This readme file was generated on 2025-12-18 by Rachel Licker and finalized 2026-01-08 by Amanda Fencl.

GENERAL INFORMATION

Title of Dataset: Power After the Storm: Achieving Grid Resilience in a Climate Changing World

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Date of data collection:
August 2025

SHARING/ACCESS INFORMATION

Licenses/restrictions placed on the data:
This dataset is made available under the Creative Commons Attribution-NonCommerical 4.0 International License: https://creativecommons.org/licenses/by-nc/4.0/

Links to other publicly accessible locations of the data:
https://doi.org/10.7910/DVN/CZ5FJQ

Was data derived from another source?

If yes, list source(s):
Data on the counties that fall within the Midcontinent Independent System Operator (MISO) territory were extracted from the U.S. Energy Information Administration's Energy Atlas RTO Regions map: https://atlas.eia.gov/datasets/eia::rto-regions/about

Citation: Licker, Rachel, 2026, "Power After the Storm: Achieving Grid Resilience in a Climate Changing World", https://doi.org/10.7910/DVN/CZ5FJQ, Harvard Dataverse

2014-2024, data for county-level power outage, number of customers, and code for generating the URI map in the report were sourced from Brelsford et al. 2024:

Brelsford, Christa; Tennille, Sarah; Myers, Aaron; Chinthavali, Supriya; Tansakul, Varisara; Denman, Matthew; et al. (2024). The Environment for Analysis of Geo-Located Energy Information's Recorded Electricity Outages 2014-2024. figshare. Dataset. https://doi.org/10.6084/m9.figshare.24237376.v3

Recommended citation for this dataset:
Licker, Rachel, 2026, "Power After the Storm: Achieving Grid Resilience in a Climate Changing World", https://doi.org/10.7910/DVN/CZ5FJQ, Harvard Dataverse

DATA & FILE OVERVIEW

File List:

* RCode_MISO_Counties.pdf: Code to intersect MISO county list from EIA database with geographic reference data (e.g., fips codes). Code removes a few extraneous counties from Texas (Dallas, Ellis, Kaufman, Rockwall, Colin, Denton, Tarrant, Johnson, and Henderson) and Mississippi (Chickasaw, Monroe, Lee, Pontotoc, and Clay) that appear in the MISO.json file as they are listed as being part of the MISO Hub, but not the regional area of service that this analysis is focused on. Then, a threshold is applied such that only counties with 10km^2 or more of area in the MISO footprint are included, and finally, all counties in Illinois are included.

  Resulting file:
  * miso_plus_counties.csv

* RCode_FilterCombineEAGLEIData.pdf: Code to filter yearly EAGLE-I data files by MISO county and combined all yearly files into one Document. The resulting file: eaglei_outages_2014_2024_miso_filtered.csv, is too large to include in the repository but should be readily reproduced using this code and the data derived and downloaded from Brelsford et al. 2024.

* RCode_DailyPeaks_DailyTotals.pdf: Code to (a) calculate the maximum number of customers without power of each 15-minute interval for each county and each day of the dataset, and (b) calculate the peak total number of customers without power each day across the full geography. The resulting daily peak total file was then sorted, and the top 100 events were coupled with a media analysis to determine whether they coincided with and were caused at least in part by an extreme weather event. The top 10 events were further examined with a media analysis to understand the implications for implicated communities.

Resulting files:
* county_daily_peak.csv
* daily_total_peak.csv
* Top_100_MISO_Plus_Events.xlsx

* RCode_Percent_Customers_Out.pdf: Code to merge the data on the number of customers for each county from Brelsford et al. 2024 with the daily_total_peak.csv file and calculate the percent of customers without power at the peak for each day and each county.

Resulting files:
* county_daily_peak_with_percent.csv

* RCode_Filter_PeakCounties.pdf: Code to extract data from daily_total_peak.csv for the top ten worst power outage days, as well as for Winter Storm Uri. Used to create the maps featured in *Power After the Storm: Achieving Grid Resilience in a Climate Changing World.*

* RCode_CustomerHours.pdf: Code to create an exposure metric that is the product of each county's annual total number of hours without power by each county's total number of customers

Resulting files:
* county_customer_hours_totals_2014_2024.csv

* RCode_Fig1_Uri_Map.pdf: Code to create a national map of Winter Storm Uri's outages in February 2021, used for Figure 1 and reflects slightly modified Uri Map code from Brelsford et al. 2024.

