



Gridmetrics[®] PENS

Power Event Notification System

Prepared for Houston Galveston Area Council (HGAC)
Geographic Data Workgroup (GDW)

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Agenda – HGAC / GDW



Gridmetrics

- Background
- Power Event Notification System - PENS

PENS

- Alerts
- API
- Playback
- Reports

Learn More

Gridmetrics - Background

Years of working
with broadband
companies

4.5+

*Has grown out of
CableLabs
innovation project*

Years of aggregated
data points

2.5+

*Gridmetrics unique
data provides an
independent,
observational view
of power*

Total number of
sensors

300,000+

*Gridmetrics
partners with
broadband
communications
providers*

US population that
live or work within
1km of a sensor

150M+

*Gridmetrics power
sensors are tightly
aligned with
population density*



Gridmetrics - Power Intelligence

Gridmetrics data enhances visibility into outage, restoration and repair, and planning

Aggregated data from communications company's networked power supplies

- Collect inverter status & input voltage from 300,000+ sensors every 5 min
- Commercial products aggregate sensors to USNG 1km x 1km
- Lat/Long of sensor locations are held confidential

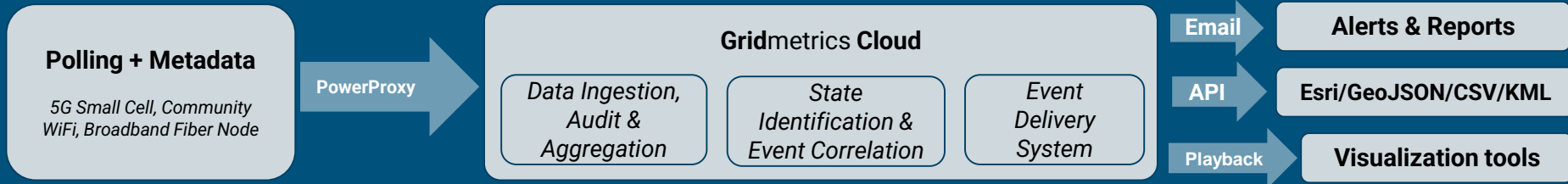
Out-of-band data source provides hyperlocal insights that span power company service territories and political boundaries

- Send power event notifications alert emails
- Supply power events through APIs
- Historical data can be used for reports
- Power event playback

Gridmetrics products designed to easily integrate into tools for context



Gridmetrics® Power Event Notification System (PENS)



1

Communications companies primary aggregation points

- Collect Inverter Status and Input Voltage from sensors
- Provide metadata for each sensor - uniqueID and location once per day
- Aggregated by each comms supplier and sent to Gridmetrics Cloud

2

Data is ingested, audited and analyzed every 5 minutes

- 300,000+ power sensors

Data mapped to USNG (US National Grid) and Landscan

- Aggregate sensors to 1 km x 1 km “cells”
- Overlay population density per USNG cell

Event identification processed every 5 minutes

- Outage Events classified by magnitude, duration and potential impact

3

Use cases

- Outage and voltage event detection
- Training, planning, trends

Market applications

- Emergency response
- Business resiliency
- Insurance claims and underwriter intel
- Augment utility OMS



Gridmetrics – Public Safety and Emergency Response

Ease of Implementation

- **Designed for integration** with existing GIS mapping platforms, e.g., Esri ArcGIS, for use in EOC or other dashboards, maps, and existing situational awareness tools
- **Multiple APIs Supported** (Esri, CSV, GeoJson, KML)

Power Outage Notifications

- **Real time, hyperlocal, PENS Alerts** can be provided to key personnel – EOC and public safety management, 1st responders, dispatchers, etc.
- **Real time Insights** into geographic scale, population impact, and time to restoration

Power Intelligence for Critical Incident Management

- **Hyperlocal , actionable insights** into the availability and quality of power that spans power company service territories and political boundaries.
- **Augment other disaster information services** – weather, traffic, wildfire, flooding, terrorist threat
- **Complements other sources** of power data and critical asset monitoring

Power Intelligence and Historical Data

- **Unprecedented view** of the state of power in the last mile aids in the identification of power vulnerable populations and facilities - critical in establishing and maintaining situational awareness for emergency and disaster management



Gridmetrics PENS Product Suite



Gridmetrics® Power Event
Notification System
(PENS)



