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

Grid metrics

Gridmetrics - Background

Years of working with broadband companies	Years of aggregated data points	Total number of sensors	US population that live or work within 1km of a sensor
4.5+	**2.5+**	**300,000+**	**150M+**
Has grown out of CableLabs innovation project	***Grid**metrics unique data provides an independent, observational view of power*	*Gridmetrics partners with broadband communications providers*	*Gridmetrics power sensors are tightly aligned with population density*

Gridmetrics - Power Intelligence

Gridmetrics data enhances visibility into <u>outage, restoration and repair, and planning</u>

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
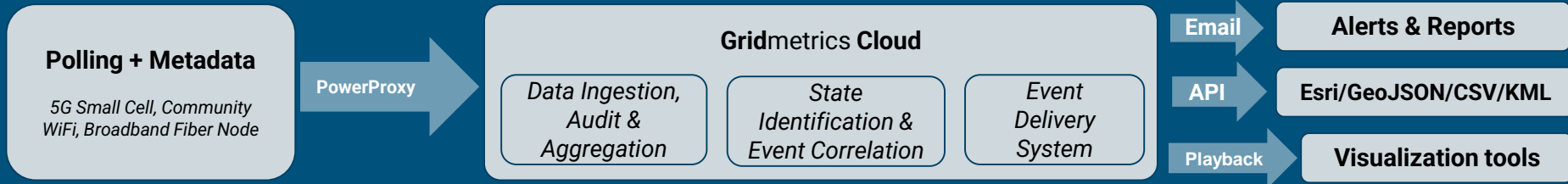- Lat/Long of sensor locations are held confidential

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)

Polling + Metadata

5G Small Cell, Community WiFi, Broadband Fiber Node

PowerProxy

Gridmetrics **Cloud**

Data Ingestion, Audit & Aggregation

State Identification & Event Correlation

Event Delivery System

Email → **Alerts & Reports**

API → **Esri/GeoJSON/CSV/KML**

Playback → **Visualization tools**

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

Gridmetrics **PENS Product Suite**

Gridmetrics® Power Event Notification System (PENS)

PENS - Alerts

PENS - API

PENS - Playback
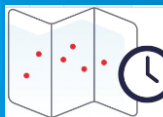
PENS - Reports

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

Clay County, Florida

(C) OpenStreetMap contributors
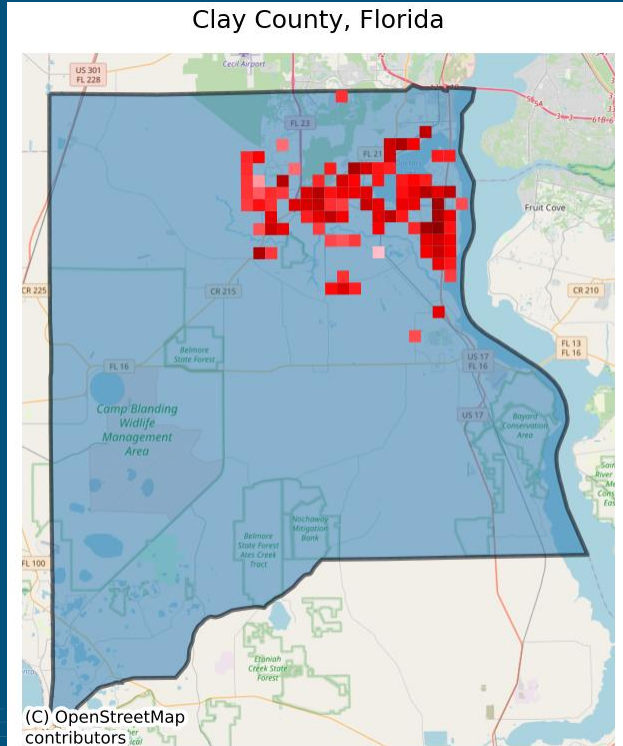
Gridmetrics® County Power Outage Notification First Update
County: Clay County, Florida (FIPS: 12019)
Potential Population Impacted: 41,464
Start Time: 07-01-2022 15:12 EDT, 07-01-2022 12:12 PDT
Duration: 0 days, 0 hours, 0 minutes
Notification Settings (Population): Minimum = 5,000, Increment = 5,000
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.

