U.S. DEPARTMENT OF ENERGY

Office of Cybersecurity, Energy Security, and Emergency Response

Tools & Models for Energy Sector Situational Awareness & Emergency Response

Matthew Tarduogno

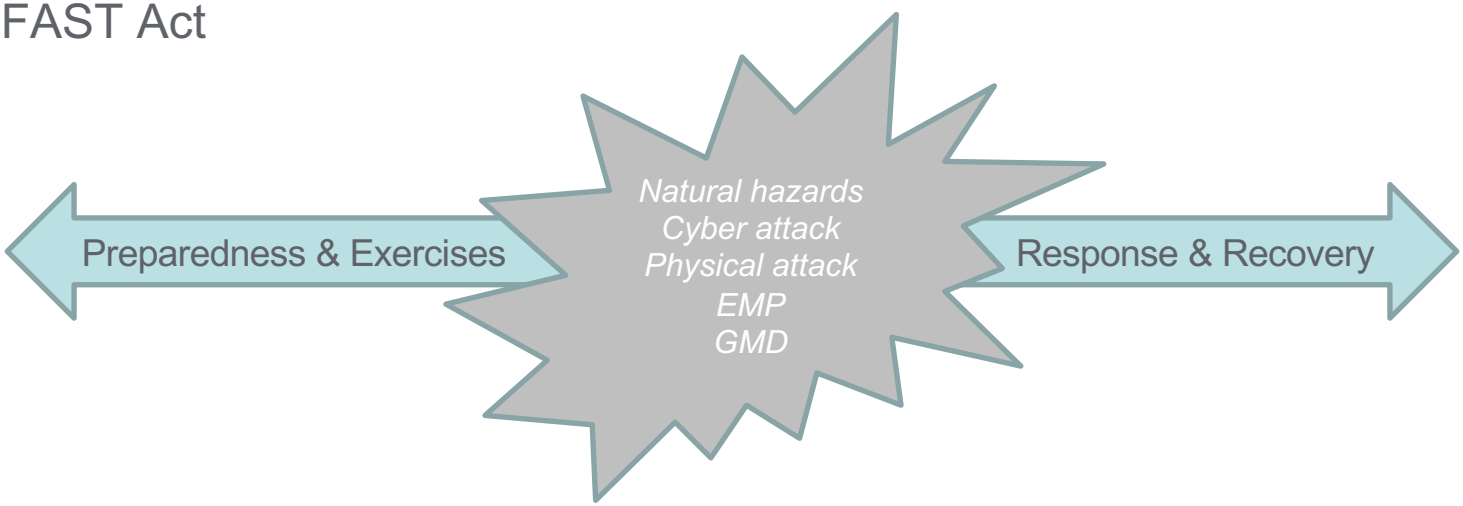
December 2019

Structure & Authorities

- DOE is Coordinating Agency for Emergency Support Function (ESF) #12 and the Sector Specific Agency (SSA) for energy
- Within DOE, ESF #12 and SSA responsibilities are lead by the Office Cybersecurity, Energy Security, and Emergency Response (CESER)

Sector Specific Agency
- PPD-8: Preparedness
- PPD-21: Infrastructure
- PPD-41: Cyber
- FAST Act

Emergency Support Function #12
- National Response Framework
- Stafford Act



Coordination with Interagency, Industry, Regional, State, Local, Tribal, and Territorial Partners

ESF #12 Essential Functions

- Facilitates the restoration of damaged energy systems
- Coordinates with federal, state and local agencies and other ESF's
- Provides technical expertise at Federal, State, and regional levels
- Assists in overcoming barriers and challenges to restoration
- Collects, evaluates, and shares energy sector information and visualizations

ESF #12 *Does not Typically*

- Physically repair or rebuild the grid
- Determine priority restoration of electricity
- Prioritize fuel distribution

