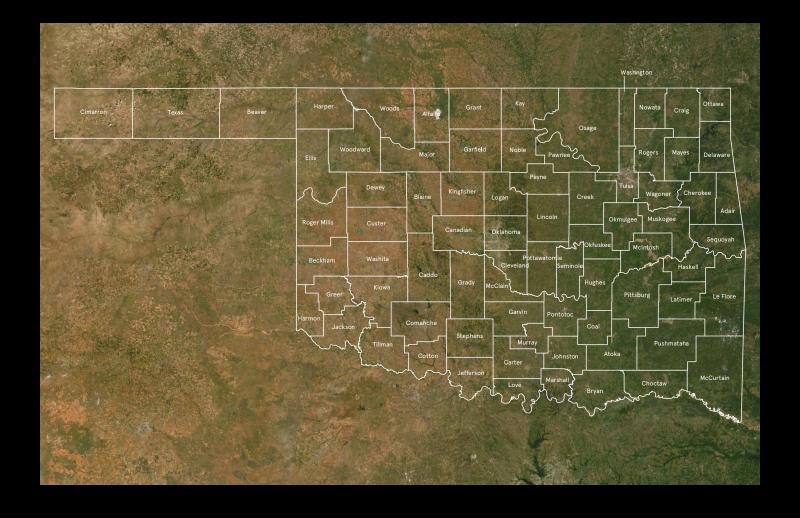
### 

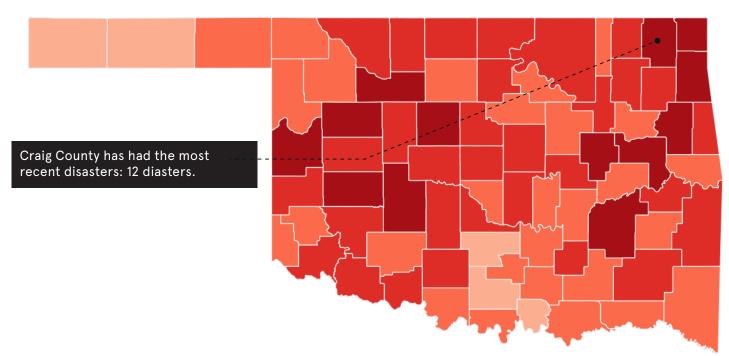


| OKLAHOMA STATISTICS SUMMARY (2011 - 2024) |  |  |  |  |  |  |  |  |  |  |
|---|--|--|--|--|--|--|--|--|--|--|
| 30  | CLIMATE DISASTER DECLARATIONS                                      |  |  |  |  |  |  |  |  |  |
| \$1.1 BILLION                             | FEMA + HUD POST-DISASTER FUNDING                                   |  |  |  |  |  |  |  |  |  |
| 4.0 MILLION PEOPLE                        | POPULATION TOTAL   |  |  |  |  |  |  |  |  |  |
| \$274                                     | PER CAPITA SPENDING ON CLIMATE DISASTERS                           |  |  |  |  |  |  |  |  |  |
| CRAIG (12<br>DISASTERS)                   | COUNTY WITH THE HIGHEST DISASTER OCCURRENCES                       |  |  |  |  |  |  |  |  |  |
| 63  | COUNTIES HAVE HAD FIVE OR MORE DISASTERS                           |  |  |  |  |  |  |  |  |  |
| 2 MILLION PEOPLE                          | LIVE IN AREAS WITH VERY HIGH SOCIAL VULNERABILITY (SVI > 0.75)     |  |  |  |  |  |  |  |  |  |
| 22.3 HOURS                                | TOTAL OUTAGE DURATION (HOURS PER CUSTOMER PER YEAR)                |  |  |  |  |  |  |  |  |  |
| N/A                                       | ASCE INFRASTRUCTURE REPORT CARD GRADE                              |  |  |  |  |  |  |  |  |  |
| 18  | SUPERFUND SITES  |  |  |  |  |  |  |  |  |  |
| \$3.6 BILLION                             | CLIMATE INFRASTRUCTURE SUPPORTED THROUGH SMALL INSURANCE SURCHARGE |  |  |  |  |  |  |  |  |  |
| 2ND HIGHEST                               | RANK IN TOP 10 STATES WITH HIGHEST NUMBER OF DISASTER DECLARATIONS |  |  |  |  |  |  |  |  |  |

### **DISASTER OCCURRENCES 2011–2024**

FEDERALLY DECLARED CLIMATE DISASTERS BY COUNTY

### declarations



### **Number of Disaster Events**

Major Disaster Declarations (2011-2024)