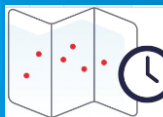
PENS - Alerts



PENS - API



PENS - Playback



PENS - Reports

PENS Alerts - Power Outage Email Notification

Real Time
Notification

Location and
Potential
Population
Coverage

Start Time,
Updates, and
Final Notification

Notification
Thresholds

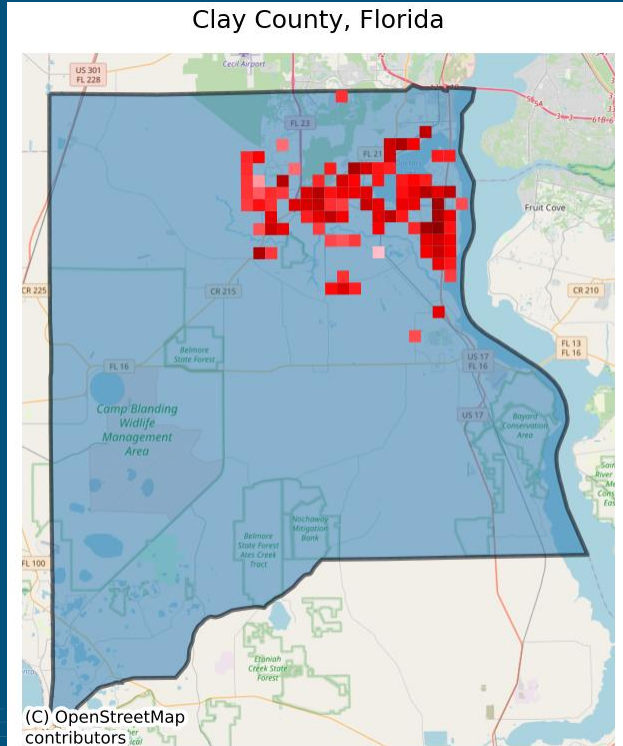
- Population minimum
- Update increment

Update History

Visualization

Note : The following slides provide images and text from an actual Alerts Notification. Sign up for a trial at <https://gridmetrics.io>

PENS Alerts - Power Outage Email Notification



Gridmetrics® County Power Outage Notification First Update

County: Clay County, Florida (FIPS: 12019)

Potential Population Impacted: 41,464

Start Time: 07-01-2022 15:12 EDT, 07-01-2022 12:12 PDT

Duration: 0 days, 0 hours, 0 minutes

Notification Settings (Population): Minimum = 5,000, Increment = 5,000

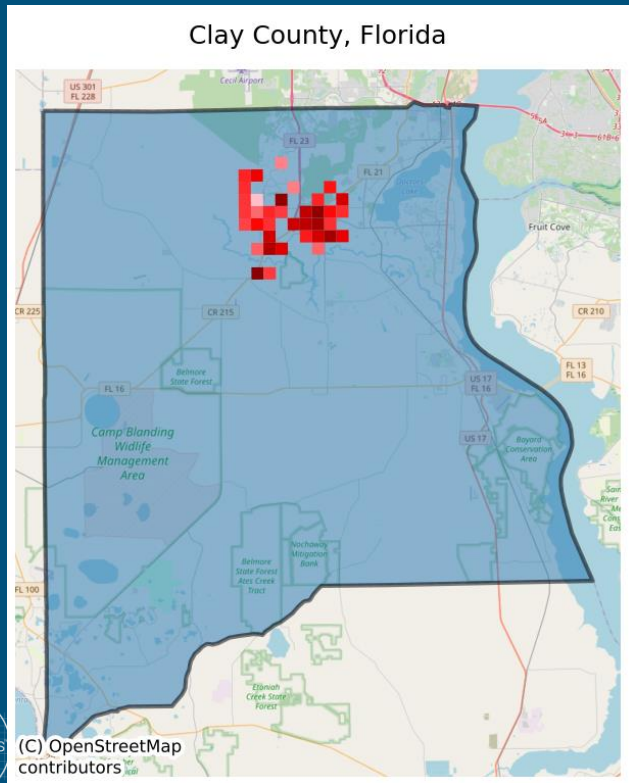
Update History (most-recent entries):

07/01/2022 15:12:33 EST: Potential Population Impacted = 41,464

NOTE: Colored squares indicate 1km x 1km USNG cells experiencing an outage.

Color indicates potential impacted population, with red being higher, and pink lower.

PENS Alerts - Power Outage Email Notification



Gridmetrics® County Power Outage Notification

County: Clay County, Florida (FIPS: 12019)

Potential Population Impacted: 11,735

Start Time: 07-01-2022 15:12 EDT, 07-01-2022 12:12 PDT

Duration: 0 days, 0 hours, 15 minutes

Notification Settings (Population): Minimum = 5,000, Increment = 5,000

Update History (most-recent entries):

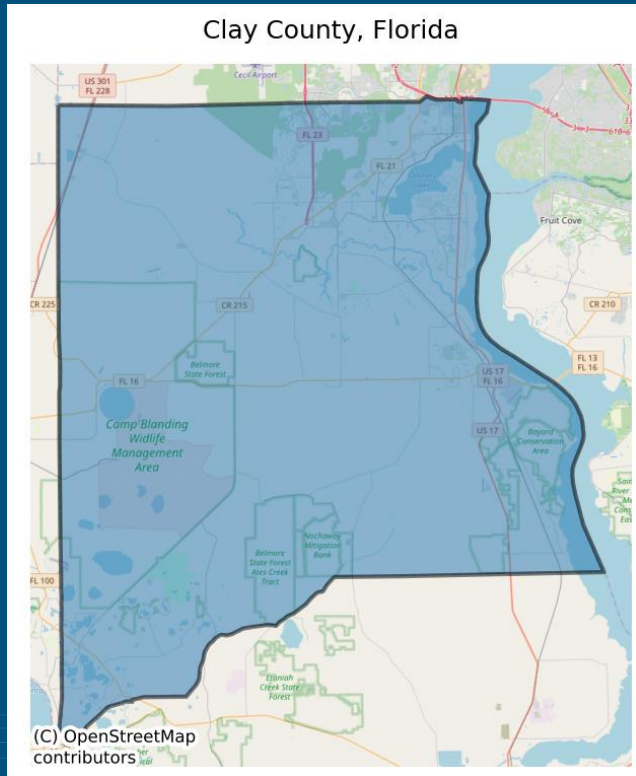
07/01/2022 15:27:35 EST: Potential Population Impacted = 11,735

07/01/2022 15:12:33 EST: Potential Population Impacted = 41,464

NOTE: Colored squares indicate 1km x 1km USNG cells experiencing an outage.