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PENS Alerts - Power Outage Email Notification

Clay County, Florida

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

Clay County, Florida
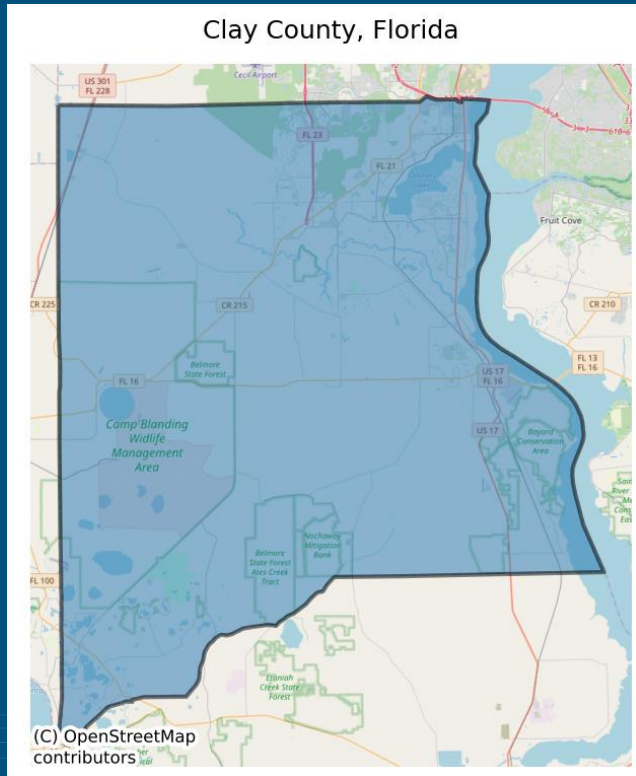
Final Update
County: Clay County, Florida (FIPS: 12019)
Potential Population Impacted: 0
Start Time: 07-01-2022 15:12 EDT, 07-01-2022 12:12 PDT
Duration: 0 days, 0 hours, 45 minutes
Notification Settings (Population): Minimum = 10,000, Increment = 2,500
Update History (most-recent entries):
07/01/2022 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

PENS API

```
                     Intended to          Meant to          PENS
                     provide              augment           provides an
                     actionable           existing tools    independent
                     insights to the      not replace       observational
                     state of             them              view in near
                     power                                  real time.
```
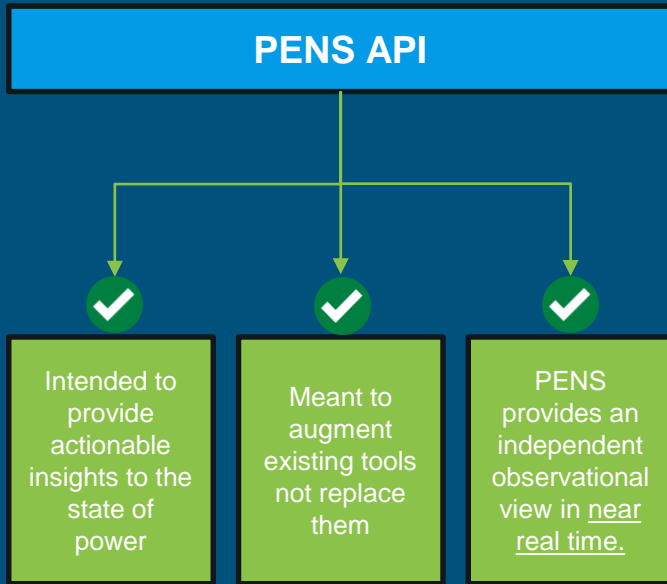
Benefits of PENS API