0 occurences

1 occurrence

2-3 occurences

4-6 occurrences

7-9 occurrences

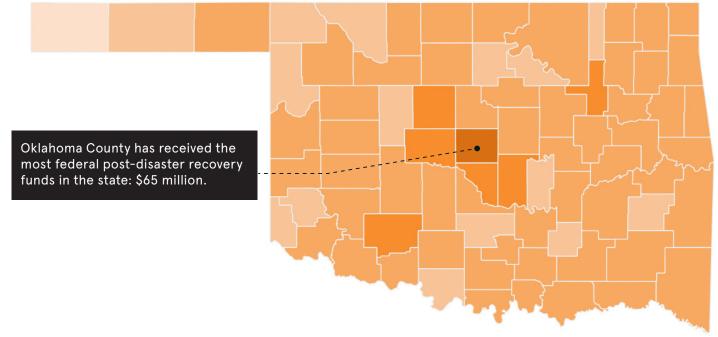
10+ occurrences

MAP MADE BY REBUILD BY DESIGN FEMA DATA COURTESY OF IPARAMETRICS

### FEMA 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

**\$857M** FEMA obligations

\$229M HUD CDBG-DR Funds

**\$1.1B** FEMA + HUD assistance

\$274 per capita cost

MAP MADE BY REBUILD BY DESIGN FEMA DATA COURTESY OF IPARAMETRICS

223

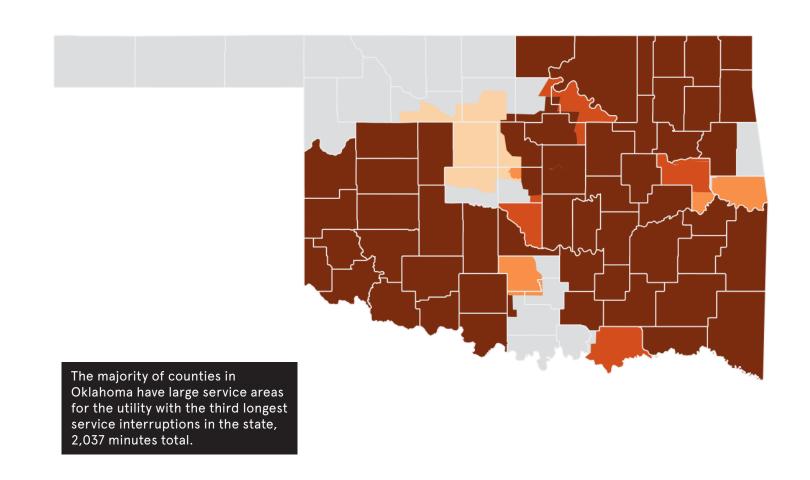
### **SOCIAL VULNERABILITY INDEX 2022**

AREAS OF GREATEST SOCIAL VULNERABILITY

# Canadian County has grown the most by population from 2010 to 2024 in Oklahoma, 36%, and experienced



**COUNTIES AT GREATEST RISK OF POWER OUTAGES** 



### Social Vulnerability Index

8 recent disasters, but it has a low

social vulnerability of 0.3.

CDC (2022)



0.0 - 0.2

### 0.2 - 0.4

0.2 - 0.