Color indicates potential impacted population, with red being higher, and pink lower.

PENS Alerts - Power Outage Email Notification



Final Update

County: Clay County, Florida (FIPS: 12019)

Potential Population Impacted: 0

Start Time: 07-01-2022 15:12 EDT, 07-01-2022 12:12 PDT

Duration: 0 days, 0 hours, 45 minutes

Notification Settings (Population): Minimum = 10,000, Increment = 2,500

Update History (most-recent entries):

07/01/2022 15:57:42 EST: Potential Population Impacted = 0

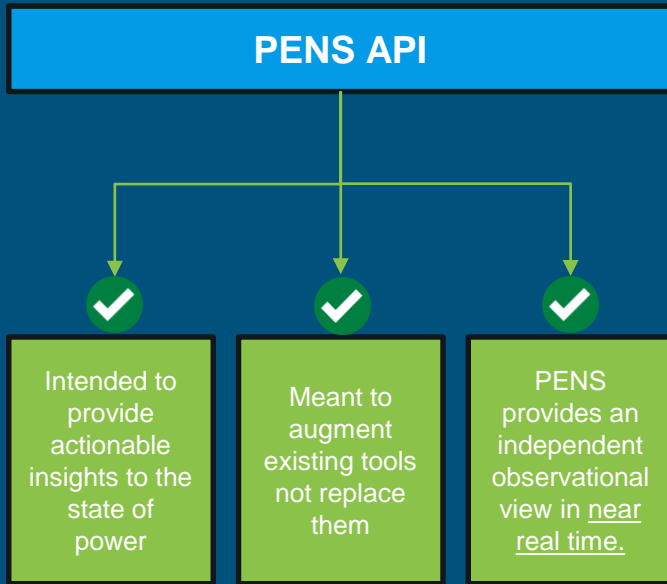
07/01/2022 15:27:38 EST: Potential Population Impacted = 11,735

07/01/2022 15:12:37 EST: Potential Population Impacted = 41,464

NOTE: Colored squares indicate 1km x 1km USNG cells experiencing an outage.

Color indicates potential impacted population, with red being higher, and pink lower.

PENS - API



Benefits of PENS API

- Hyperlocal insights in real time that span power company service territories and political boundaries
- Clear picture of power vulnerability when viewed in context with critical infrastructure assets or demographic data - valuable in an emergency or disaster incident management scenario
- Designed for easy integration into existing dashboards - Multiple APIs Supported (Esri, CSV, GeoJson, KML)

PENS – ARCGIS HIFLD Dashboard

Geography can be defined as any county, town, city, or state up to and including the U.S.

Hyperlocal insights that span power company service territories and political boundaries

Power Event Notification System

King County, WA 7/11/2022, 11:47 AM
Day Potential Population Impact: 2,366
Magnitude: Medium Duration: Short

DeKalb County, GA 7/11/2022, 1:08 PM
Day Potential Population Impact: 2,020
Magnitude: Medium Duration: Short

DeKalb County, GA 7/11/2022, 1:08 PM
Day Potential Population Impact: 1,471
Magnitude: Medium Duration: Short

Ramsey County, MN 7/11/2022, 1:22 PM
Day Potential Population Impact: 625
Magnitude: Small Duration: Short

Camden County, NJ 7/11/2022, 12:48 PM
Day Potential Population Impact: 585
Magnitude: Small Duration: Short

DeKalb County, GA 7/11/2022, 1:08 PM
Day Potential Population Impact: 242
Magnitude: Medium Duration: Short

Camden County, NJ 7/11/2022
Last update: a few seconds ago

Number of Power Events

24

Last update: a few seconds ago

Events Day Pop Night Pop



Gridmetrics - Power Event Notification System (PENS)
Critical Infrastructure Dashboard - Select a power event on the left and infrastructure on the right to view impact

Shelter Facilities

Saint Mary's School
Type: EVAC
Address: 19 WASHINGTON STREET, FAIR HAVEN, VT, 05743
Shelter ID: 75

Burlington High School
Type: POST
Address: 123 CAMBRIDGE ST, BURLINGTON, MA, 01803
Shelter ID: 94

Cooling Center - Charlestown Fire Department
Type: POST
Address: 1 Main Street, CHARLESTOWN, NH, 03603
Shelter ID: 1,056

Everett High School
Type: POST
Address: 100 Elm Street, EVERETT, MA, 02149
Shelter ID: 1,489

Holbrook Junior/Senior High School
Type: POST
Address: 245 S FRANKLIN ST, HOLBROOK, MA, 02343

Shelter Facilities

Legend

Power Event Notification System

PENS Far Zoom

Day Potential Pop Impacted
3 - 10,935

PENS Coverage

Power Events from Gridmetrics
Website [Gridmetrics.io](https://gridmetrics.io)
PENS [Marketplace Listing](#)
PENS [Pricing Map](#)

Critical Infrastructure from DHS HIFLD Open Data

Population Estimates from ORNL LandScan

Shown with Esri ARCGIS dashboard

More at gridmetrics.io



PENS – ARCGIS Dashboard

Geography can be defined as any county, town, city, or state up to and including the U.S.

