORM MUDS		4831: TROPICA HELEN	
GEOID COUNTY NAME 51000 51000: Statewide	DISASTERS	\$346,746,493.46	\$341,030,149.78	M Obligations \$5,716,343.68	\$24,056,183.13	ψ110,000.00 ψ000,000.12 ψ100,200.1	Obligations Obligations 79 \$3,081,169.56 \$43,343.00	PA Obligations 0 \$13,113,326.10	Obligations \$139,811.00	\$7,129,790.04	Obligations P/ \$72,642.00 \$3	Obligations Obligat \$423,2	PA Obligations 211.91 \$1,593,84	Obligations 1.00 \$262,589.00	PA Obligations 3 \$31,662,876.29	Obligations \$587,987.83	PA Obligations O \$24,574,596.11	Obligations P	Obligations Obliga 663,380,676.02 \$1,500,	tions Obligation \$933,519	Obligations PA C .63 \$25,304.39 \$109	Obligations 9,942,143.67	Obligations Obligations \$635,774.00 \$4,294,446.33	Obligations	PA Obligations \$21,230,772.10	Obligations \$0.00
51001 51001: Accomack County 51003 51003: Albemarle County 51005 51005: Alleghany County	5	\$2,222,750.00 \$648,380.23 \$166,336.36	\$1,531,303.00 \$253,910.23 \$166,336.36	\$691,447.00 \$394,470.00 \$0.00		\$691,447.00 \$0.00 \$0.00	00	\$148,796.43 \$166,336.36	\$0.00 \$0.00	\$1,218,172.97	\$0.00	\$63,161.20	\$0.00									\$41,952.60	\$394,470.00		\$0.00	\$0.00
51007 51007: Amelia County 51009 51009: Amherst County	5 1	\$30,515.45 \$31,450.40	\$30,515.45 \$31,450.40	\$0.00 \$0.00	\$0.00	\$0.00		\$0.00 \$31,450.40	\$0.00 \$0.00								\$30,515.45	\$0.00	\$0.00	\$0.00		\$0.00				
51011 51011: Appomattox County 51013 51013: Arlington County 51015 51015: Augusta County	3	\$0.00 \$2,736,651.22 \$90,775.25	\$0.00 \$2,736,651.22 \$90,775.25	\$0.00 \$0.00 \$0.00				\$0.00 \$433,668.35 \$90,775.25	\$0.00 \$0.00 \$0.00	\$490,903.55	\$0.00	1,812,079.32	\$0.00				\$0.00	\$0.00	\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00
51017 51017: Bath County 51019 51019: Bedford County	1 5	\$75,656.61 \$118,395.63	\$75,656.61 \$118,395.63	\$0.00 \$0.00				\$75,656.61 \$118,395.63	\$0.00 \$0.00										\$0.00	\$0.00		\$0.00	\$0.00		\$0.00	\$0.00
51021 51021: Bland County 51023 51023: Botetourt County	3	\$0.00 \$78,572.77	\$0.00 \$78,572.77	\$0.00 \$0.00		CO. OO		\$0.00 \$78,572.77	\$0.00 \$0.00						\$0.00	\$0.00	\$200,000,00	#0.00	ФСО 700 FO	(0.00					\$0.00 \$0.00	\$0.00 \$0.00
 51025 51025: Brunswick County 51027 51027: Buchanan County 51029 51029: Buckingham County 	3	\$443,291.58 \$2,332,256.99 \$26,347.15	\$443,291.58 \$2,332,256.99 \$1,597.15	\$0.00 \$0.00 \$24,750.00		\$0.00		\$1,597.15	\$0.00								\$229,896.90	\$0.00	\$69,723.59	\$0.00 \$778,694	.77 \$0.00	\$0.00	\$1,553,562.22 \$24,750.00	\$0.00	\$0.00 \$0.00	
