



U.S. DEPARTMENT  
*of* **ENERGY**

Federal Energy  
Management Program

# Resilience Results and Metrics

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T02-S02, August 5th, 2025

**FEMP Summer CAMP** (Courses Aligned with Mission Priorities)



# Keith Benson

Director – Energy Navy Shore TYCOM / Navy Installations Command

# Session Learning Outcomes

1. Recognize the core components of effective resilience planning for mission-critical infrastructure.
2. Identify metrics and results that define successful resilient operations.
3. Evaluate real-world strategies for sustaining operations during disruptions.
4. Recognize the value of cross-sector collaboration in resilience program development.



# Nicholas Judson, Ph.D.

Associate Group Leader  
MIT Lincoln Laboratory

# Critical Infrastructure, Services, and Networks

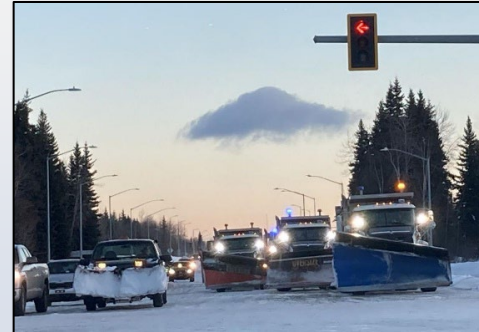
## Energy



## Communications



## Transportation



## Water and Wastewater





# The Inevitability of Infrastructure Failure

*Every infrastructure system: energy, water, communications, will fail.*

*These failures introduce risks to national defense missions when infrastructure is most needed.*

## Natural Disasters

### The Texas Electric Grid Failure Was a Warm-up

One year after the deadly blackout, officials have done little to prevent the next one—which could be far worse.

By Russell Gold

February 2022

124



## Cyber / Control System Attacks

### China-backed Volt Typhoon hackers have lurked inside US critical infrastructure for 'at least five years'

Carly Page @carlypage\_ / 3:38 PM EST • February 7, 2024

Comment



Image Credits: imaginima / Getty Images

China-backed hackers have maintained access to American critical infrastructure for "at least five years" with the long-term goal of launching "destructive" cyberattacks, a coalition of U.S. intelligence agencies warned on Wednesday.

Volt Typhoon, a state-sponsored group of hackers based in China, has been burrowing into the networks of aviation, rail, mass transit, highway, maritime, pipeline, water and sewage organizations — none of which were named — in a bid to pre-position themselves for destructive cyberattacks, the NSA, CISA and FBI said in a [joint advisory published on Wednesday](#).