Clear picture of power vulnerability when viewed in context with critical infrastructure assets or demographic data - valuable in an emergency or disaster incident management scenario

Power Event Notification System

DeKalb County, GA 7/11/2022, 1:08 PM
Day Potential Population Impact: 2,402
Magnitude: Large Duration: Short

DeKalb County, GA 7/11/2022, 1:08 PM
Day Potential Population Impact: 2,020
Magnitude: Large Duration: Short

DeKalb County, GA 7/11/2022, 1:08 PM
Day Potential Population Impact: 1,471
Magnitude: Large Duration: Short

DeKalb County, GA 7/11/2022, 1:08 PM
Day Potential Population Impact: 702
Magnitude: Large Duration: Short

DeKalb County, GA 7/11/2022, 1:08 PM
Day Potential Population Impact: 242
Magnitude: Large Duration: Short

Last update: 27 minutes ago

Number of Power Events

5

Last update: 27 minutes ago

Events Day Pop Night Pop

usng_sensor_summary_0

USNG 17R MP 3128

Coordinate

Coverage Sparse
Density

Day 3,704
Night 1,703
Population

Average 2,704
Population

Layers

- Public Schools
- Child Care Centers
- Hospitals
- Nursing Homes
- Pharmacies
- Urgent Care Facilities
- Local Law Enforcement
- Fire Stations
- Emergency Medical Services
- Shelter Facilities
- Local Emergency Operations
- Microsoft Building Footprints - Features

Shelter Facilities

REMOVE Sequoyah Middle School
Type: POST
Address: 3456 AZTEC RD, ATLANTA, GA, 30340
Shelter ID: 11,149

DCPS Tucker High School
Type: POST
Address: 5036 Lavista Rd, TUCKER, GA, 30084
Shelter ID: 20,419

REMOVED CPS Henderson Middle School
Type: POST
Address: 2830 Henderson Mill Rd, ATLANTA, GA, 30341
Shelter ID: 35,046

Norcross First United Methodist Church
Type: BOTH
Address: 2500 Beaver Ruin Rd, NORCROSS, GA, 30071
Shelter ID: 55,784

St. Andrews Presbyterian Church
Type: BOTH
Address: 4882 Lavista Road, TUCKER, GA, 30084
Shelter ID: 56,854

Legend

- Public Schools
- Child Care Centers
- Hospitals
- Nursing Homes

Gridmetrics - Power Event Notification System (PENS) Critical Infrastructure Dashboard - Select a power event on the left and infrastructure on the right to view impact

Gridmetrics
Power Events from Gridmetrics
Website [Gridmetrics.io](https://www.gridmetrics.io)
PENS [Marketplace Listing](#)
PENS [Pricing Map](#)

Critical Infrastructure from
DHS [HIFLD Open Data](#)

Population Estimates from
ORNL [LandScan](#)

Shown with Esri ARCGIS dashboard
More at gridmetrics.io



PENS Alerts - Power Outage Email Notification

Gridmetrics® County Power Outage Notification

County: Lee County, Florida (FIPS: 12071)

Potential Population Impacted: 126,596

Start Time: 09-28-2022 07:34 EDT, 09-28-2022 04:34 PDT

Duration: 0 days, 5 hours, 15 minutes

Notification Settings (Population): Minimum = 5,000, Increment = 5,000

Update History (most-recent entries):