51031 51031: Campbell County 51033 51033: Caroline County	5	\$0.00 \$16,207.37	\$0.00 \$16,207.37	\$0.00 \$0.00	\$13,137.53	\$0.00	\$3,069.84 \$0.00		\$0.00			\$0.00	\$0.00				\$0.00	\$0.00	\$0.00 \$0.00	\$0.00 \$0.00		\$0.00	\$0.00			
 51035 51035: Carroll County 51036 51036: Charles City County 51037 51037: Charlotte County 	2	\$18,345.74 \$69,206.17 \$185,292.40	\$18,345.74 \$69,206.17 \$185,292.40	\$0.00 \$0.00 \$0.00	\$69,206.17	\$0.00		\$18,345.74 \$0.00	\$0.00 \$0.00						\$0.00	\$0.00	\$109,145.53	\$0.00	\$76.146.87	\$0.00		\$0.00	\$0.00		\$0.00 \$0.00	
51041: Chesterfield County 51043: Clarke County	4	\$1,733,505.94 \$40,944.12	\$1,733,505.94 \$40,944.12	\$0.00 \$0.00	\$918,048.38	\$0.00		\$10,660.17	\$0.00	\$0.00	\$0.00	\$30,283.95	\$0.00		\$105,673.33	\$0.00	\$570,616.14		\$139,168.09	\$0.00		ψ0.00	ψο.σσ		ψ0.00	ψ0.00
51045 51045: Craig County 51047 51047: Culpeper County	5	\$17,633.73 \$430,342.82	\$17,633.73 \$430,342.82	\$0.00 \$0.00		\$243,061.50 \$0.0	00	\$12,316.18 \$30,391.88	\$0.00 \$0.00	\$0.00 \$0.00	\$0.00 \$0.00	\$156,889.44	\$0.00		\$5,317.55	\$0.00	Ф2 270 24	#0.00	#0.00	(0.00		\$0.00			\$0.00	\$0.00
 51049 51049: Cumberland County 51051: Dickenson County 51053 51053: Dinwiddie County 	1	\$3,279.21 \$0.00 \$406,042.08	\$3,279.21 \$0.00 \$406,042.08	\$0.00 \$0.00 \$0.00		\$0.00		\$0.00 \$0.00	\$0.00 \$0.00								\$3,279.21 \$0.00	\$0.00 \$0.00		\$0.00 \$0.00		\$0.00	\$0.00		\$0.00	\$0.00
51057 51057: Essex County 51059 51059: Fairfax County	4	\$84,466.92 \$4,907,783.67	\$84,466.92 \$4,907,783.67	\$0.00 \$0.00		\$0.00	\$0.00 \$0.00 \$1,043,677.11 \$0.00	0 \$168,598.22	\$0.00	\$0.00 \$127,206.37			\$0.00				\$0.00	\$0.00	\$0.00	\$0.00		\$0.00				
51061 51061: Fauquier County 51063 51063: Floyd County 51065 51065: Fluvanna County	5	\$631,372.31 \$1,797.51 \$202,760.18	\$631,372.31 \$1,797.51 \$67,283.27	\$0.00 \$0.00 \$135,476.91		\$0.00 \$135,476.9	91	\$56,093.29 \$1,797.51 \$0.00	\$0.00 \$0.00 \$0.00	\$94,977.64	\$0.00	\$480,301.38	\$0.00		\$0.00	\$0.00	\$0.00 \$0.00	\$0.00 \$0.00	\$0.00	\$0.00		\$0.00 \$67,283.27			\$0.00	\$0.00
51067 51067: Franklin County 51069 51069: Frederick County	4	\$402,468.27 \$939,187.09	\$286,218.27 \$939,187.09	\$116,250.00 \$0.00		\$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$ \$		\$37,574.41 \$589,320.40	\$0.00 \$0.00	\$3,048.22	\$0.00	\$346,818.47	\$0.00		\$35,535.14	\$0.00	\$194,402.73		\$18,705.99	\$0.00		ψον,200.27	40.00			