## Physical Attacks

### Ukraine war: Massive Russian strikes target energy grid - Zelensky

23 October 2022

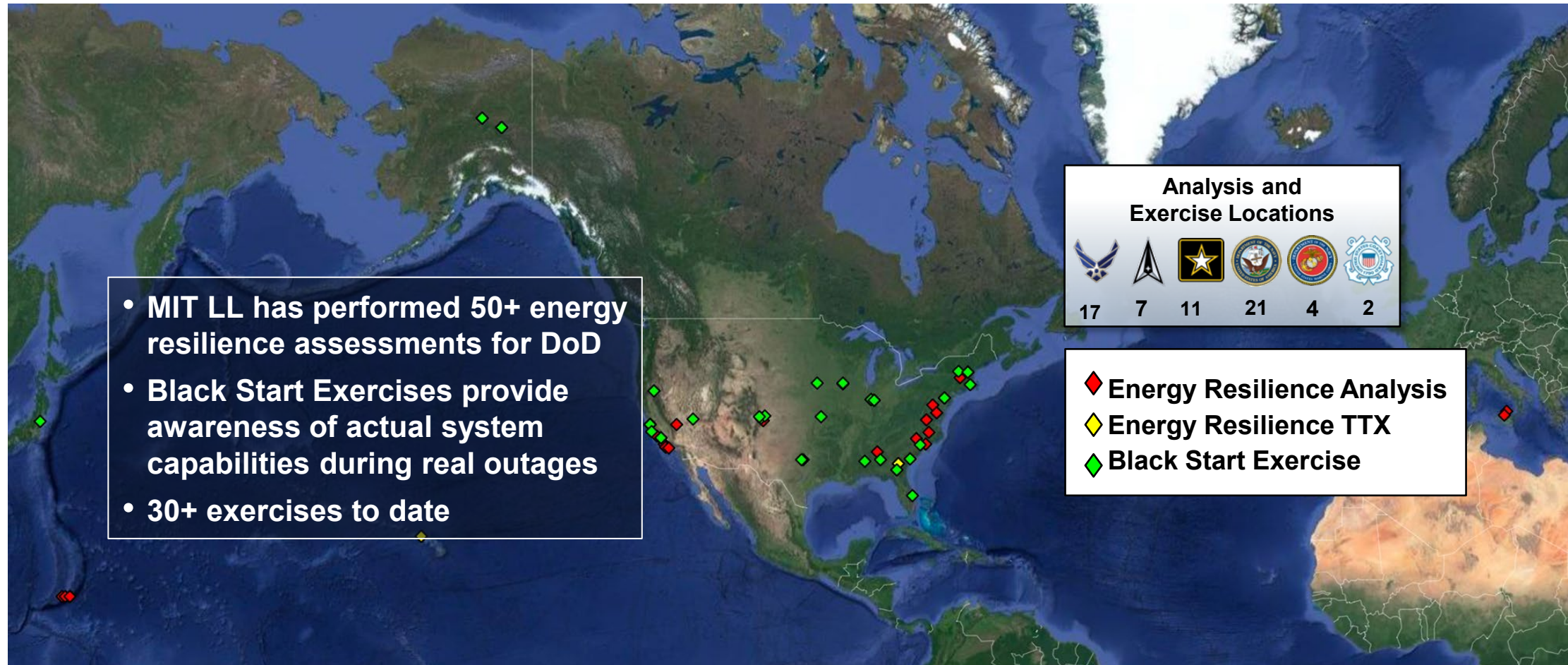
BBC

Russia strikes have crippled power plants across Ukraine in recent days



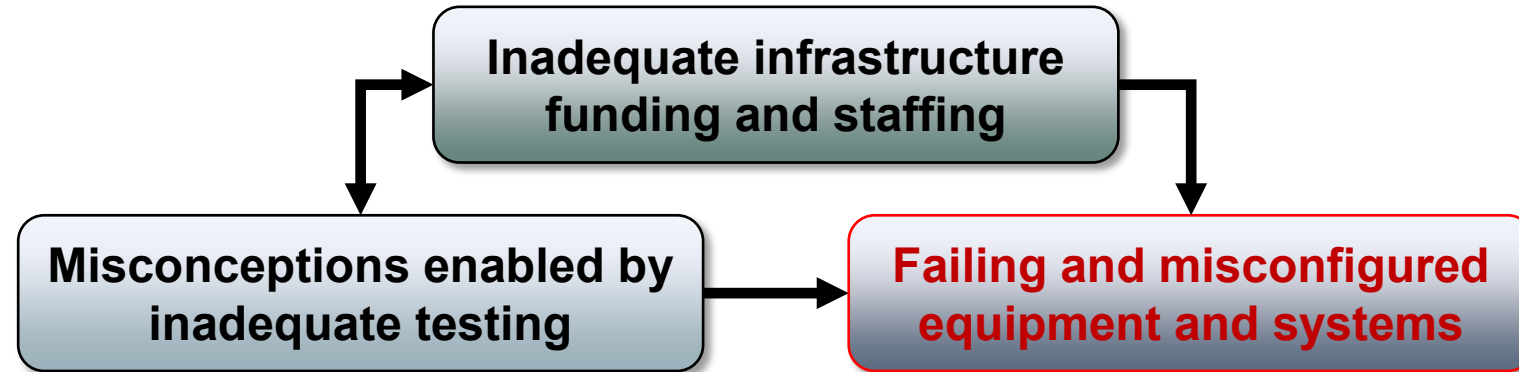
Ukrainian Presidential Press Service via Reuters

# Black Start Exercises





# Common Energy Challenges Found During Previous Exercises



Widespread **communications disruptions** from unsupported core/facility comms equipment

Unpowered “**noncritical**” **support functions**: HVAC, cold storage, water systems, child care

Untested or nonexistent **generator refueling** plans, unpowered bulk fuel distribution

Untested **backup locations** without sufficient backup power/comms/personnel capacity