### 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

224 225

MAP MADE BY REBUILD BY DESIGN

DATA SOURCE: CDC/ATSDR 2022 SVI

| TOTAL: 30 DISASTERS   |   | Total   |  |   | 2011   | 2012   |  | 2013 2014   |  | 2015                                     | 20  | 16   | 2017  |  | 2018  |  | 2019   | 2020   | 2021  | 20   | )22   | 2023   |  |   |                                       | 024                           |                |
|---|---|---|--|---|--|--|--|---|--|--|---|--|---|--|---|--|--|--|---|--|---|--|--|---|---------------------------------------|-------------------------------|----------------|
| FEMA PA + HM: \$857.1 M HUD CDBG-DR: \$229.1 M                    |   |   | 1970: SEVERE<br>TORNADOE<br>STRAIGHT-LIN | ES, AND   | RE WINTER 1988: SEVERE STORMS<br>NOWSTORM AND FLOODING   | 1989: SEVERE STORMS, TORNADOES, STRAIGHT- LINE WINDS, AND FLOODING  4064: SEVERE STORMS, TORNADOES, STRAIGHT- LINE WINDS, AND LINE WINDS, AND NOBLE WILDFIRES  | 4109: SEVERE WINTER<br>STORM AND SNOWSTORM | R 4117: SEVERE STORMS, 4164: SEVERE WINTER RM TORNADOES, AND FLOODING STORM   | 4222: SEVERE STO<br>TORNADOES, STRAIC<br>WINDS, AND FLOC | ORMS,<br>GHT-LINE STORMS AND FLOODING    | INTER 4256: SEVERE WINTER ODING STORMS AND FLOODING                     | 4274: SEVERE STORMS 4299: SEVERE AND FLOODING STORM  | E WINTER 4315: SEVERE STORMS,<br>TORNADOES, AND FLOODII | 4324: SEVERE STORMS,<br>TORNADOES, STRAIGHT-<br>IG LINE WINDS, AND | 4373: WILDFIRES   | 4438: SEVERE STORMS,<br>STRAIGHT-LINE WINDS,<br>TORNADOES, AND FLOODIN | 4453: SEVERE STORMS, TORNADOES, STRAIGHT- LINE WINDS, AND FLOODING | 4456: SEVERE STORMS, STRAIGHT-LINE WINDS, TORNADOES, AND FLOODING  | ORM 4587: SEVERE WINT<br>STORMS                       | 4657: SEVERE STORMS,<br>TORNADOES, AND<br>FLOODING | 4670: SEVERE STORMS,<br>TORNADOES, AND<br>FLOODING        | SEVERE WINTER STORM 4706: SEVERE STORM STRAIGHT-LINE WI AND TORNADOR | DRMS, 4721: SEVERE STOR<br>INDS, STRAIGHT-LINE WIN<br>ES AND TORNADOES | RMS, 4776: SEVERE ST<br>STRAIGHT-LINE V<br>NDS, TORNADOES, A      | AND TORNAD                            | TIME WINDS                    | 2: SEVERE STOR |
| FEMA + HUD ASSISTANCE: \$1.1 B  GEOID COUNTY NAME # OF            | EEMA TOTAL                              | RA Obligations LIM Ob                           | ligations PA                             | HM PA   | HM PA HM   | PA HM PA HM PA HM  | RA Obligations HM                          | PA Obligations HM PA HM   | RA Obligations LIM O                                     | bligations BA Obligations                | HM BA Obligations HM  | PA HM PA Obligations   | HM RA Obligations HM                                    | PA HM  | PA HM   | RA Obligations HM  | PA HM  | PA HM RA Obligations HM  | PA HM   | PA HM  | PA HM P   | A HM BA Obligations  | HM PA Obligations H  | IM PA Obligations   | HM PA                                 | HM                            | PA HM          |
| 40000 40000: Statewide 28   | \$469,506,148.33                        | \$462,500,057.80 \$7,00                         | Obligations   06,090.53                  | Obligations         Obligations           \$143,501.87         \$999,355.42 | Obligations         Obligations         Obligations           \$21,956.66         \$231,032.67         \$81,187.68 | Obligations Obligations Obligations Obligations Obligations Salary Salar | Obligation 954,408,933.66 \$601,423.       | ons   17 Obligations   Obligations   Obligations   Obligations   Obligations   05   05   05   05   05   05   05   0 | ns \$8,873,718.13 \$1,0                                  | Obl<br>094,802.09 \$16,495,111.79 \$21   | ligations Obligations Obligations (2,869.62 \$34,601,884.02 \$407,246.0 | Obligations Obligations 14 Obligations 5 State    State    State    State    Obligations    Obligations    State    Stat | Obligations   | s Obligations Obligations 99 \$1,558,877.42 \$192,656.9            | S Obligations Obligations 99 \$4,515,343.47 \$97,760.48 | Obligations \$8,786,790.54 \$482,398.                                  | S Obligations Obligation 04 \$754,475.00 \$116,083.4               | Obligations   Obligations   17 Obligations   Obligations   Obligations   Obligations   S71,004,347.10   \$253,23 | ons Obligations Obligations 26.03 \$794,006.96 \$98,0 | one Cangatrone Cangatrone                          | Obligations Obligations Obligations \$0.00 \$0.00 \$264,5 | ations   Obligations   1.4 estigations   Obli<br>581.77              | \$0.00 \$10,721,231.25   | solutions   TA Obligations   Ob<br>\$0.00   \$3,205,730.12   \$74 | Obligations                           | Obligations Obli              | \$0.00 \$0     |
| 40001 40001: Adair County 7                                       | \$2,300,390.52                          | \$1,013,856.54 \$1,28                           | 66,533.98                                | <b>*</b>  | \$299,367.13 \$0.00  |  | ,  | , , , , , , , , , , , , , , , , , , ,   | \$80,035.78  | \$0.00                                   | \$270,590.90 \$1,286,533.9  | 8  | \$183,521.03  |  | , , , , , , , , , , , , , , , , , , ,                   | \$180,341.70 \$0.0   | 00   | \$ \tag{2.50}  |   | 0.00 \$0.00 \$0.00                                 | *****   | V 11.00 V 11,02-11,0 11.11   | Ψ3.03 Ψ1.0,1.2.1,20.1.20   | \(\frac{1}{2}\)   | ,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,,, | Ţ                             | <b>40.00</b>   |
| 40003 40003: Alfalfa County 9<br>40005 40005: Atoka County 6      | ¥ 1,=00,010110                          | \$1,285,019.73<br>\$3.800.347.87                | \$0.00<br>\$0.00 \$2,634,157.38          | 00.02   |  | \$0.00   | \$13,604.32 \$0.                           | \$62,520.12 \$0.00  | \$916,639.01   |  | \$0.00 \$0.00 \$0.0   |  |   | \$0.00 \$0.0   | 00  | \$1,123,043.00 \$0.0   | 00 \$10,516.60 \$0.0<br>\$143,046.22 \$0.0                         |  | \$0.00 \$42,434.47 \$28.673.02                        | 0.00   |   |  | \$15,312.12  | 00.02   |                                       | 4                             |                |
| 40007 40007: Beaver County 6                                      | , , , , , , ,                           | \$1,209,049.77 \$3                              |  | ψ0.00   |  |  | \$281,024.97 \$0.                          |   | ψ510,005.01  | ψ0.00                                    |   | \$726,496.44   | \$0.00 \$0.00 \$0                                       | 00   |   | \$149,122.18 \$37,515.0  |  |  | \$0.00  |  |   |  | \$52,406.18  |   |                                       |                               |                |
| 40009 40009: Beckham County 8                                     | , | \$2,255,859.09 \$60                             | 1  |   |  | 007.000.50   | \$41,157.56 \$0.                           |   | \$229,477.56 \$2   |  | 12,887.43 \$27,161.66 \$196,850.9                                       |  |   | \$288,073.01 \$0.0   | 00  | \$1,589,501.93 \$0.  |  | 0455 700 00  | \$0.00  |  |   |  |  |   | <b></b>                               | , and the same                |                |
| 40011 40011: Blaine County 9<br>40013 40013: Bryan County 4       | \$644,688.21<br>\$1,530,149.53          | \$644,688.21<br>\$1,530,149.53                  | \$0.00<br>\$0.00                         |   |  | \$87,303.56 \$0.00   | \$87,200.65 \$0.                           | J.00  | \$925,926.45   | \$143,988.80<br>\$0.00 \$355,349.17      | \$0.00 \$125,849.71 \$0.0<br>\$0.00                                     | \$21,024.15  | \$0.00  |  |   | \$23,528.31 \$0.0  | \$187,090.01 \$0.0   | \$155,793.03<br>00   | \$0.00 \$0.00 \$<br>\$61,783.90                       | 0.00   |   |  |  |   | \$0.0                                 | 0.00 \$0.00                   |                |