Relationship between files, if important:

R code needs to be run from files in the order listed above. With exception is the final file, R Code Fig 1 Uri Map.pdf, which is independent and used for one figure in the report.

METHODOLOGICAL INFORMATION

Methods for processing the data:
Methods of processing the data are covered in the R code files, again Files need to be run in the order listed above to generate results from the raw Brelsford et al. 2024 data.

Instrument- or software-specific information needed to interpret the data:

R, Excel

Describe any quality-assurance procedures performed on the data:

Results were spot-checked and then re-processed by a second party.

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People involved with sample collection, processing, analysis and/or submission:

Rachel Licker, Jayson Toweh, Amanda Fencl

DATA-SPECIFIC INFORMATION FOR: miso_plus_counties.csv

Number of variables:
6

Number of cases/rows:
860

Variable List: <list variable name(s), description(s), unit(s) and value labels as appropriate for each>
* fips_code (unique, county-level geographic identifier)
* county (name)
* state (name)
* area_county_km2 (county area in square kilometers)
* area_in_miso_km2 (portion of county in MISO territory in square kilometers)
* share_in_miso (fraction of county in MISO territory)
* percent_in_miso (portion of county in MISO territory in percent)

Missing data codes: <list code/symbol and definition>
* blank

Specialized formats or other abbreviations used:
N/A

DATA-SPECIFIC INFORMATION FOR:
eaglei_outages_2014_2024_miso_filtered.csv

Number of variables:
6

Number of cases/rows:
52076257

Variable List: <list variable name(s), description(s), unit(s) and value labels as appropriate for each>
* X (row label)
* fips_code (unique, county-level geographic identifier)
* county (name)
* state (name)
* customers_out (number of customers without power)
* run_start_time (15 minute power outage interval start-time)

Missing data codes: <list code/symbol and definition>
* blank

Specialized formats or other abbreviations used:
N/A

DATA-SPECIFIC INFORMATION FOR: county_daily_peak.csv

Number of variables:
5

Number of cases/rows:
1944541

Variable List: <list variable name(s), description(s), unit(s) and value labels as appropriate for each>
* date (YYYY-MM-DD)
* fips_code (unique, county-level geographic identifier)
* county (name)
* state (name)
* county_daily_peak (peak number of customers without power for each county and each day of the dataset)

Missing data codes: <list code/symbol and definition>
* blank

Specialized formats or other abbreviations used:
N/A

DATA-SPECIFIC INFORMATION FOR: daily_total_peak.csv

Number of variables:
2

Number of cases/rows:
3714

Variable List: <list variable name(s), description(s), unit(s) and value labels as appropriate for each>
* date (YYYY-MM-DD)
* daily_total_customers (daily peak total number of customers without power for all of MISO+ territory)

Missing data codes: <list code/symbol and definition>
* blank

Specialized formats or other abbreviations used:
N/A

DATA-SPECIFIC INFORMATION FOR: Top100Events_12-1-25.xlsx
county_customer_hours_totals_2014_2024.csv

Number of variables:
5

Number of cases/rows:

101

Variable List: <list variable name(s), description(s), unit(s) and value labels as appropriate for each>
* date (D/M/YY)
* Peak Daily Total Customer Out (daily peak total number of customers without power for all of MISO+ territory)
* Event Type (key extreme weather event(s) that affected MISO+ territory that day according to media analysis)
county (name)
* Approximate Event Start Date (MM/DD/YYYY; approximate start date according to media analysis)
* Example News Sources (examples of media covering the event)

Missing data codes: <list code/symbol and definition>
* N/A

Specialized formats or other abbreviations used:
* Excel file

DATA-SPECIFIC INFORMATION FOR:
county_customer_hours_totals_2014_2024.csv

Number of variables:
4

Number of cases/rows:
859

Variable List: <list variable name(s), description(s), unit(s) and value labels as appropriate for each>
* fips_code (unique, county-level geographic identifier)
* county (name)
* state (name)
* total_customer_hours_2014_2024 (product of total number of customers for each county and county's total number of hours without power over the course of the dataset)

Missing data codes: <list code/symbol and definition>
* blank

Specialized formats or other abbreviations used:
N/A

This readme template was derived from Cornell University Data Services: https://data.research.cornell.edu/data-management/sharing/readme/

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