Reports, Products, and Tools

- **Pre-Storm Regional Overview**
  - Primer to provide an overview of fuel supply chain in a given region, major utility companies, status of mutual assistance, and other relevant factors
- **Situations Reports**
  - Comprehensive overview on the status of the energy sector during an incident
  - DOE produces both an Official Use Only and public version
- **Predictive Power Outage Estimates**
  - Based on Argonne National Lab HEADOUT model, provides estimate of peak customer outages within the 72-hour forecast
- **Imagery, Flood Detection, & Damage Assessments**
  - Provide post-incident imagery and flood detection around key energy assets and working towards automated damage detection
- **EAGLE-I**
  - Provides near-real time power outage information and platform for DOE's situational awareness products

Examples: Situation Reports & Outage Estimates

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Hurricane Dorian | ESF-12 Situation Report #10

REPORT TIME & DATE:	9:00 AM EDT | Thursday, September 05, 2019
INCIDENT START DATE:	August 28, 2019
PRIMARY LOCATION[S]:	Florida, Georgia, South Carolina, North Carolina, and Virginia
REPORT DISTRIBUTION:	DOE & Federal Agencies
DOE POC:	Matthew Tarduogno (202-586-2892 // matthew.tarduogno@hq.doe.gov)

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EXECUTIVE SUMMARY

As of 8:00 AM EDT, Hurricane Dorian was 70 miles south-southeast of Charleston, South Carolina, moving north-northeast at 8 MPH, with maximum sustained winds of 115 MPH (category 3). On the forecast track, the center of Dorian will continue to move close to the coast of South Carolina today, and then move near or over the coast of North Carolina tonight and Friday. The center should move to the southeast of extreme southeastern New England Friday night and Saturday morning, and approach Nova Scotia later on Saturday. The DOE Energy Response Organization is activated to coordinate Emergency Support Function (ESF) – 12 response efforts. DOE is holding regular calls with industry and interagency partners to assess preparations, potential post-storm requirements, and any unmet needs.

Electricity Sector Summary

- Current Outages (as of 8:00 AM EDT):
  - Georgia: 16,563 customer outages
  - South Carolina: 198,579 customer outages
  - North Carolina: 4,425 customer outages
- Utilities across the potentially affected region are prepared for potential impacts from Dorian.
- Utilities are holding daily mutual assistance coordination calls and mutual assistance crews are pre-positioning throughout the potentially impacted region from over 36 states, the District of Columbia, and Canada to support restoration efforts post storm.

Oil & Natural Gas Sector Summary

- Per the Energy Information Administration, stocks of fuel in the Lower Atlantic Region (PADD 1C: WV, VA, NC, SC, GA, and FL) are within the 5-year range, with gasoline 2% above the 5-year average and distillate (diesel) stocks 1% above 5-year average in the region.
- Jet fuel stocks are 11% above the 5-year average across the East Coast (PADD 1).
- While stocks throughout the region are robust, there are reports of scattered retail fuel station outages from increased demand. Retail fuel availability across Florida has stabilized.
- Widespread retail fuel station outages are not expected in Georgia or the Carolinas due to the smaller area forecast for potential impacts compared to the early forecast for Florida.
- Petroleum markets remain fully mobilized to resupply stations across the potential impacted states as needed and are working closely with the states to help expedite fuel resupply shipments.

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Organization: Matthew Tarduogno (CR-20) Date: September 4, 2019

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Estimated Electrical Customer Outages

Tropical Storm Dorian – Update #7

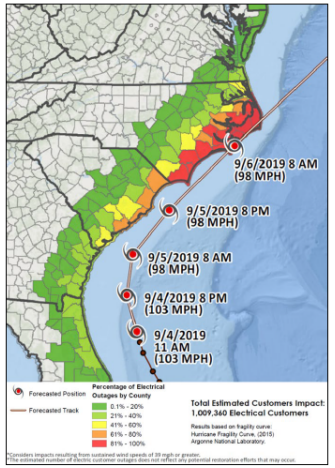
Based on Advisory #45
Wednesday, September 4 at 11:00 AM EDT

The following is a preliminary estimate of the potential peak number of electrical customer outages predicted by the U.S. Department of Energy's (DOE) Argonne National Laboratory. The estimate is for awareness only and based on forecasts from the National Hurricane Center. This estimate is not intended for public release unless otherwise approved by DOE.

Note: The predictive outages model only estimates peak customer outages within the projected 72-hour wind-swath and may not account for all variables.