09/28/2022 12:50:16 EST: Potential Population Impacted = 126,596

09/28/2022 12:45:20 EST: Potential Population Impacted = 101,418

09/28/2022 12:40:21 EST: Potential Population Impacted = 82,751

09/28/2022 12:25:21 EST: Potential Population Impacted = 76,357

09/28/2022 11:55:12 EST: Potential Population Impacted = 70,341

09/28/2022 11:30:18 EST: Potential Population Impacted = 61,758

09/28/2022 11:25:12 EST: Potential Population Impacted = 48,094

09/28/2022 11:10:12 EST: Potential Population Impacted = 41,521

09/28/2022 11:05:26 EST: Potential Population Impacted = 35,282

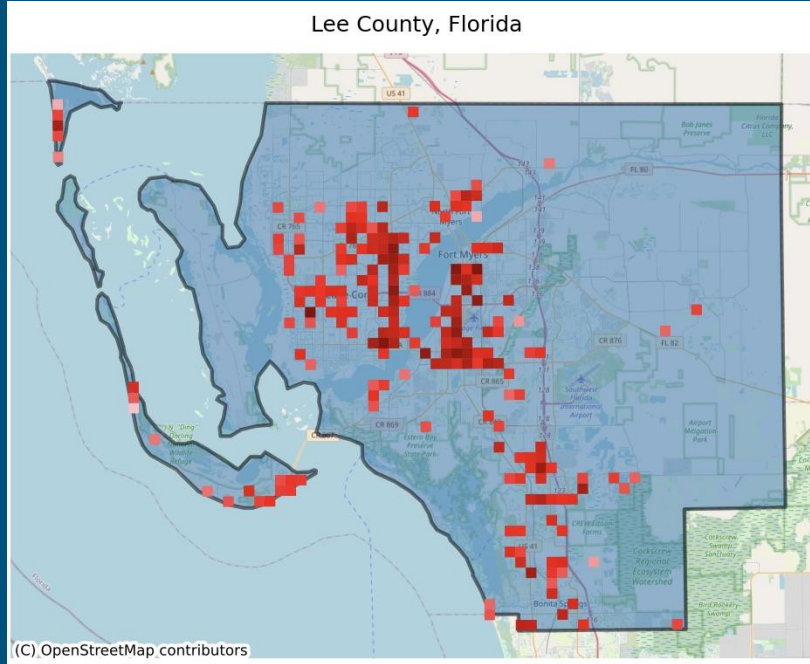
09/28/2022 09:29:56 EST: Potential Population Impacted = 27,487

09/28/2022 09:05:15 EST: Potential Population Impacted = 22,413

09/28/2022 08:39:49 EST: Potential Population Impacted = 16,096

09/28/2022 08:24:49 EST: Potential Population Impacted = 10,984

09/28/2022 07:34:43 EST: Potential Population Impacted = 5,287

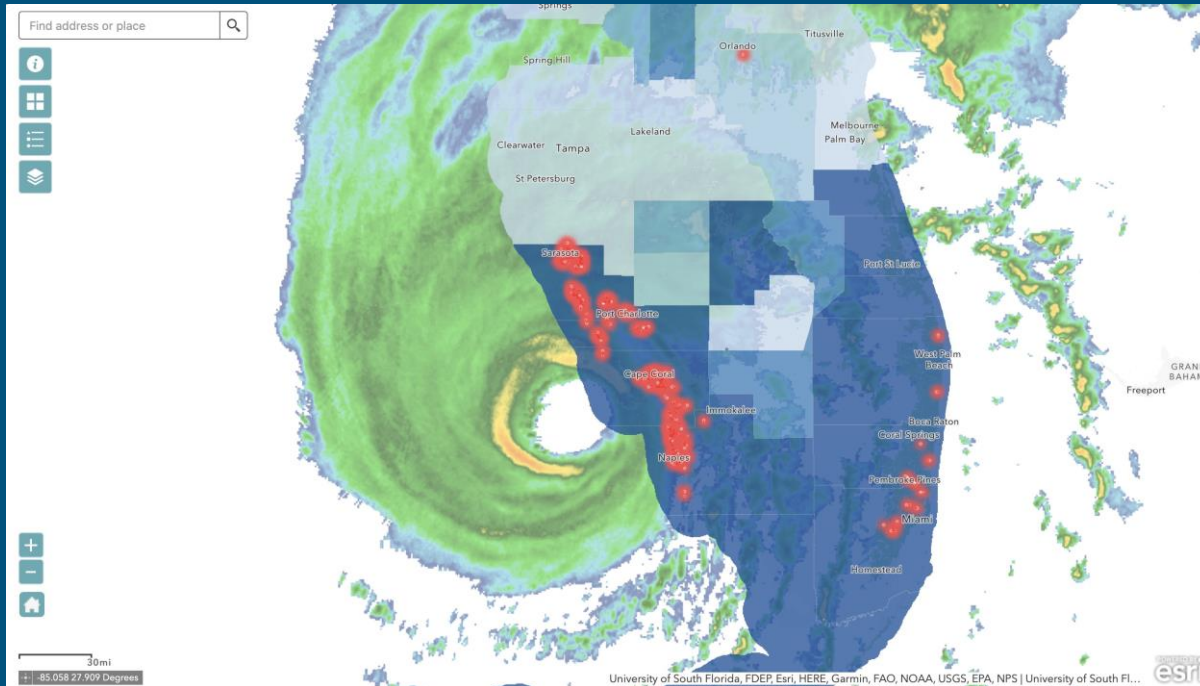


PENS – Hurricane Ian – 28 Sept., 2022

Geography can be defined as any county, town, city, state, or location up to and including the U.S.

Clear picture of power vulnerability

when viewed in context with critical infrastructure assets or demographic data - valuable in an emergency or disaster incident management scenario