51071 51071: Giles County 51073 51073: Gloucester County 51075 51075: Goodbland County	2	\$29,590.51 \$35,770.82	\$29,590.51 \$35,770.82	\$0.00 \$0.00	\$5,661.72		00	\$29,590.51	\$0.00	\$30,109.10	\$0.00								\$0.00	\$0.00		00.00	\$0.00		\$0.00	\$0.00
51075 51075: Goochland County 51077 51077: Grayson County 51079 51079: Greene County	3	\$0.00 \$51,711.06 \$176,949.03	\$0.00 \$51,711.06 \$29,750.03	\$0.00 \$0.00 \$147,199.00		\$0.00 \$0.0		\$17,114.66	\$72,199.00	\$2,749.89	\$0.00	\$9,885.48	\$0.00		\$18,381.40	\$0.00	\$3,642.66	\$0.00	\$0.00	\$0.00		\$0.00 \$0.00	\$0.00		\$29,687.00 \$0.00	\$0.00 \$0.00
51081 51081: Greensville County 51083 51083: Halifax County	2 9	\$7,531.43 \$2,149,083.72	\$7,531.43 \$310,478.97	\$0.00 \$1,838,604.75	\$7,531.43			\$0.00	\$0.00						\$9,840.89	\$1,838,604.75	\$275,933.29	\$0.00	\$0.00 \$24,704.79	\$0.00 \$0.00						
51085 51085: Hanover County 51087 51087: Henrico County 51089 51089: Henry County	2	\$262,379.20 \$5,094,043.74 \$330,568.80	\$262,379.20 \$5,094,043.74 \$330,568.80	\$0.00 \$0.00 \$0.00	\$3,853,562.22							1,240,481.52	\$0.00		\$330,568.80	\$0.00			\$0.00	\$0.00		\$0.00	\$0.00			
51091 51091: Highland County 51093 51093: Isle of Wight County	3	\$44,289.31 \$893,305.20	\$44,289.31 \$893,305.20	\$0.00 \$0.00		\$0.00		\$43,257.39	\$0.00	\$1,031.92	\$0.00	\$0.00	\$0.00 \$169,39	7.61 \$0.00												
51095 51095: James City County 51097 51097: King and Queen County	nty 6	\$2,280,611.08 \$47,720.81	\$2,207,111.08 \$47,720.81	\$0.00		\$0.00	\$0.00 \$0.0			\$0.00	\$0.00	*************************************	147.05		\$0.00	\$0.00	\$125,156.92 \$0.00	\$0.00 \$0.00	\$0.00	\$0.00		\$404.00 7 .40	00.00			
51099 51099: King George County 51101 51101: King William County 51103 51103: Lancaster County	5	\$1,931,865.78 \$142,966.43 \$43,743.64	\$269,717.83 \$64,966.43 \$43,743.64	\$1,662,147.95 \$78,000.00 \$0.00	\$64,966.43		00 \$50,535.72 \$0.00			\$0.00	\$0.00	\$30,901.81 \$1,662,1	147.95		\$0.00 \$5,583.05		\$0.00 \$10,872.00	\$0.00 \$0.00	\$0.00 \$0.00	\$0.00 \$0.00		\$124,327.48 \$0.00	\$0.00 \$78,000.00			
51105 51105: Lee County 51107 51107: Loudoun County	1 2	\$0.00 \$1,717,495.74	\$0.00 \$1,717,495.74	\$0.00 \$0.00						\$361,478.98	\$0.00		\$0.00												\$0.00	\$0.00
51109 51109: Louisa County 51111 51111: Lunenburg County 51113 51113: Madison County	5	\$42,117,700.88 \$188,712.60 \$7,797.74	\$42,117,700.88 \$188,712.60 \$7,797.74	\$0.00 \$0.00 \$0.00	\$8,302.15	\$41,898,081.16 \$0.00 \$0.00	00	\$0.00 \$0.00 \$2,448.00	\$0.00 \$0.00 \$0.00	\$0.00	\$0.00		\$0.00 \$0.00		\$0.00	\$0.00	\$28,207.61	\$0.00	\$0.00 \$152,202.84	\$0.00 \$0.00	•	\$178,082.02 \$5,349.74			\$0.00	\$0.00