- **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

Shown with Esri ARCGIS dashboard

More at **gridmetrics.io**

Gridmetrics

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

Shown with Esri ARCGIS dashboard

More at **gridmetrics.io**

PENS Alerts - Power Outage Email Notification

Lee County, Florida

(C) OpenStreetMap contributors

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
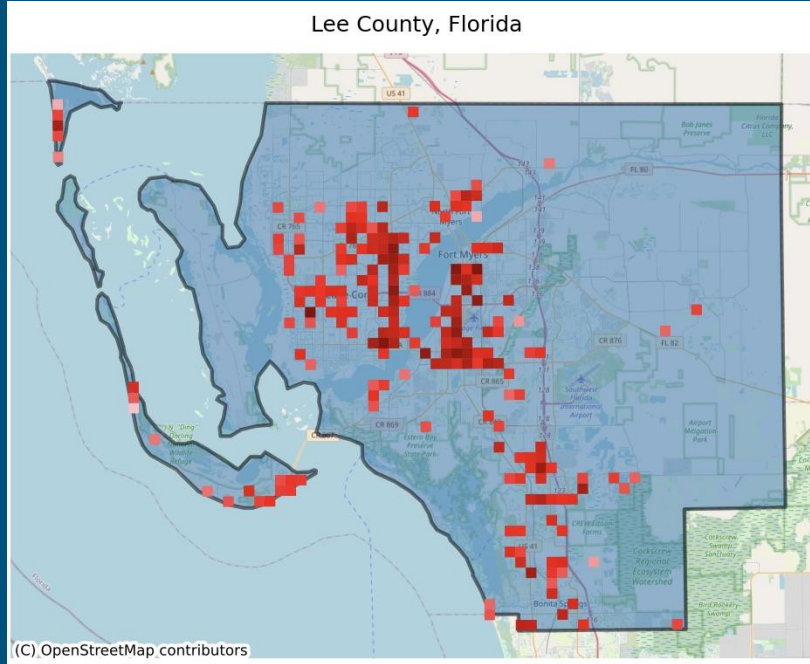
PENS – Hurricane Ian – 28 Sept., 2022

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
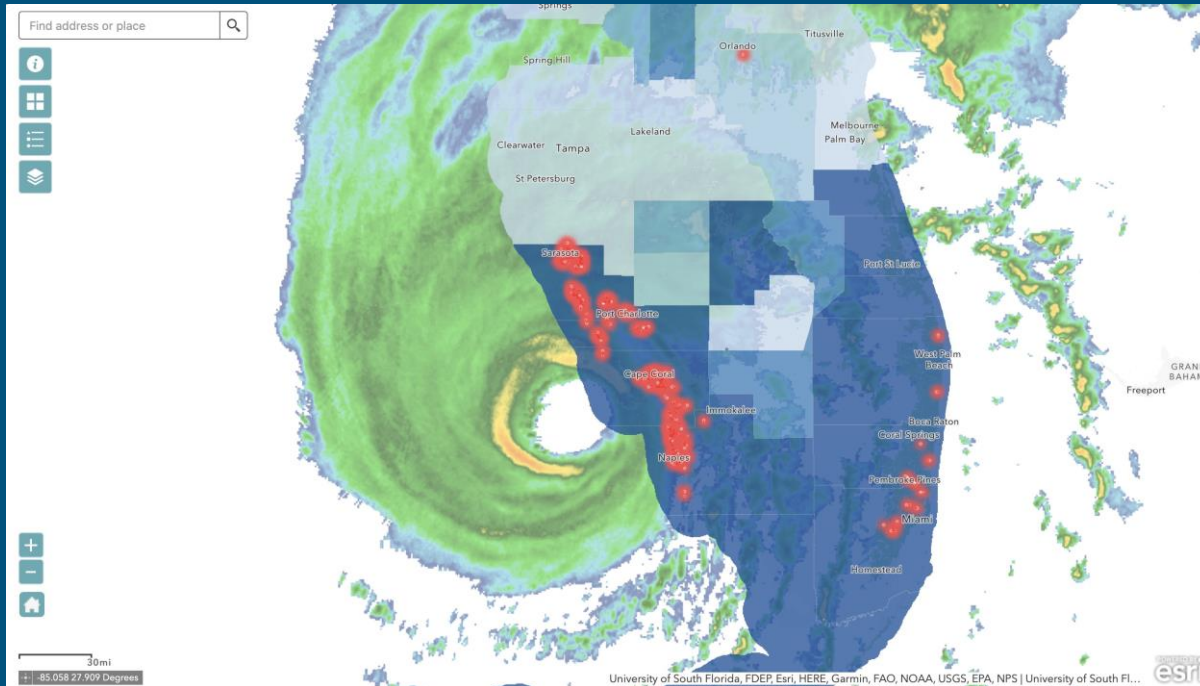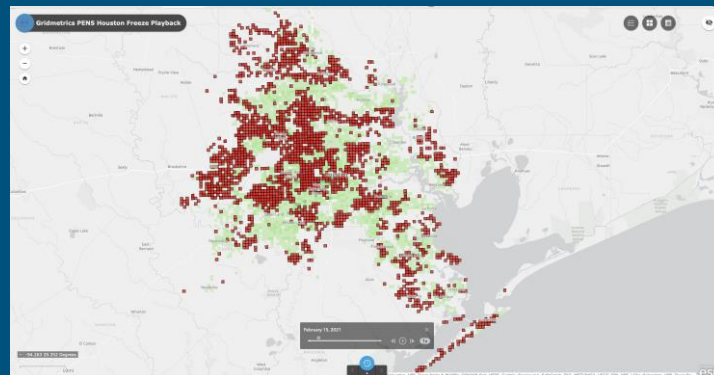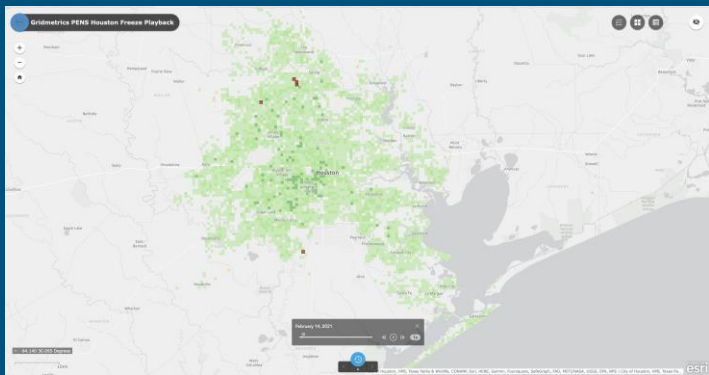