Insufficient backup for **access, safety, and security** systems

**Key individual** essential for infrastructure operations and troubleshooting

HVAC: Heating Ventilation and Air Conditioning





# Guy G. Warner

Chairman and CEO  
Pareto Energy LTD

# In the Current Electric Utility Business Model, Consumers cannot get...

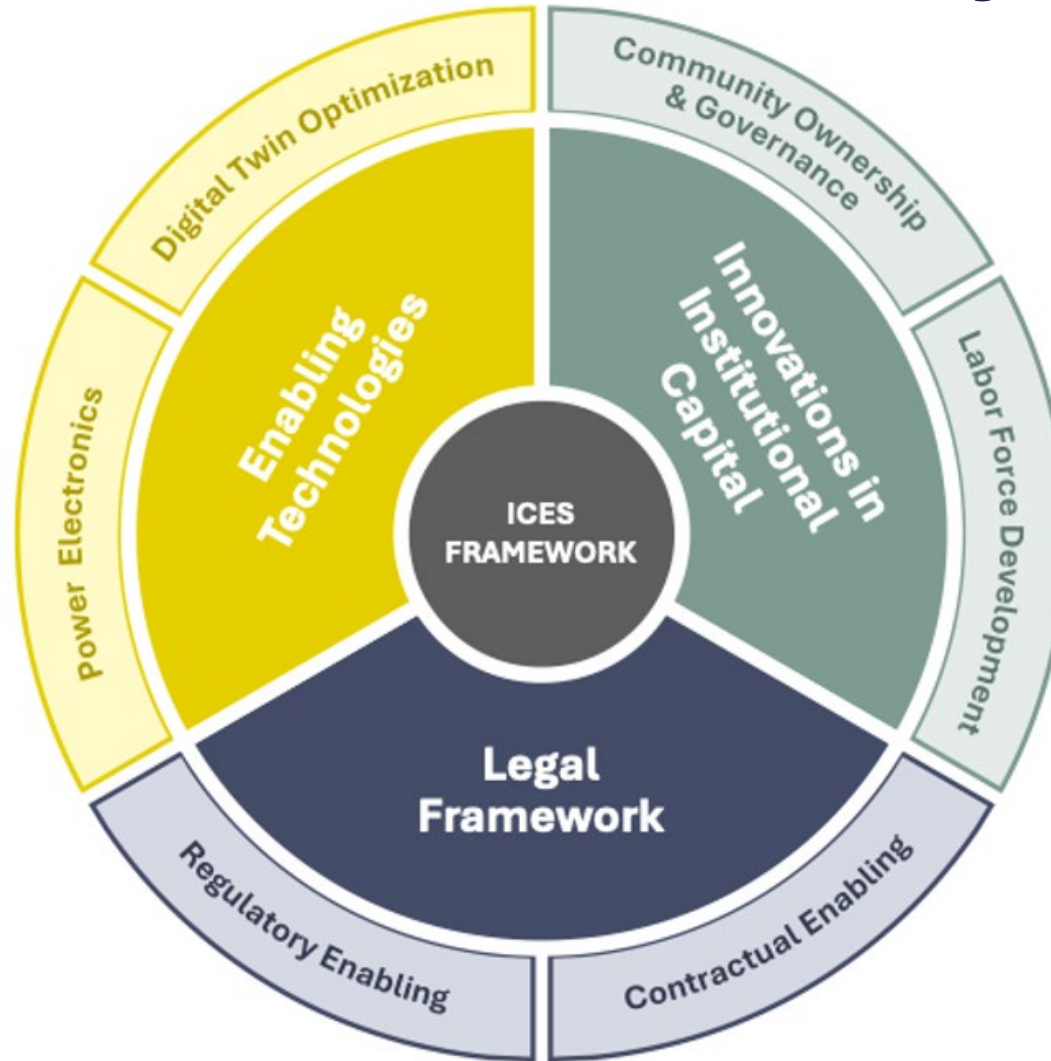
**Timely delivery of the quantity of power needed to respond to increase demands for electrification ...**

- **>70%** of the U.S. grid is **25+ years old**
- **2x** increase in **utility growth forecasts** from 2022 to 2023
- **▲ 160%** growth in **data center power demand** by 2030
- **1,250 GW** incremental **capacity from wind and solar projects** waiting to integrate into the grid (same as the current capacity of U.S. power plants)
- **4-7 yrs** on average to move from design to implementation for new generation?
- **▲ 300%** Congestion increase

**At the quality needed to meet operational imperatives for resilience and reliability ...**

- **3.7x** more reported cyber attacks and physical terrorism incidents than five years ago
- **>100 outages tied to severe weather** on average over the past five years (double the average from early 2000s)
- **>8 hours** Overall frequency and length of power outages on the rise due to mix of other issues listed here of outages on average with US customers in 2022
- **▲ 19.5%** increase in coal burned in the U.S. in 2023

# Six Elements of a Distributed Utility Business Model





# Matt Kime

Sr. Project Manager  
DoD NV5 contractor support



# Introduction

## Problem:

*Data-driven decision making is difficult due to commodity usage data being reported in a tabular, unstandardized format.*

## Solution:

*Web-application that consolidates and transforms consumption data into an easily digestible format, including charts, reports, and geospatial visualizations... that we call the **Energy Visualization Module (EVM)***