51115 51115: Mathews County 51117 51117: Mecklenburg County	3	\$1,358,665.20 \$1,193,151.47		\$1,330,635.32 \$104,250.00		\$0.00 \$0.00		Ψ2,440.00	φυ.υυ		\$1,330,635.32	φυ.υυ	\$0.00		\$0.00 \$50,328.05		\$94,647.48	\$104,250.00	\$302,244.35	\$0.00		φυ,υ49.74	φυ.συ		φ0.00	φ0.00
51119 51119: Middlesex County 51121 51121: Montgomery County	3	\$39,954.41 \$202,464.13	\$39,954.41 \$202,464.13	\$0.00 \$0.00		\$0.00		\$202,464.13	\$0.00	\$5,734.41	\$0.00				20.00	00.00	\$0.00 \$0.00	\$0.00 \$0.00	\$0.00	\$0.00			4400 500 00		\$0.00	
 51125 51125: Nelson County 51127 51127: New Kent County 51131 51131: Northampton County 	5	\$201,608.65 \$945,658.22 \$585,407.59	\$5,108.65 \$945,658.22 \$395,407.59	\$196,500.00 \$0.00 \$190,000.00	\$839,632.21	\$0.00 \$0.00 \$6,000.62 \$0.0	00	\$5,108.65 \$32,285.75	\$0.00 \$0.00	\$0.00 \$13,872.33 \$314,514.21	\$0.00 \$0.00 \$100,000.00				\$0.00	\$0.00	\$59,867.93 \$0.00	\$0.00 \$90,000.00	\$0.00	\$0.00		\$0.00	\$196,500.00		\$0.00	\$0.00
51133 51133: Northumberland Cou51135 51135: Nottoway County	nty 5	\$146,470.52 \$996,933.40	\$146,470.52 \$996,933.40	\$0.00 \$0.00	\$88,882.74	\$0.00		\$2,197.31	\$0.00	\$9,542.78	\$0.00				\$0.00 \$0.00		\$48,045.00 \$34,882.65	\$0.00		\$0.00 \$0.00						
51137 51137: Orange County 51139 51139: Page County 51141 51141: Patrick County	2	\$442,161.30 \$118,504.39 \$0.00	\$442,161.30 \$118,504.39 \$0.00	\$0.00 \$0.00 \$0.00		\$433,602.81 \$0.0	00	\$0.00 \$36,702.25	\$0.00 \$0.00				\$0.00 \$0.00		\$0.00	\$0.00			\$0.00	\$0.00		\$8,558.49	\$0.00		\$0.00	\$0.00
51143 51143: Pittsylvania County 51145 51145: Powhatan County	5	\$4,800,685.78 \$37,433.14	\$4,671,473.53 \$37,433.14	\$129,212.25 \$0.00		\$0.00		\$16,125.49 \$0.00	\$0.00 \$0.00			φυ.υυ	\$0.00		\$0.00		\$4,403,447.27 \$32,249.81	\$129,212.25 \$0.00	\$0.00 \$251,900.77 \$0.00	\$0.00 \$0.00		\$0.00	\$0.00		\$0.00	
51147 51147: Prince Edward Count 51149 51149: Prince George Count	ty 2	\$435,913.00 \$312,819.73	\$435,913.00 \$312,819.73	\$0.00 \$0.00	\$312,819.73	\$0.00		\$0.00	\$0.00								\$298,971.45	\$0.00	\$136,941.55 \$0.00	\$0.00 \$0.00		\$0.00	\$0.00			
 51153 51153: Prince William Coun 51155 51155: Pulaski County 51157 51157: Rappahannock Count 	3	\$780,286.97 \$125,521.64 \$9,090.00	\$780,286.97 \$51,571.64 \$0.00	\$0.00 \$73,950.00 \$9,090.00			\$124,317.82 \$0.0	0 \$10,454.25 \$39,140.49 \$0.00	\$0.00 \$0.00 \$0.00	\$135,551.16 \$0.00	\$0.00 \$0.00		\$0.00 \$0.00		\$12,431.15	\$73,950.00	\$0.00	\$9,090.00				\$0.00	\$0.00		\$0.00	\$0.00