| 40015 40015: Caddo County 10                                      | · · · ·                                 | \$2,239,291.88 \$4                              | 5,000.00                                 |   |  | \$0.00 \$0.00  |  |   | \$460,780.74   | \$0.00 \$252,323.68                      | \$0.00 \$298,710.24 \$0.0   | \$341,836.28 \$0.00  | \$0.00 \$0  | 00   |   | \$47,343.86 \$0.0  |  | \$788,876.60 \$45,0  | 00.00 \$49,420.48                                     | 0.00   |   |  |  |   | \$0.0                                 | \$0.00                        |                |
| 40017 40017: Canadian County 8<br>40019 40019: Carter County 3    | , | \$18,394,030.43 \$1,44<br>\$2,004,335.93        | \$0,066.65                               |   |  | \$454,295.50 \$1,389,044.00  |  | \$1,332,061.15 \$0.00   | \$803,119.05<br>\$1,816,516.58                           | \$30,000.00 \$5,004,376.36 \$2<br>\$0.00 | 21,022.65 \$135,005.46 \$0.0  | 0  |   |  |   | \$2,549,182.72 \$0.0   | 00   | \$8,079,310.84   | \$0.00 \$36,679.35<br>\$19,192.40                     | 0.00   |   |  |  | \$168,626.95  | 00.02                                 | 4                             |                |
| 40021 40021: Cherokee County 10                                   | <b>+=,</b> 00 1,000.00                  | \$907,157.02 \$11                               |  | \$121,461.91  | \$0.00 \$156,338.77 \$0.00   | \$2,056.04 \$0.00  |  |   | \$0.00   | \$0.00                                   | \$64,589.65 \$0.0   | 0  | \$423,642.85 \$0  | 00 \$0.00 \$0.0  | 00  | \$139,067.80 \$112,500.0   | 00   |  |   | 0.00 \$0.00 \$0.00                                 |   |  |  | \$100,020.93  | ψ0.00                                 |                               |                |
| 40023 40023: Choctaw County 4                                     | \$1,000,894.46                          | \$1,000,894.46                                  | \$0.00                                   |   |  |  |  | \$515,194.03 \$0.   | \$485,700.43   | \$0.00                                   |   |  | 20.00   |  |   |  |  |  | \$0.00  |  |   |  | \$0.00   |   |                                       |                               |                |
| 40025 40025: Cimarron County 3<br>40027 40027: Cleveland County 6 | \$0.00<br>\$37,385,285.10               | \$0.00<br>\$33,472,157.82<br>\$3,91             | \$0.00<br>3,127.28                       |   |  | \$0.00 \$0.00  |  | \$23,725,072.12 \$954,919.98  | \$1,911,318.97   | \$0.00                                   |   |  | \$0.00 \$0  | 00   |   |  |  | \$7,765,318.21 \$2,958.2   | \$0.00<br>07.30 \$70,448.52                           | 0.00   |   | \$0.00   | \$0.00<br>\$0.00   | \$0.00  |                                       | $\overline{}$                 |                |
| 40029 40029: Coal County 7  | , | \$597,534.89                                    | \$0.00                                   |   |  |  |  | \$99,406.45 \$0.00  | \$215,151.76   | \$0.00                                   | \$123,614.89 \$0.0  |  |   | \$81,372.31 \$0.0  | 00  |  | \$63,769.48 \$0.0  |  | \$14,220.00   | 0.00   |   |  |  | \$0.00  | \$0.00                                |                               |                |
| 40031 40031: Comanche County 6<br>40033 40033: Cotton County 7    | , , ,                                   | \$12,193,223.85<br>\$3,585,300.06               | \$0.00<br>\$0.00                         |   |  |  |  |   | \$5,034,999.65<br>\$2,316,144.68                         | \$0.00<br>\$0.00                         | \$10,875.00 \$0.0<br>\$0.00 \$0.0                                       | 0 \$1,478,101.70 \$0.00<br>0 \$264.473.16 \$0.00   |   | \$934,448.48 \$0.0   | 00  |  |  | \$716,713.51   | \$0.00 \$125,596.58<br>\$0.00                         | 0.00   |   |  |  | \$0.00<br>\$0.00<br>\$0.00  | 00.02                                 | 4                             |                |
| 40035 40035: Craig County 12                                      | · · · ·                                 | \$1,975,532.22 \$22                             |  | \$89,767.52   | \$0.00   | \$201,797.73 \$0.00 \$92,641.96 \$179,817.50   |  | \$75,137.92 \$5,864.00  | \$169,273.66   | *****                                    | \$166,894.73 \$0.0  | 0  | \$470,662.15 \$0  |  |   | \$696,791.66 \$0.0   | 00 \$12,564.89 \$0.0   | 00   | \$0.00  |  |   |  |  | \$0.00 \$0.00   |                                       |                               |                |
| 40037 40037: Creek County 6                                       | · · · ·                                 | <del>+-,,</del>                                 | \$0.00                                   | \$90,124.47   | \$0.00   | \$0.00 \$0.00  | <b>\$600.047.77</b>                        |   | \$458,314.53   | \$0.00                                   | 17 007 0F #0 040 000 07   |  |   |  | 00.00   | \$871,012.31 \$0.  | 00   | 2-2  | \$0.00  |  |   |  | \$882,331.08   | \$0.00  | •                                     | 00 00                         |                |
| 40039 40039: Custer County 9<br>40041 40041: Delaware County 10   | , | \$8,228,718.61 \$30<br>\$1,744,250.12 \$36      |  |   | \$161,520.93 \$0.00  | \$86,664.30 \$0.00   | \$600,247.75 \$51,975.                     | 0.00  | \$1,723,440.71<br>\$180,898.04<br>\$1                    | \$0.00 \$169,621.80 \$4<br>160,427.50    | \$3,942,382.37 \$59,699.1<br>\$109,306.37 \$148,682.6                   |  | \$494,918.10 \$0  | 00 \$20,177.12 \$0.0   | \$0.00 \$0.00   | \$1,728,650.39 \$0.0<br>\$330,785.15 \$0.0                             | 00   | \$58,525.59  | \$0.00 \$5,850.00 \$148,0<br>\$0.00 \$58,5            |  |   |  | \$101,716.95   | \$0.00  |                                       | \$0.00 \$0.00<br>\$.16 \$0.00 |                |
| 40043 40043: Dewey County 10                                      | \$8,290,421.16                          | \$8,290,421.16                                  | \$0.00                                   |   |  |  | \$907,317.35 \$0.                          |   | \$470,349.11   |  | \$0.00 \$983,289.13 \$0.0   | \$336,013.28   | \$0.00 \$1,419,544.83 \$0                               |  | \$422,820.21 \$0.00                                     | \$1,357,591.15   | 00   |  | \$0.00 \$0.00   | 0.00   |   |  |  |   |                                       |                               |                |
| 40045 40045: Ellis County 6<br>40047 40047: Garfield County 5     | \$478,626.05<br>\$3,743,282.49          | \$478,626.05<br>\$3,705,782.49 \$3              | \$0.00<br>\$7,500.00                     |   |  |  | \$103,414.50 \$0.<br>\$79,359.07 \$0.      |   |  | \$0.00<br>\$1,024,206.23                 | \$0.00<br>\$0.00  | \$278,071.20   | \$0.00  |  |   | \$97,140.35 \$0.0<br>\$904,726.98 \$37,500.0                           |  |  | \$0.00 \$0.00<br>\$0.00 \$0.00                        |  |   |  |  |   |                                       |                               |                |
| 40049 40049: Garvin County 3                                      | \$963,392.83                            | \$963,392.83                                    | \$0.00                                   |   |  |  | ψ0.  |   | \$571,782.28   | \$0.00                                   |   | \$391,610.55 \$0.00  |   |  |   |  |  |  | \$0.00  |  |   |  |  |   |                                       |                               |                |