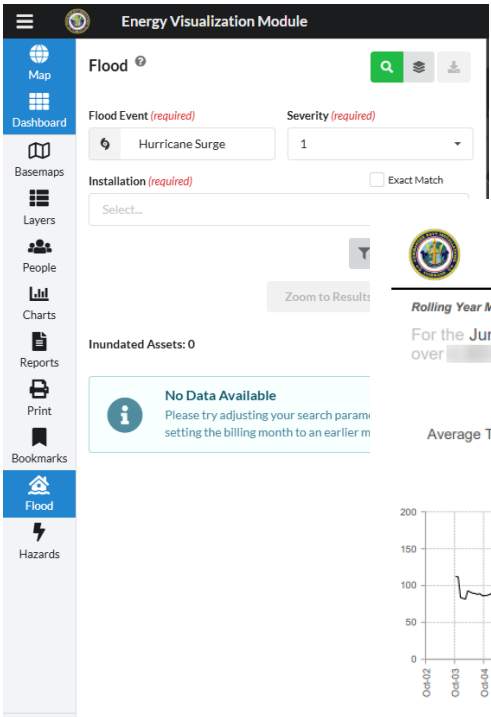
# Application & Data

## Features

- Charts
- Reports
- Map
- Hazards & Flood

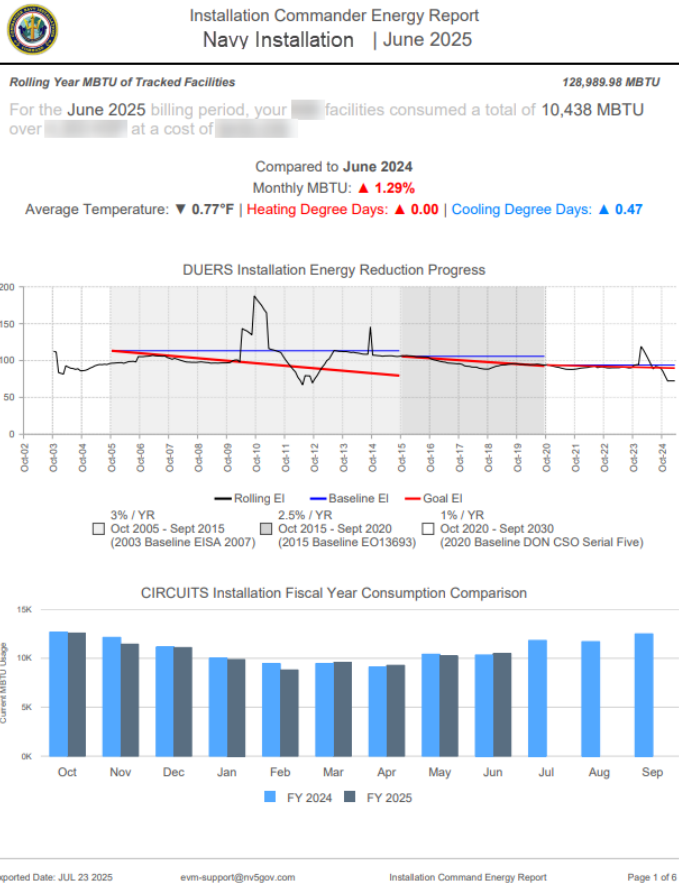
## Data Analysis & Sources

- Energy and Water Intensity
- Consumption breakdown by region, installation, facility
- ASHRAE Building Standards & Reduction Potential
- Estimated Cost Data
- Reliability Metrics
- Resiliency Analysis
- Data Anomalies



CALENDAR YEAR	MONTH	KSF	UTILITY TYPE	QUANTITY	UNITS	TOTAL COST	UNIT COST
2025	4	100	FSX	0	MBTU	0	0
2025	4	7000	PHP	0	MWH	0	0
2025	4	7000	SOL	0	MBTU	0	0
2025	4	7000	NAG	30000	MBTU	138000	4.6
2025	4	0	ELC	200	MWH	27000	135
2025	4	0	PWT	300	KGAL	2430	8.1
2025	4	7000	STP	0	MBTU	0	0
2025	4	7000	FSX	0	MBTU	0	0
2025	4	100	FSD	0	MBTU	0	0
2025	4	100	PWT	200	KGAL	1610	8.05
2025	4	7000	PHO	0	MWH	0	0
2025	4	7000	ELC	6600	MWH	861630	131
2025	4	7000	FSD	2500	MBTU	66150	26.5
2025	4	100	ELC	50	MWH	6688	134
2025	4	7000	PWT	10500	KGAL	101640	9.68
2025	4	100	NAG	1200	MBTU	25632	21.4

Example DUERS export for Naval Base ABC from the IEPS Toolsuite DUERS .



# Questions?

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**FEMP Summer Workshops**

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How to obtain your CEUs:

1. Log in to <https://edu.wbdg.org/> using your WBDG credentials
  - The assessment and evaluation will be made available to attendees at 8:00am ET on Monday, August 11<sup>th</sup>
  - The assessment and evaluation will close on September 22<sup>nd</sup>
2. In the list of trainings you attended, click on the Visit link by the course you wish to complete
  - If the course you're looking for is not listed, click on My Account in the top right menu
  - If you still can't find your course, contact the WBDG support team to check your eligibility
3. Complete the assessment with a score of 80% or above
4. Upon passing the assessment, click the Post-Evaluation Survey button
5. Complete and submit the evaluation
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# Thank You

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