51159 51159: Richmond County 51161 51161: Roanoke County	3 9	\$94,955.59 \$565,177.83	\$94,955.59 \$565,177.83	\$0.00 \$0.00	\$94,955.59	\$0.00		\$255,690.51	\$0.00								\$0.00 \$309,487.32	\$0.00 \$0.00	\$0.00	\$0.00		, , , , , ,			\$0.00	\$0.00
 51163 51163: Rockbridge County 51165 Flooringham County 51167 S1167: Russell County 	1 5	\$20,836.13 \$1,738,188.05 \$0.00	\$20,836.13 \$1,641,497.05 \$0.00	\$0.00 \$96,691.00 \$0.00				\$20,836.13 \$1,641,497.05	\$0.00 \$96,691.00						\$0.00	\$0.00									\$0.00	\$0.00
51169 51169: Scott County 51171 51171: Shenandoah County	1 5	\$40,259.28 \$134,312.56	\$40,259.28 \$134,312.56	\$0.00 \$0.00				\$27,628.70	\$0.00	\$86,308.10	\$0.00	\$20,375.76	\$0.00		ψ0.00	φο.σσ									\$40,259.28	\$0.00
51173 51173: Smyth County 51175 51175: Southampton County	2	\$9,024.47 \$131,188.11 \$231,473.68	\$9,024.47 \$131,188.11 \$231,473.68		\$131,188.11		00	\$9,024.47	\$0.00			\$80,873.35		0.00 \$0.00	0							\$123,630.20	\$0.00		\$0.00	\$0.00
 51177 51177: Spotsylvania County 51179 51179: Stafford County 51181: Surry County 	3	\$231,473.68 \$1,549,534.03 \$81,807.98	\$1,549,534.03 \$81,807.98	\$0.00 \$0.00 \$0.00				\$207,344.49	\$0.00	\$14,627.93	\$0.00		\$0.00 \$0.00									1,153,007.62				
51183 51183: Sussex County 51185 51185: Tazewell County	3	\$1,441,409.09 \$108,042.10	\$1,328,909.09 \$108,042.10	\$112,500.00 \$0.00		\$0.00		\$56,732.70	\$0.00										\$124,144.16 \$112,	500.00			\$23,492.68	\$0.00	\$27,816.72	\$0.00
 51187 51187: Warren County 51191 51191: Washington County 51193 Westmoreland Count 	1 5	\$220,859.93 \$321,595.37 \$216,988.62	\$220,859.93 \$321,595.37 \$216,988.62	\$0.00 \$0.00 \$0.00		\$0.00	\$35,809.44 \$0.0	\$8,019.65	\$0.00	\$0.00 \$0.00	\$0.00 \$0.00	\$212,840.28	\$0.00				\$0.00	\$0.00				\$0.00	\$0.00		\$321,595.37	\$0.00
51195 51195: Wise County 51197 51197: Wythe County	1 9	\$36,286.70 \$8,095.00	\$36,286.70 \$8,095.00	\$0.00 \$0.00						, , , , ,												, ,,,,,			\$36,286.70 \$8,095.00	\$0.00 \$0.00
51199 51199: York County 51510 51510: Alexandria city 51520 51520: Bristol city	3	\$2,523,551.08 \$2,078,159.17 \$0.00	\$1,186,398.01 \$2,078,159.17 \$0.00	\$1,337,153.07 \$0.00 \$0.00	\$315,188.35		\$796,818.74 \$0.00	0				\$966,152.08	\$0.00		\$0.00	\$0.00									\$0.00	\$0.00
51520: Bristol City 51530: Suena Vista city 51540: Charlottesville city	1 5	\$0.00 \$27,605.30 \$96,169.54	\$27,605.30 \$96,169.54	\$0.00 \$0.00 \$0.00				\$27,605.30 \$96,169.54	\$0.00 \$0.00							φυ.00									φυ.υυ	φυ.υυ