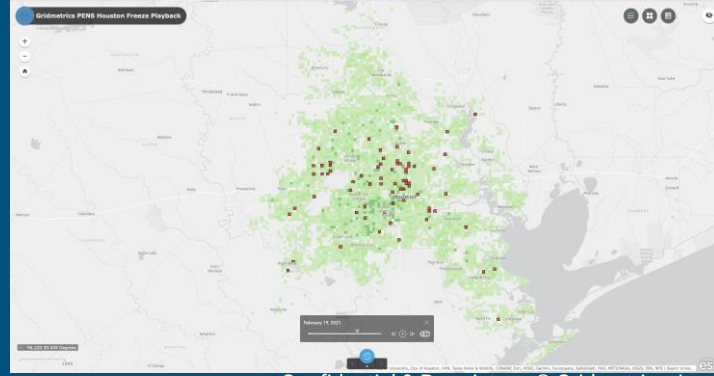
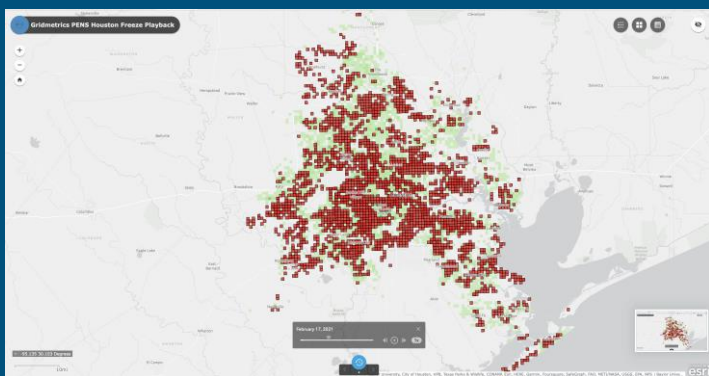
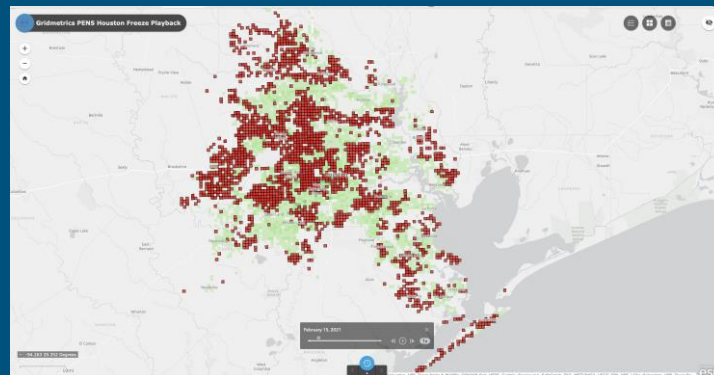
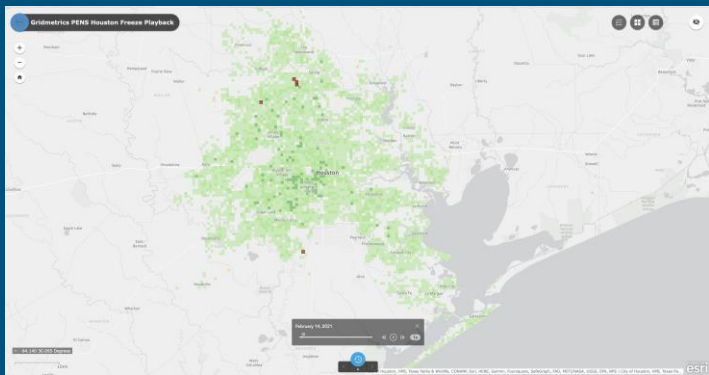


Shown with
Esri ARCGIS
map

More at
gridmetrics.io



Houston Freeze – Feb. 14 to Feb. 21, 2021

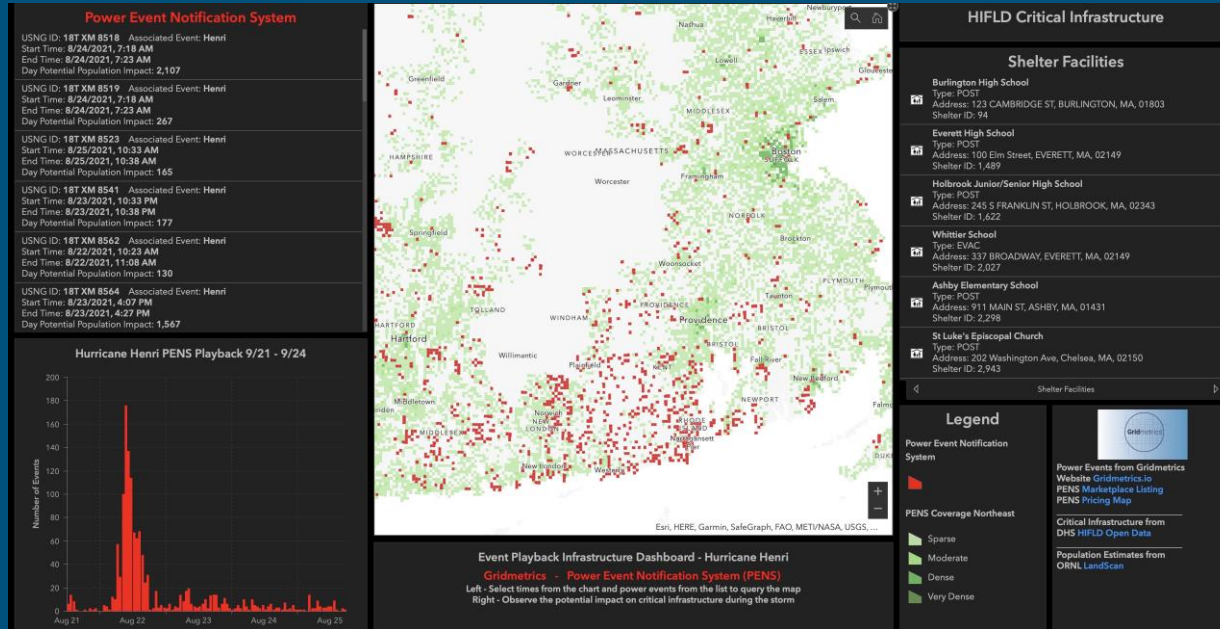


PENS – Playback – Hurricane Henri - 21 to 24 Sept., 2021

Leverages historical PENS data to provide playback visualization that can be customized by geography and time

Geography can be defined as any county, town, city, or state up to and including the U.S.