Estimated Electrical Customer Outages by State over Next 72-Hours

State	Estimated Customer Outages	Percent of Customers with Outages
Georgia	83,130	2.3%
North Carolina	464,214	12.2%
South Carolina	357,386	19.4%
Virginia	104,630	3.4%



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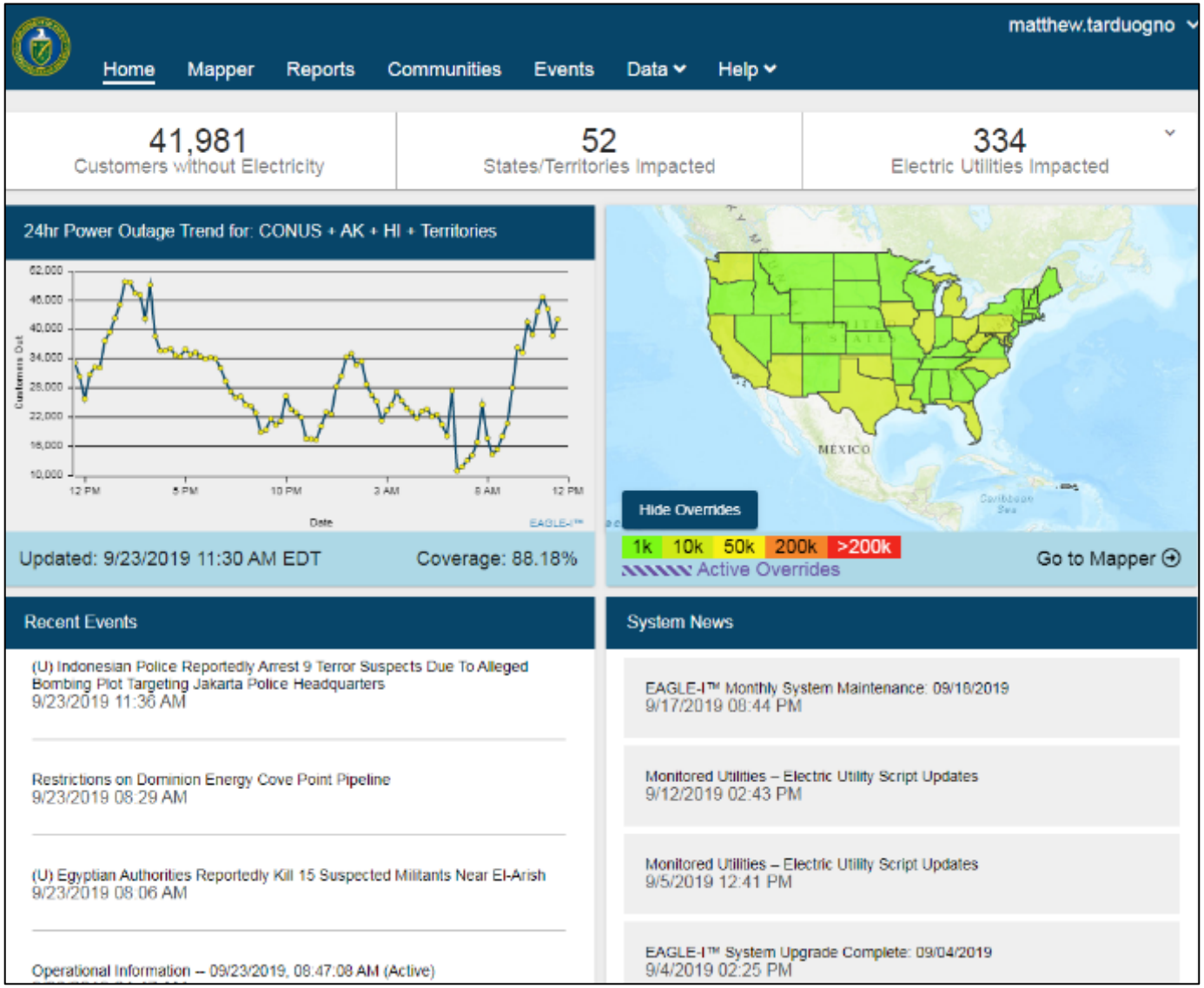
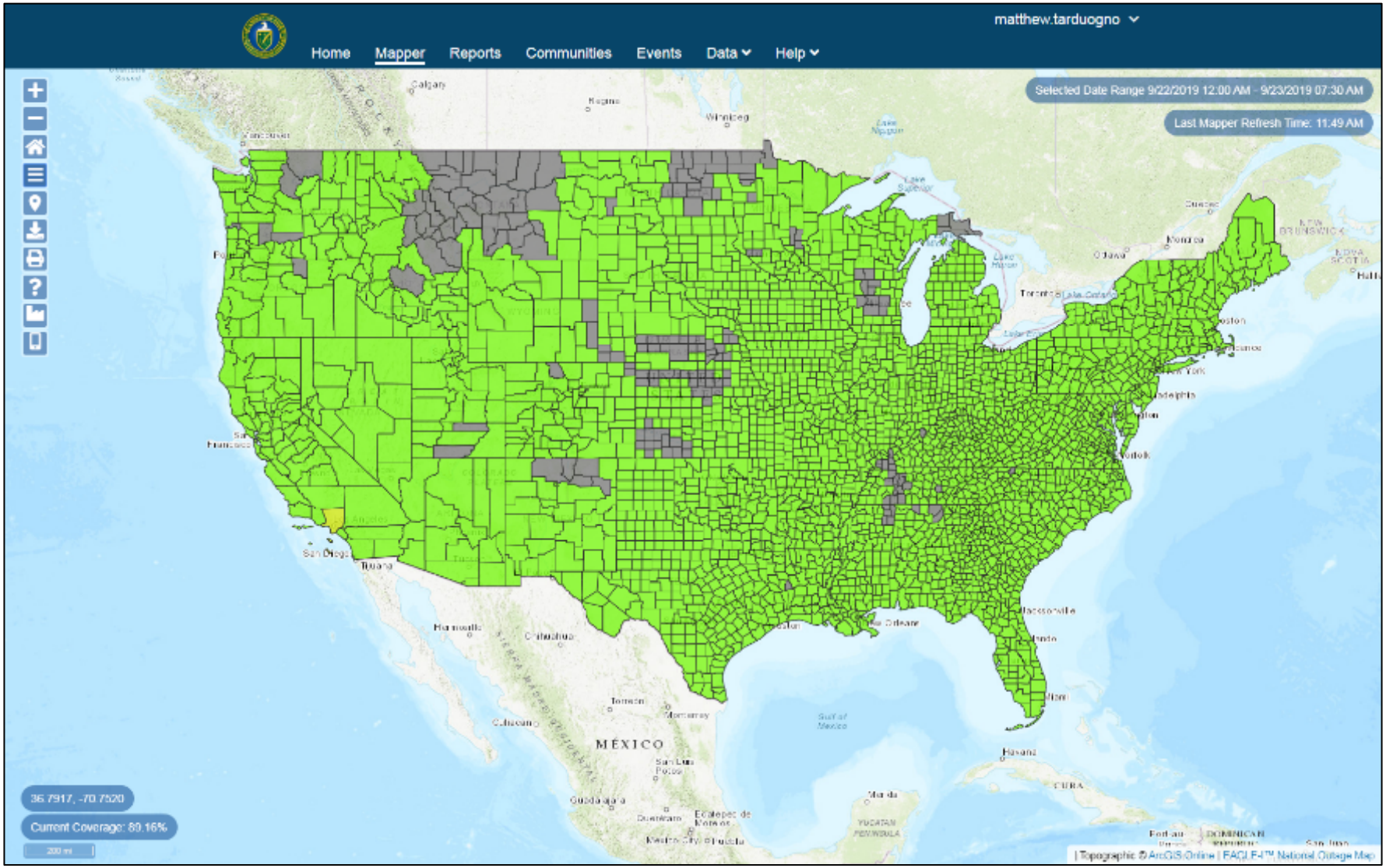
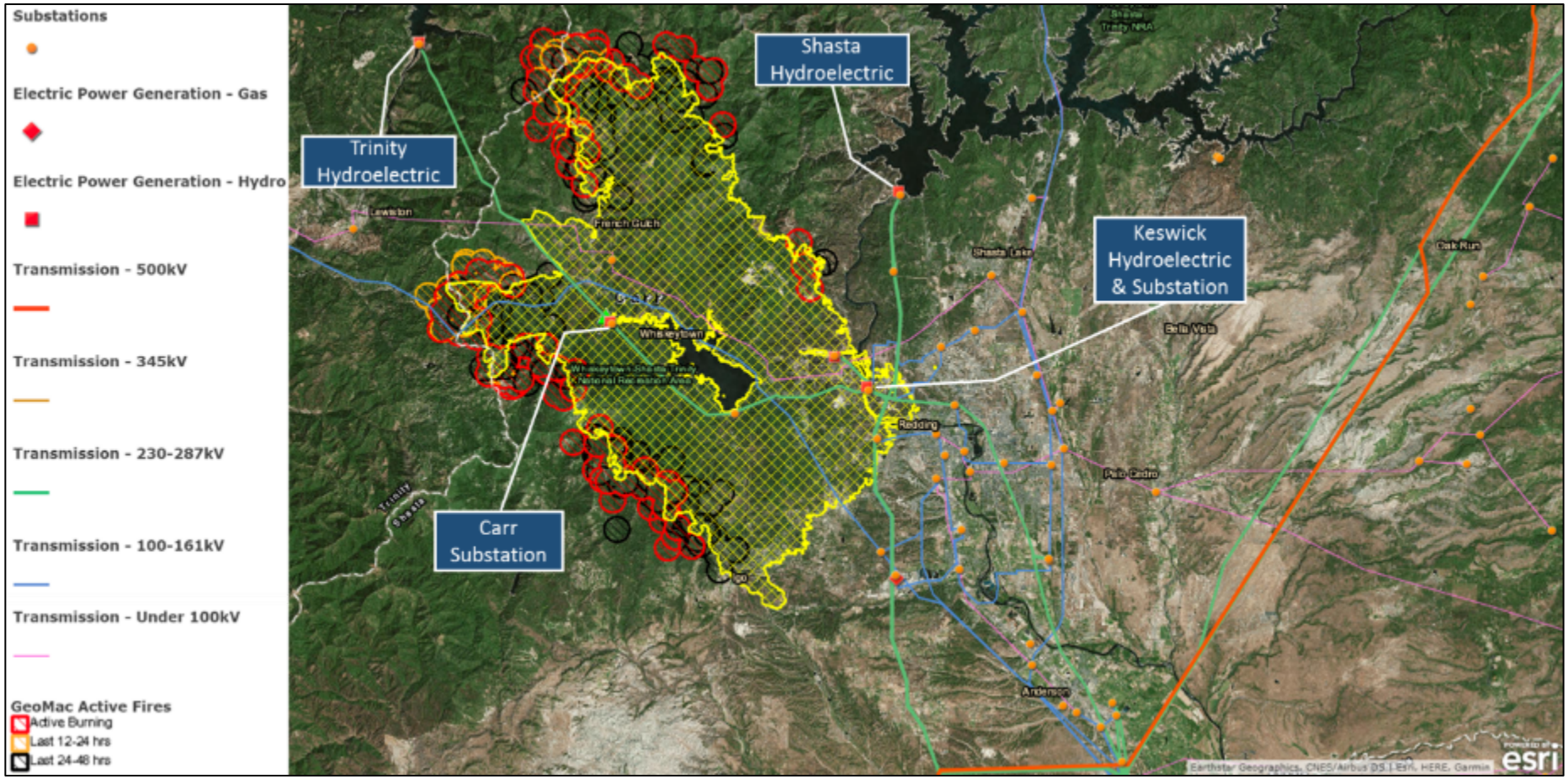
EAGLE-I Dashboard