51550 51550: Chesapeake city 51570 51570: Colonial Heights city 51580 51580: Covington city	1 1	\$5,621,390.13 \$481,024.95 \$93,041,60	\$3,990,819.88 \$481,024.95	\$1,630,570.25 \$0.00	\$481,024.95			COO. CALL CO	00.00				\$1,342,35	7.89 \$545,159.25	5										00.00	00.00
 51580 51580: Covington city 51590 51590: Danville city 51595 51595: Emporia city 	5	\$93,041.60 \$9,088,171.11 \$121,970.18	\$93,041.60 \$9,088,171.11 \$82,093.18	\$0.00 \$0.00 \$39,877.00		\$39,877.00		\$93,041.60 \$292,984.32	\$0.00 \$0.00						\$141,377.28	\$0.00	\$7,858,150.25	\$0.00	\$795,659.26	\$0.00					\$0.00 \$0.00	
51600 51600: Fairfax city 51610 51610: Falls Church city	3 9	\$0.00 \$323,516.70	\$0.00 \$323,516.70	\$0.00 \$0.00				\$0.00 \$187,743.09	\$0.00 \$0.00	\$0.00 \$49,441.75	\$0.00 \$0.00		\$0.00 \$0.00													
 51620 51620: Franklin city 51630 51630: Fredericksburg city 51640 Galax city 	4	\$430,451.14 \$670,374.03 \$392,151.46	\$390,923.14 \$670,374.03 \$392,151.46	\$39,528.00 \$0.00 \$0.00		\$39,528.00 \$36,745.97 \$0.0	00	\$122,579.46	\$0.00			\$309,220.51	\$95,38 \$0.00	1.86 \$0.00	\$13,440.82	\$0.00	\$392,151.46	\$0.00			:	\$201,828.09	\$0.00		\$0.00	\$0.00
51640: Galax city 51650: Hampton city 51660: 51660: Harrisonburg city	3	\$392,151.46 \$3,461,104.83 \$203,140.50			\$1,135,074.18	\$1,395,112.00		\$203,140.50	\$0.00				\$535,34	9.07 \$0.00	\$239,862.08	\$155,707.50	ψ002, 101.40	φυ.υυ							φυ.υυ	φυ.υυ
51670 51670: Hopewell city 51678 51678: Lexington city	1 9	\$160,842.58 \$184,154.82	\$160,842.58 \$184,154.82	\$0.00 \$0.00		\$0.00		\$184,154.82	\$0.00																	
 51680 51680: Lynchburg city 51683 51683: Manassas city 51685 51685: Manassas Park city 	2	\$1,757,501.96 \$279,614.01 \$17,182.72	\$1,693,394.96 \$279,614.01 \$17,182.72	\$64,107.00 \$0.00 \$0.00				\$1,693,394.96 \$0.00	\$64,107.00 \$0.00	\$26,704.02	\$0.00		\$0.00 \$0.00													
51690 51690: Martinsville city 51700 51700: Newport News city	3	\$17,102.72 \$678,182.95 \$2,847,581.91	\$416,789.20 \$2,847,581.91	\$261,393.75		\$0.00		\$52,634.30	\$0.00	\$343,356.75	\$0.00	,	\$	0.00 \$0.00			\$364,154.90	\$261,393.75								
51710 51710: Norfolk city 51720 51720: Norton city	2 5	\$6,873,047.49 \$0.00	\$6,358,560.49 \$0.00	\$514,487.00 \$0.00	\$2,966,086.91	\$514,487.00							\$3,392,47		0										\$0.00	\$0.00
51730 51730: Petersburg city 51735 51735: Poquoson city 51740 51740: Portsmouth city	1 5	\$528,207.25 \$205,978.67 \$2,907,226.48	\$528,207.25 \$183,130.67 \$2,907,226.48	\$0.00 \$22,848.00 \$0.00		\$22,848.00							\$2,143,06	4.27 \$0.00	\$127,176.15 0	\$0.00										