Shown with Esri ARCGIS map

More at **gridmetrics.io**

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Houston Freeze – Feb. 14 to Feb. 21, 2021
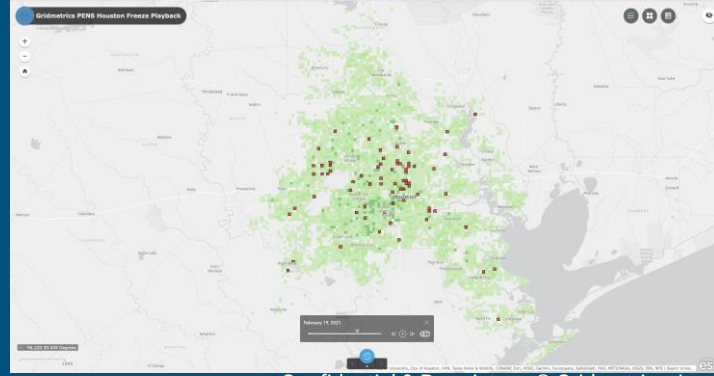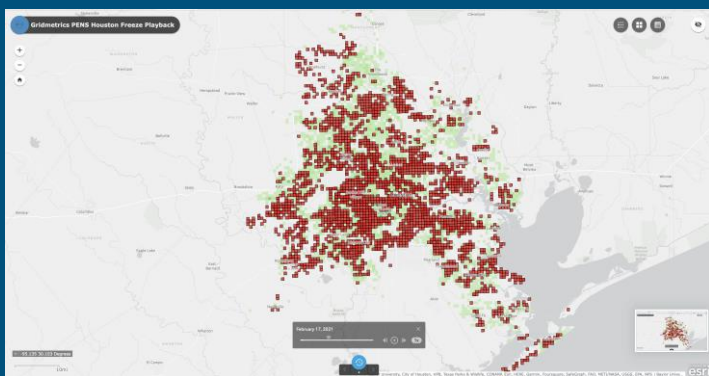
PENS – Playback – Hurricane Henri - 21 to 24 Sept., 2021