| 40051 40051: Grady County 8                                       | 1 1 1                                   | \$3,662,004.34 \$13                             |  |   |  | \$68,769.79 \$0.00   | \$15,985.96 \$0.                           | 200   | \$1,851,167.19   | \$0.00 \$197,990.28                      |   | 6 \$288,157.36 \$0.00  |   |  |   | \$227,446.97 \$0.0   |  |  | \$0.00 \$5,391.25                                     |  |   |  |  |   |                                       | A                             |                |
| 40053 40053: Grant County 8<br>40055 40055: Greer County 5        | \$2,673,248.41<br>\$272,635.47          | \$2,673,248.41<br>\$272,635.47                  | \$0.00<br>\$0.00                         |   |  | \$521,074.25 \$0.00  | \$15,985.90 \$0.                           | 5.00  | \$36,545.53<br>\$80,618.11                               | \$0.00 \$24,489.24<br>\$0.00 \$72,749.51 | \$0.00 \$0.00 \$0.0<br>\$0.00 \$12,598.14 \$0.0                         | 0  |   |  |   | \$1,979,054.04 \$0.0<br>\$16,981.32 \$0.0                              |  | \$14,023.25  | \$0.00 \$82,076.14 \$89,688.39                        | 0.00   |   |  |  |   |                                       |                               |                |
| 40057 40057: Harmon County 4                                      | \$148,211.05                            | \$148,211.05                                    | \$0.00                                   |   |  |  |  |   | \$124,968.63   | \$0.00                                   | \$0.00 \$0.0  |  |   |  | \$23,242.42 \$0.00                                      |  |  |  | \$0.00  |  |   |  |  |   |                                       |                               |                |
| 40059 40059: Harper County 4<br>40061 40061: Haskell County 8     | \$586,082.08<br>\$2,674,326.32          | \$563,582.08 \$2<br>\$2,674,326.32              | \$0.00                                   |   | \$636,040.17 \$0.00  |  |  | \$143,875.88 \$0.00   | \$1,141,940.86   | \$0.00                                   | \$277,462.98 \$0.0  | \$308,899.53   | \$22,500.00<br>\$383,558.86<br>\$0                      | 00   |   | \$104,668.06 \$0.0<br>\$0.00 \$0.0                                     |  |  | \$0.00<br>\$0.00                                      |  |   |  | \$150,014.49   | \$0.00<br>\$91,447.57   | \$0.00                                | $\overline{A}$                |                |
| 40063 40063: Hughes County 5                                      | · · · ·                                 | \$2,472,844.00                                  | \$0.00                                   |   | φοσο, στο. ττ  |  |  | \$310,929.10 \$0.00   | \$1,658,550.32   | \$0.00                                   | \$483,958.46 \$0.0  |  | φοσο,σσοσ.σσ  |  |   | ψοσο ψο  |  |  | \$0.00  |  |   |  |  |   | \$0.00                                |                               |                |
| -   |   | \$2,241,762.99                                  | \$0.00                                   | \$19,879.91   | <b>CO.00</b>   | \$27,470.00 \$0.00   |  |   | \$1,687,920.99<br>\$624,678.08                           | \$0.00                                   | \$222,444.66 \$0.0  | 0 \$69,427.16 \$0.00   |   |  |   | \$183,155.95 \$0.0   | 00   | \$78,814.23  | \$0.00 \$0.00<br>\$0.00                               |  |   |  | ΦE0. 770. 47   | <b>CO. OO</b>   | \$0.0                                 | 0.00 \$0.00                   |                |
| 40067 40067: Jefferson County 5<br>40069 40069: Johnston County 4 | \$722,507.45<br>\$1,667,240.45          | \$722,507.45<br>\$1,667,240.45                  | \$0.00<br>\$0.00                         | \$19,879.91   | \$0.00   | \$27,178.99 \$0.00   |  |   | \$1,341,202.83   | \$0.00<br>\$0.00                         |   |  |   | \$28,141.67 \$0.0  | 00  |  |  |  | \$0.00  |  |   |  | \$50,770.47  | \$297,895.95  | \$0.00                                |                               |                |
| 40071 40071: Kay County 9   |   | \$7,268,609.44 \$1,63                           |  |   |  | \$1,856,168.35 \$0.00  | \$32,181.38 \$47,689.                      |   | \$749,110.28   | \$0.00                                   | \$0.00 \$1,501,496.0  |  |   |  |   | \$3,185,310.63 \$90,000.   |  |  |   | 0.00   |   |  |  | \$20,524.17   | \$0.00                                |                               |                |
| 40073 40073: Kingfisher County 11<br>40075 40075: Kiowa County 7  |   | \$16,542,567.88<br>\$1,779,517.10<br>\$5        | \$0.00<br>64.702.13                      |   |  | \$1,210,741.08 \$0.00  | \$9,465.83 \$0.                            | 0.00  | \$54,175.38<br>\$973,845.86                              | \$0.00 \$82,974.91<br>\$0.00 \$0.00 \$5  | \$0.00 \$41,649.18 \$0.0<br>54,702.13 \$0.00 \$0.0                      |  | \$0.00<br>\$20,488.46<br>\$0.00                         | 00   | \$258,707.88 \$0.00                                     | \$933,458.63 \$0.0<br>\$579,452.59 \$0.0                               |  |  | \$0.00 \$0.00 \$<br>\$0.00 \$155,620.99               |  |   |  | \$42,721.22  | \$0.00  |                                       | $\overline{A}$                |                |
|   | \$338,156.30                            | \$338,156.30                                    | \$0.00                                   |   |  |  |  | \$115,997.72 \$0.00   | \$70,968.79  | \$0.00                                   | \$0.00 \$0.0  |  | 7-3,333.0   |  |   |  |  | 10,000   | \$151,189.79  |  |   |  |  |   |                                       |                               |                |
| 40079 40079: Le Flore County 8<br>40081 40081: Lincoln County 8   |   | \$1,814,742.07 \$50<br>\$965,760.62 \$1,80      |  |   | \$244,897.42 \$0.00  | \$39,682.10 \$0.00   |  | \$0.00 \$483,289.00 \$8,714.42 \$0.<br>\$472,620.06 \$844,263.72  | \$1,041,042.54<br>\$0.00<br>\$9                          |  |   |  | \$86,560.60 \$0   | \$274,527.01 \$0.0   | 00  | \$201,259.32 \$0.0<br>\$382,527.66 \$0.0                               | 00 \$5,657.99 \$0.0  | 00 \$18,394.31   | \$4,619.26<br>\$0.00 \$0.00                           | 0.00   |   |  |  | \$0.00  | 90.00                                 | 4                             |                |
| 40083 40083: Logan County 8                                       |   | \$3,274,228.09 \$3,09                           |  | \$46,031.78   | \$0.00   | \$387,896.03 \$0.00  |  | ψ472,020.00 ψ044,203.72   |  | 099,510.00 \$248,633.93                  | \$0.00  |  | \$86,869.91 \$0   |  |   | \$1,090,786.68 \$0.0   |  |  | \$0.00 \$0.00   |  |   |  |  | φ0.00   | \$0.00                                |                               |                |
| 40085 40085: Love County 5  |   | \$3,975,482.59 \$23                             |  |   |  | 2077 100 10 20 00  |  | #000 040 0F #000 000 F0   | \$227,839.59   |  |   |  |   |  |   |  | \$17,385.01 \$0.0  |  | \$0.00 \$230,2  |  |   | 2000 404 70  |  | \$0.00 \$3,720,380.80   |                                       |                               |                |
| 40087 40087: McClain County 7<br>40089 40089: McCurtain County 5  |   | \$5,288,464.73 \$44<br>\$1,467,500.32           | \$0.00                                   |   |  | \$677,166.42 \$0.00  |  | \$286,912.85 \$296,802.56<br>\$162,095.91 \$0.  | \$2,451,865.03 \$1<br>00 \$582,821.99                    | \$0.00                                   | \$656,760.12 \$0.0  | 0  |   |  |   |  |  | \$1,646,088.71   | \$0.00 \$0.00<br>\$0.00                               |  |   | \$226,431.72   |  | \$0.00<br>\$0.00  | \$0.00                                | $\overline{}$                 |                |