51750 51750: Radford city 51760 51760: Richmond city	2 2	\$86,549.56 \$2,097,254.74	\$86,549.56 \$2,097,254.74	\$0.00 \$0.00	\$1,907,918.11			\$86,549.56	\$0.00				,-,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,	ψυ.υί	\$189,336.63										\$0.00	
51770 51770: Roanoke city 51775 51775: Salem city 51790 51790: Staupton city	1	\$543,007.09 \$133,655.08 \$106.642.76	\$543,007.09 \$133,655.08 \$106.642.76	\$0.00 \$0.00				\$543,007.09 \$133,655.08 \$106.642.76	\$0.00 \$0.00						\$0.00	\$0.00									\$0.00	\$0.00
 51790 51790: Staunton city 51800 51800: Suffolk city 51810: Virginia Beach city 	2	\$106,642.76 \$1,790,676.61 \$11,766,306.45	\$106,642.76 \$1,790,676.61 \$11,554,535.64	\$0.00 \$0.00 \$211,770.81	\$1,122,162.45			\$106,642.76	\$0.00				\$668,51 \$6,832,22	4.16 \$0.00 0.00 \$94,660.81					\$25,098.35	\$0.00						
51830 51830: Williamsburg city 51840 51840: Winchester city	2 9	\$472,300.43 \$0.00	\$472,300.43 \$0.00	\$0.00 \$0.00	\$399,473.11	\$0.00		\$0.00	\$0.00				\$0.00		\$72,827.32											
otal Total						\$5,736,278.07 \$43,550,470.91 \$915,683.7	70 \$5,135,398.23 \$43,343.0		· ·	\$10,459,122.12	\$1,503,277.32 \$4			9.44 \$902,409.06	\$33,230,394.26	\$2,656,250.08	\$40,052,320.07 \$1	1,350,421.00 \$	\$66,611,116.23 \$1,612,	302.28 \$1,712,214	.40 \$25,304.39 \$111	1,846,163.18	\$1,404,494.00 \$5,871,501.23	\$185,141.48	\$21,694,512.17	\$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.

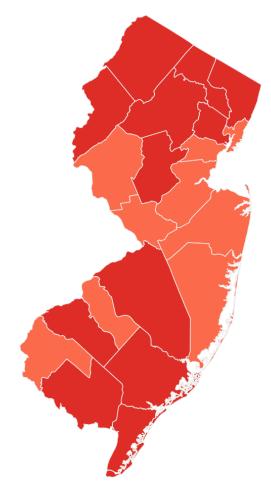


GEOGRAPHIC MAP. SOURCE: ESRI WORLD IMAGERY BASEMAP

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."

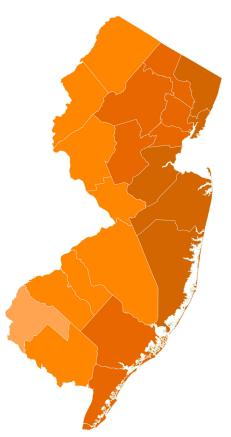
Importantly, extreme heat waves do not fit the criteria for federal disaster declarations despite being the leading cause of deaths among climate hazards. Likewise, sea level rise is not included in this definition despite the threat it poses to numerous communities, including damage to property, loss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

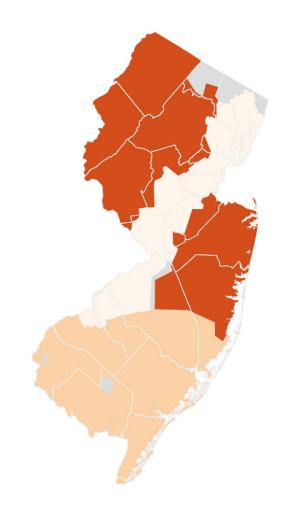
- Socioeconomic Status (below poverty, unemployed, income, no high school diploma);
- Household Composition & Disability (aged 65 or older, aged 17 or younger, older than age 5 with a disability, single-parent households);
- Minority Status & Language (minority, speak English "less than well"); and
-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

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

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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