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
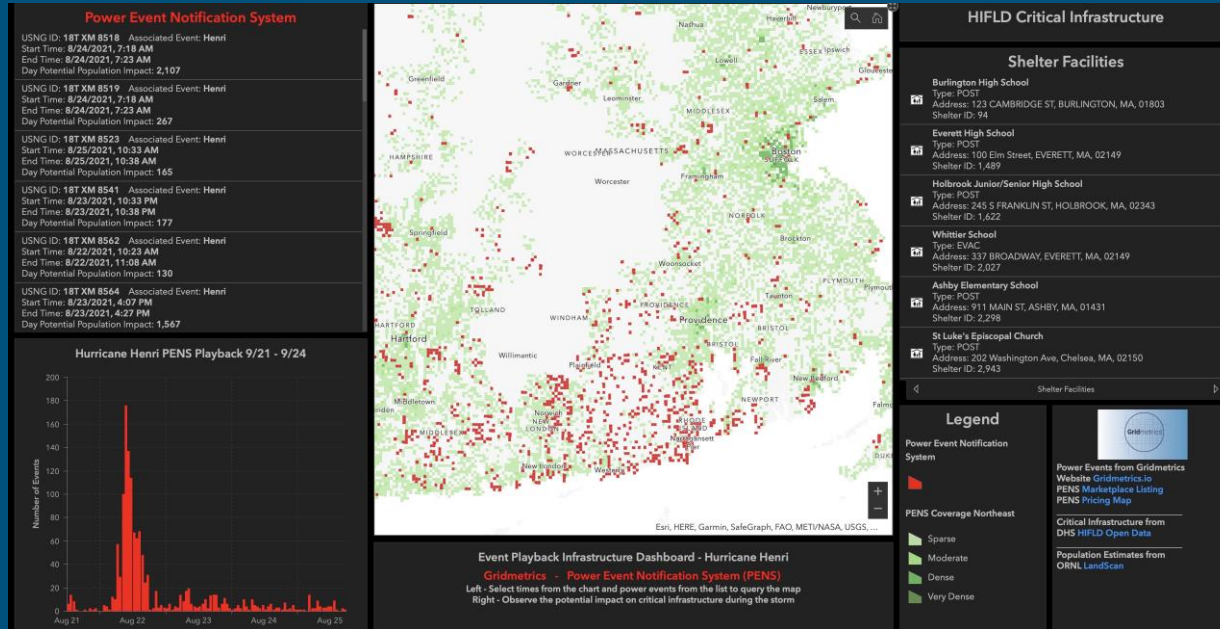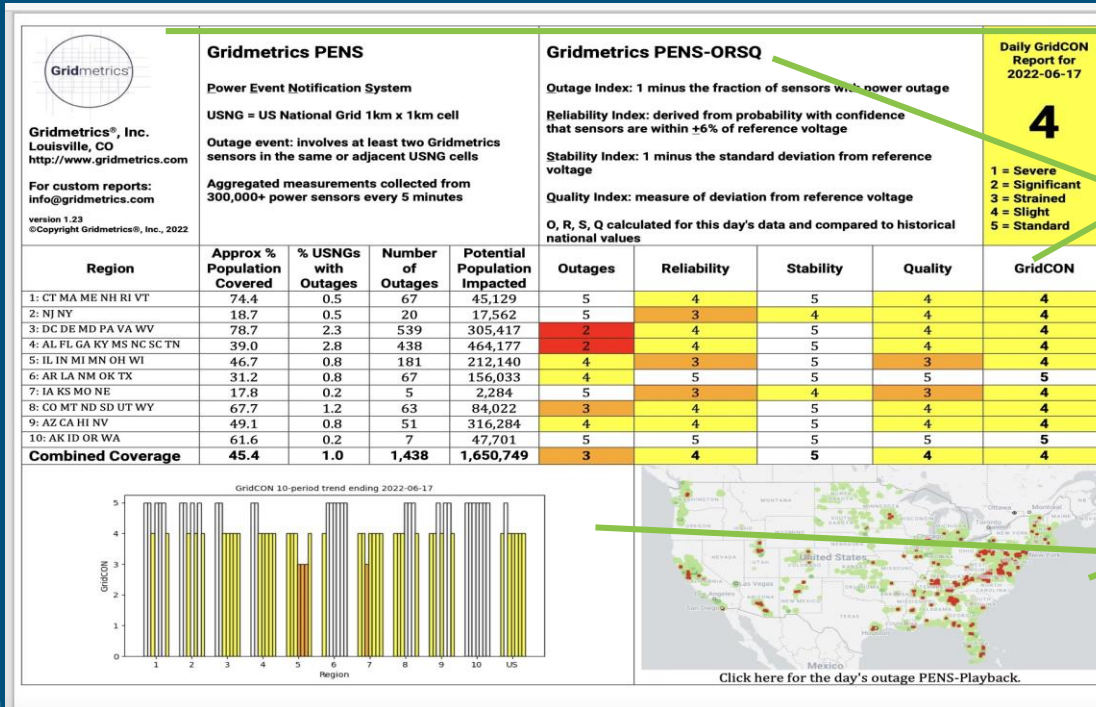