EAGLE-I National Outage Map

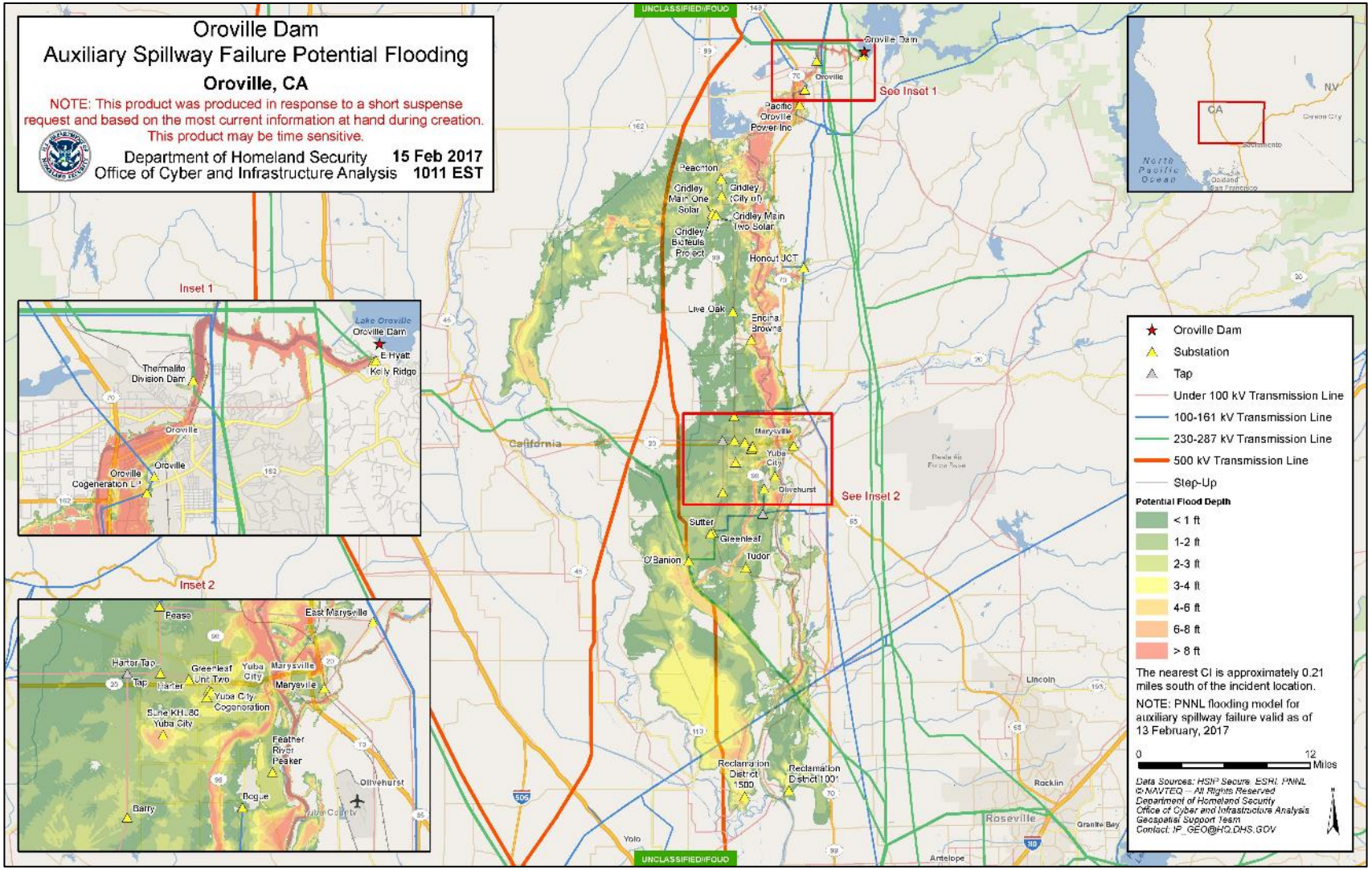


Mapping Hazards & Infrastructure



Flood Detection

Flood Modeling



Current & Future Development Efforts

- **Enhanced predictive electricity outage model**
  - Additional variables
  - Infrastructure at risk
  - Predicted restoration times
  - Additional types of severe weather
- **Enhanced imagery-based rapid damage assessment of energy infrastructure**
- **Oil and Natura Gas Sector Status**
  - Retail fuel station availability
  - Modeling retail fuel station demand during incident
- **Modeling impacts of other hazards**

Questions?