Time can either be defined as a look back of specific duration that can be accessed anytime or to view a particular event with specific time boundaries

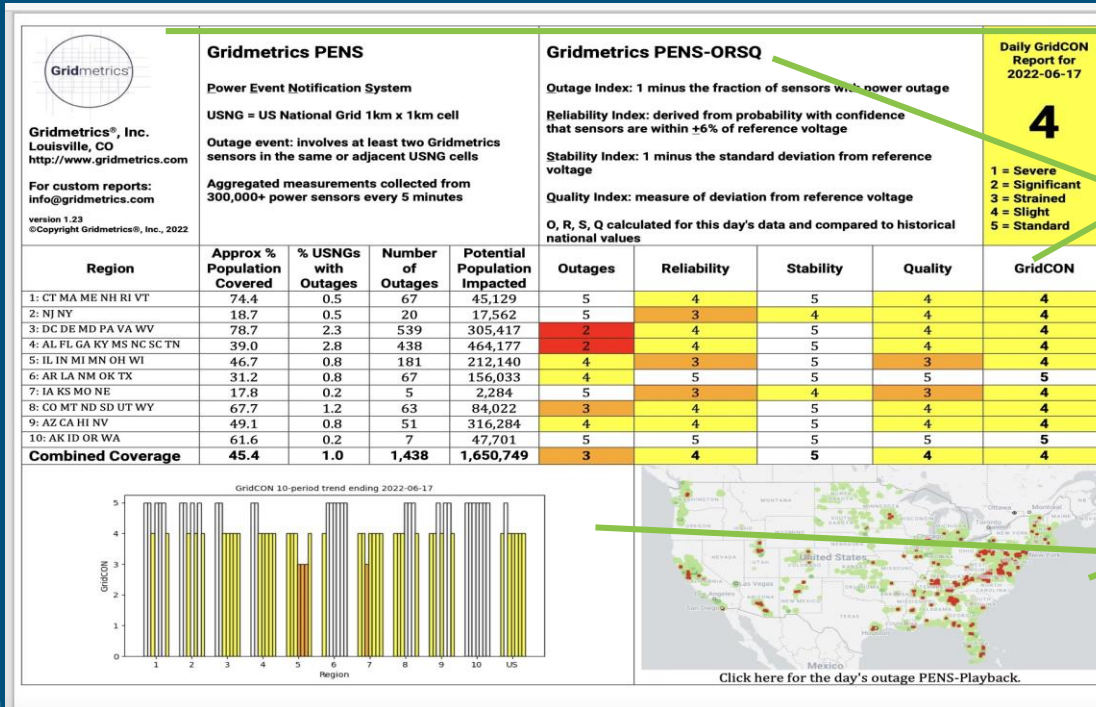


Can be displayed in context with Esri ARCGIS dashboard apps

More at [gridmetrics.io](https://www.gridmetrics.io)



PENS - Reports



Reports employing PENS Power Intelligence that can be customized by geography and time – utilizing 2 years of PENS historical voltage and outage data

Development of useful indices* derived from PENS historical voltage data and analytics

- **Reliability** measure of "efficiency" to determine, with confidence, that sensors are within +6% of reference voltage
- **Stability** measure of the fluctuations => 1 minus the std dev from reference voltage
- **Quality** measure of deviation from reference voltage
- **Outage** measure the percentage of sensors involved in an outage event

Uses:

- A daily briefing for Power Intelligence
- Identifying problematic areas of the grid
- Determining trends and forecasts
- Provide event forensics and response
- Provide real-world scenario planning and training

*Note: White paper available to provide detailed definitions and calculations underlying the 4 indices