Can be displayed in context with Esri ARCGIS dashboard apps

More at **gridmetrics.io**

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**

✓ **Valuable historical data**

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

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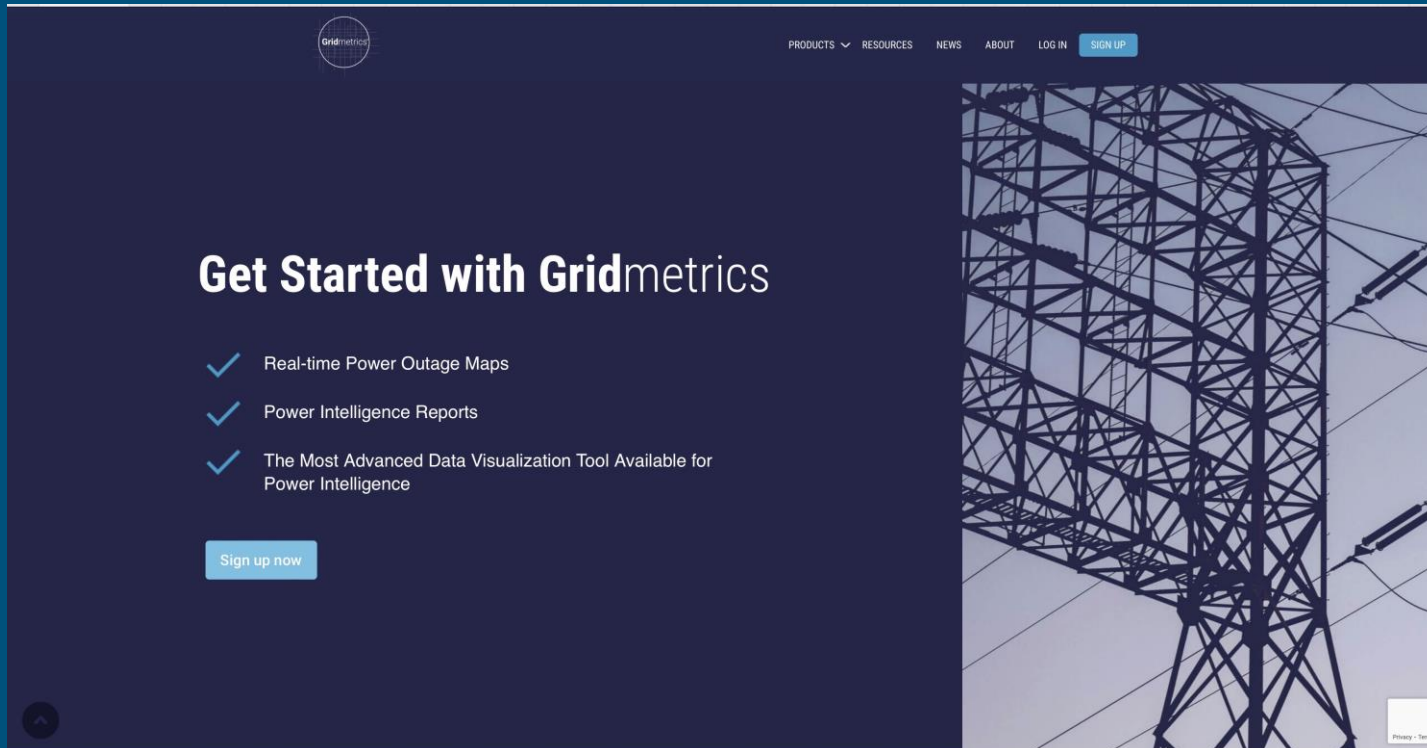
Used for time-based, location-specific playback and custom reports to develop a view of outages, reliability, stability, and quality – can also be customized by location

In near real time via a dashboard or API implementation

Gridmetrics

Learn More

Learn more and sign up for trials
gridmetrics.io

Learn More

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

Learn More

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Learn more and sign up for trials
gridmetrics.io

@gridmetrics1 for company news
@gridmetricsP for notable events

PENS Esri Feature Service Layer (Link)

THANK YOU!