| 40091 40091: McIntosh County 6                                    | · · · ·                                 | \$2,594,358.64                                  | \$0.00                                   |   | \$1,067,367.79 \$0.00  |  |  | \$336,862.40 \$0.00   | \$862,950.04   | \$0.00                                   | \$286,382.36 \$0.0  | 0  |   |  |   |  |  |  | \$3,204.25  | 0.00   |   |  | \$37,591.80  | \$0.00  |                                       |                               |                |
| 40093 40093: Major County 10<br>40095 40095: Marshall County 2    | \$2,160,454.07<br>\$1,013,389.59        | \$850,641.67 \$1,30<br>\$985,599.12 \$2         |  |   |  | \$9,692.81 \$0.00  | \$39,605.67 \$0.                           | 0.00  | \$144,883.52 \$1,1<br>\$985,599.12 \$                    |  | 18,000.00 \$214,085.21 \$0.0  | \$126,341.73   | \$130,028.75  |  |   |  | \$234,393.62 \$0.0   | \$21,025.22  | \$0.00 \$0.00 \$41,00<br>\$0.00                       |  |   |  | \$0.00   | \$0.00  |                                       |                               |                |
|   | · · · ·                                 | \$1,836,974.00 \$13                             |  | \$111,781.69  | \$0.00   |  |  |   | \$211,873.55   | \$0.00                                   | \$231,130.00 \$0.0  | 0  | \$40,049.92 \$56,339                                    | 06   |   | \$648,459.12 \$0.0   | 00   |  | \$0.00  |  |   |  | \$324,190.48 \$82,5  | 500.00  | \$269,489.2                           | \$0.00                        |                |
| 40099 40099: Murray County 4                                      |   |   | \$0.00<br>4.902.50                       |   | \$254.002.20 \$0.000   |  |  |   | \$764,507.54<br>\$904.543.38                             | \$0.00                                   | \$276.405.57  |  | \$205 FOE 04  | \$19,364.06 \$0.0<br>00 \$364,238.23 \$0.0                         |   | \$4 825 704 46 \$2 444 000   | 50   |  | \$0.00  |  |   |  | ¢164 634 00  | \$2,855,270.99  | \$0.00                                | 00 00                         |                |
| 40101 40101: Muskogee County 10<br>40103 40103: Noble County 7    |   | \$7,406,100.86 \$2,14<br>\$486,410.61 \$4       |  |   | \$354,893.28 \$0.00  |  | \$0.00 \$22,261.                           | 1.00  | \$904,543.38<br>\$28,307.66                              | \$0.00<br>\$0.00                         | \$376,495.57 \$0.0<br>\$0.00 \$0.0                                      |  | \$025,505.24  | \$0.0  |   | \$4,825,791.16 \$2,144,902.8<br>\$177,247.11 \$0.0                     | 00 \$0.00 \$0.0  | \$280,855.84 \$22,6  | \$90,000.00   | 0.00 \$0.00 \$0.00<br>0.00                         |   |  | \$164,634.00   | φυ.υυ   | \$0.0                                 | 0.00 \$0.00                   |                |
| 40105 40105: Nowata County 9                                      | \$2,718,393.87                          | \$2,718,393.87                                  | \$0.00                                   | \$53,206.20   | \$0.00   | \$52,943.05 \$0.00 \$48,208.49 \$0.00  |  | \$146,200.61 \$0.00   | \$98,428.81  | \$0.00                                   |   |  |   | 0.100 ==== ==  |   | \$2,293,418.35 \$0.0   | 00 \$25,988.36 \$0.0   | 00   | \$0.00  | 0.00   |   |  |  | \$0.00  |                                       |                               |                |
|   |   | \$4,525,201.40 \$1,71<br>\$62,554,688.89 \$2,01 |  | \$5.615.07  | \$0.00   |  |  | \$600,651.55 \$1,717,120.13<br>\$10,558,813.66 \$974,005.35   | \$856,047.81<br>\$600,193.79 \$1,0                       | \$0.00<br>036,695.66 \$3,475,366.95      | \$32,278.59 \$0.00<br>\$0.00  |  |   | \$409,586.59 \$0.0   | JU  | \$1,071,986.30 \$0.0<br>\$113,556.66 \$0.0                             | 00 \$185,068.36 \$0.0<br>00  |  | \$4,500.00<br>\$0.00 \$560,696.05                     | 0.00   |   |  |  | \$1,365,082.20  | \$0.00                                |                               |                |
| 40111 40111: Okmulgee County 11                                   | \$5,283,366.18                          | \$3,486,113.22 \$1,79                           | 7,252.96                                 | \$70,117.46   | \$0.00 \$207,234.39 \$0.00   |  |  | \$246,627.74 \$0.00   | \$1,318,813.87 \$1,5                                     |  | \$409,002.69 \$0.0  |  |   | \$124,834.53 \$0.0   |   | \$575,362.90 \$0.0   | 00 \$0.00 \$0.0  | 00   | \$3,394.41 \$219,4                                    | 1.25 \$0.00 \$0.00                                 |   |  |  | \$530,725.23  |                                       |                               |                |
| 9   |   | \$7,279,533.47<br>\$1,697,460.49 \$1,15         | \$0.00<br>53.219.50                      | \$60,939.47<br>\$88,996.57  |  | \$0.00 \$0.00<br>\$0.00 \$0.00   |  | \$12,850.94 \$39,700.00   | \$138,673.09 \$2   | 230.032.99                               | \$0.00 \$0.0<br>\$74,016.57 \$181,600.1                                 |  | \$214,083.23 \$21,303                                   | 37   |   | \$1,200,464.19 \$0.0<br>\$924,099.07 \$580,959.0                       | 00 \$883,821.99 \$0.0<br>00 \$232,806.09 \$0.0                     |  | \$0.00<br>\$11,934.93                                 | 0.00   |   |  |  | \$5,134,307.82<br>\$0.00  |                                       |                               |                |
| 40117 40117: Pawnee County 6                                      | \$659,068.10                            | \$659,068.10                                    | \$0.00                                   |   | \$0.00   | ψο.οο  |  | ψ.2,555.51 ψ05,750.00   | ψ.00,070.09 Φ2   | 3,002.00                                 | φιτ,σισ.σι φισι,σσσ.1   |  | \$180,915.37 \$0  | 00   |   | \$272,025.63 \$0.0   |  |  | \$0.00  |  |   |  | \$8,337.86   | \$0.00  | ψ0.00                                 |                               |                |
|   |   | \$4,648,812.39 \$4,01<br>\$4,568,917,25         |  |   | \$166,563.18 \$0.00  |  |  | \$110 011 16  | \$2.050.675.45   | \$0.00                                   | \$335,031.46 \$0.0  |  | \$186,352.69 \$4,013,111<br>\$411,289.32 \$0            | 34 00 \$121,751.95 \$0.0   |   | \$1,395,379.16 \$0.0<br>\$415,013,64 \$0.0                             | 00 \$154,023.63 \$0.0  |  | \$0.00 \$3,952.26<br>\$261,486.15                     | 0.00   |   |  | \$824,754.52   | \$0.00<br>\$525,171.31  | \$0.00                                |                               |                |
|   | · · · ·                                 | \$4,568,917.25<br>\$2,836,072.35                | \$0.00<br>\$0.00                         |   | \$100,503.18 \$0.00  |  |  | \$119,911.16 \$0.00   | \$2,058,675.45<br>\$1,274,229.07                         | \$0.00<br>\$0.00                         | \$335,031.46 \$0.0  |  | \$411,289.32  | \$243,643.08 \$0.00  |   | φ415,U13.04 \$0.0  | 00 \$154,023.63 \$0.0  |  |   | 0.00   |   |  |  | \$525,171.31<br>\$1,312,139.82                                    |                                       |                               |                |