Gridmetrics – Summary



**Real time power event
email notification**

Alerts can be customized for location



Valuable historical data

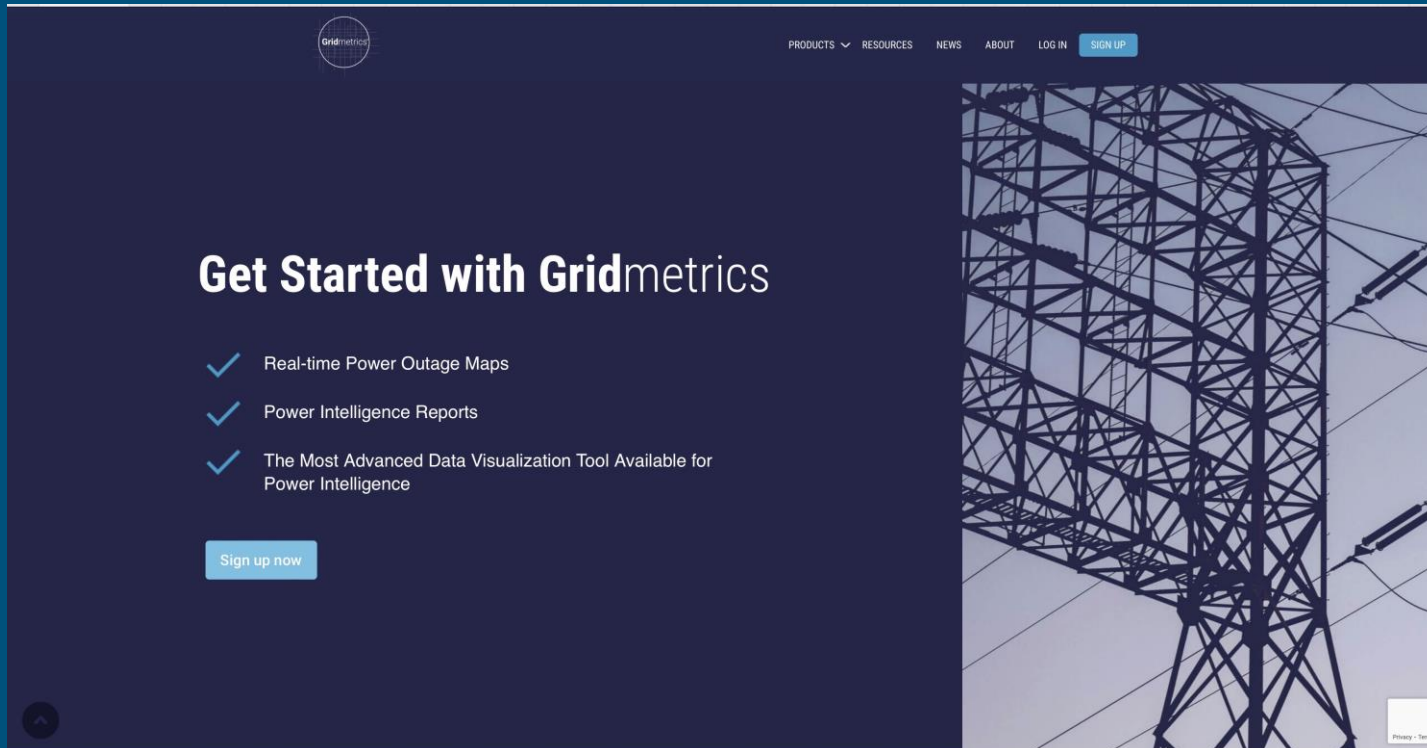
*Used for time-based, location-specific
playback and custom reports to
develop a view of outages, reliability,
stability, and quality – can also be
customized by location*



**Critical asset
monitoring to provide
actionable insights to the
state of power**

*In near real time via a dashboard or
API implementation*

Learn More



The screenshot shows the Gridmetrics website landing page. At the top left is the Gridmetrics logo. The navigation menu includes 'PRODUCTS', 'RESOURCES', 'NEWS', 'ABOUT', 'LOG IN', and a 'SIGN UP' button. The main heading is 'Get Started with Gridmetrics'. Below it are three bullet points, each with a checkmark icon: 'Real-time Power Outage Maps', 'Power Intelligence Reports', and 'The Most Advanced Data Visualization Tool Available for Power Intelligence'. A 'Sign up now' button is positioned below the list. The right side of the page features a large image of a power transmission tower. In the bottom right corner of the image, there is a small 'Privacy - Terms' link.

Gridmetrics

PRODUCTS ▾ RESOURCES NEWS ABOUT LOG IN SIGN UP

Get Started with Gridmetrics

- ✓ Real-time Power Outage Maps
- ✓ Power Intelligence Reports
- ✓ The Most Advanced Data Visualization Tool Available for Power Intelligence

Sign up now

Privacy - Terms

Learn more and sign up for trials
gridmetrics.io

Learn More

The screenshot shows the ArcGIS Marketplace interface. At the top, there is a navigation bar with the Esri logo and links for Products, Solutions, Support & Services, Stories, and About. A search icon and a user profile icon are on the right. Below this is a secondary navigation bar with links for Overview, Products, Services, Become a Provider, Help, and Console. The main content area features a product listing for 'DATA Power Event Notification System (PENS) Free Trial' by Gridmetrics. The listing includes a circular Gridmetrics logo, a 'Purchase request' button, and a '21-Days Trial' button. A pricing note states: 'Pricing: Pricing is dependent on the population within the monitored geographic area (typically a county, state or full US), update frequency (5 or 15 min) and number of users (3, 10, 20, or organization). Contact info@gridmetrics.io for a quote.' To the right of the text is a map of the United States with red dots indicating monitored locations. Below the main map are four smaller thumbnails: a map view, a software interface, a data table, and a video player. At the bottom of the listing, there are tabs for 'Overview' and 'Reviews'.

PENS Esri Feature Service Layer ([Link](#))

Learn More

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Learn more and sign up for trials
gridmetrics.io



[@gridmetrics1](https://twitter.com/gridmetrics1) for company news
[@gridmetricsP](https://twitter.com/gridmetricsP) for notable events



PENS Esri Feature Service Layer ([Link](#))

THANK YOU!