| 40125: Pottawatomie 9   |   | \$11,977,085.42                                 | \$0.00                                   | \$110,220.11  | \$0.00   |  |  | \$721,926.42 \$0.00   | \$1,434,632.79   | \$0.00                                   |   |  |   |  |   | \$160,891.66 \$0.0   |  |  | \$0.00 \$0.00   | 0.00 \$0.00 \$0.00                                 |   | \$9,078,804.81   |  | \$0.00  |                                       |                               |                |
| 40127 40127: Pushmataha County 9 40129: Roger Mills County 11     |   | \$2,478,727.39<br>\$1,604,737.94<br>\$15        | \$0.00 \$0.00<br>66,112.50               | \$0.00  |  |  | \$277,210.63 \$0.                          |   | \$449,822.95<br>\$572,017.23                             | \$0.00<br>\$0.00 \$237,819.10            | \$637,239.85 \$0.0<br>\$0.00 \$189,812.69 \$72,562.5                    |  | \$83,550.00   | \$0.00 \$0.0   | 00 \$88,387.58 \$0.00                                   |  | 00 \$146,800.57 \$0.0  |  | \$0.00<br>\$0.00                                      | 0.00   |   |  | \$0.00   | \$0.00  | \$0.0                                 | 0.00 \$0.00                   |                |
|   | \$7,004,947.09                          | \$5,856,125.71 \$1,14                           | 8,821.38                                 | \$275,890.66  | \$0.00   |  | ψ0.  |   | \$0.00 \$1,1   | 148,821.38                               | ψ12,002.0   | ψυ.υυ  | \$300,047.99 \$0  |  |   | \$1,424,854.64 \$0.0   | 00   | ψ0.00  | \$0.00  | 0.00   |   |  | \$882,119.56   |   |                                       | 2.86 \$0.00                   |                |
| 40133 40133: Seminole County 5                                    | \$904,817.85<br>\$3.567.536.32          | \$893,163.04 \$1<br>\$3,566,036.32 \$           |  |   | \$364,078.69 \$0.00  |  |  | \$162,778.49 \$0.00   | \$588,362.77<br>\$1,530,092.25                           | \$0.00<br>\$1.500.00                     | \$727,695.86 \$0.0  |  | \$299,274.42 \$0  | 00   |   | \$636,609.96 \$0.  | 00   |  | \$11,464.49<br>\$8,285.14                             | 0.00 \$0.00 \$11,654.81                            |   |  |  | \$130,557.29  | \$0.00                                |                               |                |
|   |   | \$3,497,483.53 \$12                             |  | \$191,755.57  | \$0.00 \$36,263.19 \$0.00  |  |  |   | \$1,530,092.25<br>\$509,458.18                           |  | \$1.21,095.00 \$0.0   | \$1,387,866.82 \$0.00  | φ299,214.42 \$0   |  |   | ψυου,ου <del>3</del> .30 \$0.0   | \$275,979.03 \$0.0   | \$152,544.14 \$92,1  |   | 0.00   |   |  | \$49,342.75  | \$0.00  |                                       |                               |                |
| 40139 40139: Texas County 3                                       | \$330,643.68                            | \$330,643.68                                    | \$0.00                                   |   |  |  |  |   |  |  |   | \$253,027.33   | \$0.00 \$77,616.35 \$0                                  | 00   |   |  |  |  | \$0.00  | 0.00   |   |  |  |   |                                       |                               |                |
| 40141 40141: Tillman County 8<br>40143 40143: Tulsa County 7      | · · · ·                                 | \$3,448,328.14<br>\$23,833,985.41 \$1,39        | \$0.00<br>2,906.81                       | \$998 531 14  | \$19,658.00  |  |  |   | \$2,099,474.99<br>\$171,870.93<br>\$2                    |  | \$118,762.71 \$0.0  | 0 \$281,745.30 \$0.00  | \$69,354.45 \$855,636                                   | 31   |   | \$231,749.12 \$0.0<br>\$16,795,381.76 \$269,550.0                      | 00 \$421,318.62 \$0.0<br>00  | \$197,390.06   | \$0.00 \$0.00 \$<br>\$405,489.73                      | 0.00<br>0.00 \$0.00 \$0.00                         |   |  | \$5,393,357.40   | \$97,887.34<br>\$0.00   | \$0.00                                |                               |                |
| 40145 40145: Wagoner County 6                                     | \$1,218,438.93                          | \$1,105,938.93 \$11                             |  | \$25,767.86   | \$0.00   |  |  |   | \$547,608.15   |  |   |  | , , , , , , , , , , , , , , , , , , ,                   |  |   | \$532,562.92 \$112,500.0   | 00   |  | \$0.00  | 0.00   |   |  | \$0.00   | \$0.00 \$0.00   | \$0.00                                |                               |                |
| 40147 40147: Washington County 4                                  | \$924,476.80<br>\$5,966,605.70          | \$924,476.80<br>\$5,490,237.04 \$47             | \$0.00<br>76.368.66                      | \$89,140.16   | \$0.00   |  | \$0.00 \$45.740                            | 3.00  | \$1,158,690.13   | \$0.00 \$70.706.07 \$0                   | 26,010.66 \$2,923,440.59 \$158,107.7                                    |  | \$40 AFE 60 \$00 747                                    | 50 \$70.957.53 \$0.0   | 00  | \$196,583.71 \$0.0<br>\$1,095,190.86 \$0.0                             |  | <b>60.00</b>   | \$0.00<br>\$0.00 \$0.00 \$190,8                       |  |   |  |  | \$638,752.93<br>\$151,795.64                                      | \$0.00                                |                               |                |
| 40149 40149: Washita County 10<br>40151 40151: Woods County 7     | \$5,966,605.70<br>\$772,592.35          | \$5,490,237.04 \$47                             | \$0.00                                   |   |  |  | \$0.00 \$15,713.<br>\$327,625.90 \$0.      |   | ψ1, 100,090.13   | \$0.00 \$70,706.67 \$2                   |   |  | 1 1 1   | φτυ,931.33 φυ.0  |   | \$402,259.30 \$0.0   | 00   | \$0.00   | \$0.00 \$190,8  |  |   |  |  | φ151,795.04   |                                       | \$0.00                        |                |
| 40153 40153: Woodward County 6                                    | \$1,266,245.28                          | \$1,266,245.28                                  | \$0.00                                   |   |  |  | \$424,654.37 \$0.                          |   |  |  |   | \$552,782.09   |   |  | \$0.00 \$0.00   |  | 00   |  | \$0.00  | 0.00   |   |  | \$0.00   |   |                                       |                               |                |
| otal Total 30   | \$857,058,847.05                        | \$815,954,148.35 \$41,10                        | 4,698.70 \$4,871,305.35                  | \$143,501.87 \$3,490,382.11   | \$141,238.66 \$3,925,597.61 \$81,187.68  | \$7,221,515.89 \$1,524,854.81 \$2,918,163.24 \$211,608.50 \$0.00 \$0.00  | \$57,648,989.57 \$739,062.                 | 2.08 \$55,032,768.45 \$6,178,337.97 \$3,966,025.05 \$27,730.  | 00 \$62,065,124.66 \$11,2                                | 272,732.37 \$29,475,163.85 \$49          | 93,490.44 \$49,143,878.08 \$4,151,704.5                                 | 7 \$4,693,118.02 \$99,604.82 \$133,956,446.74  | \$849,176.75 \$85,571,382.12 \$5,722,118                | 57 \$4,539,992.99 \$192,656.9                                      | 99 \$5,308,501.56 \$97,760.48                           | \$ \$65,433,124.77 \$3,867,824.5                                       | 54 \$3,880,281.80 \$116,083.4                                      | 48 \$6,543,056.06 \$0.00 \$160,423,253.27 \$3,371,2  | 12.13 \$4,005,114.43 \$986,1                          | 7.18 \$0.00 \$11,654.81                            | \$0.00 \$0.00 \$264,5                                     | \$0.00 \$11,229,284.00   | \$0.00 \$24,673,702.77 \$82,5  | 500.00 \$20,265,702.25 \$74                                       | 42,500.00 \$5,407,691.9               | 94 \$0.00                     | \$0.00 \$0     |

### **APPENDIX**

### IMIAIPINIG THIE IIMIPACT

### **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.

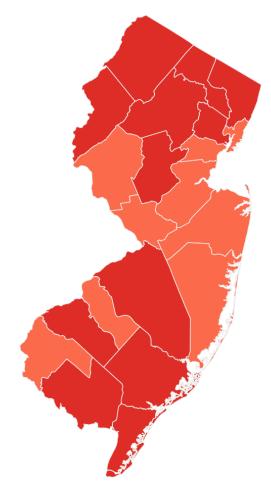


GEOGRAPHIC MAP. SOURCE: ESRI WORLD IMAGERY BASEMAP

### **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."

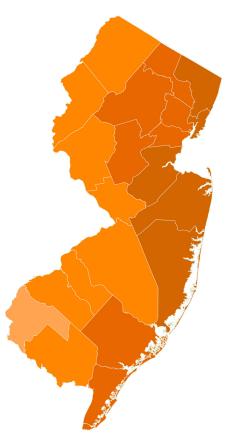
Importantly, extreme heat waves do not fit the criteria for federal disaster declarations despite being the leading cause of deaths among climate hazards. Likewise, sea level rise is not included in this definition despite the threat it poses to numerous communities, including damage to property, loss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

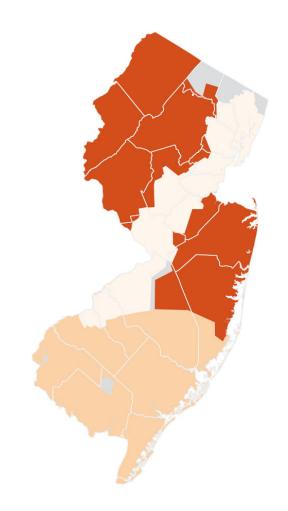
- Socioeconomic Status (below poverty, unemployed, income, no high school diploma);
- Household Composition & Disability (aged 65 or older, aged 17 or younger, older than age 5 with a disability, single-parent households);
- Minority Status & Language (minority, speak English "less than well"); and
-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