

# Faster Resilience Assessments: An Introduction to the New Technical Resilience Navigator Lite

Ethan Epstein, Doug Elliott, Kathryn Otte, Hannah Rabinowitz, and Julia Rotondo

August 15, 2023



# Notice

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# Agenda

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- Introduction to Today's Training
- FEMP Introduction
- Resilience Planning & Risk 101
- TRN Lite Overview
- TRN Lite Web Tool Walk Through
- Next Steps
- Q&A
- Upcoming Events

# Notice

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**This training is eligible for CEUs.**

**If you haven't already, register for today's training here:**

**<https://wbdg.org/continuing-education/femp-courses/femplw08152023>**

**After today's training, log back into your account and you can access the quiz questions for CEUs.**

# Training Logistics

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- Please use the WebEx chat or Q&A functionality for any questions you have during today's training
- We'll be going over the questions at the end of the hour
- We will plan to share slides with registered attendees after the training

# Goals of Today's Training

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**Upon completion of this course, attendees will be able to:**

- Access and use FEMP's TRN Lite
- Understand how to apply the TRN Lite to initiate a resilience planning process
- Have tangible next-steps for how to initiate and pursue using the TRN Lite at their own sites



# Today's Speakers & Trainers



Ethan Epstein  
Resilience Planning Lead  
U.S. Department of Energy

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# Federal Energy Management Program

Ethan Epstein. U.S. Department of Energy



# FEMP Focuses on Federal Agency Support

FEMP works with **key stakeholders** to support **all stages of energy management** in federal agencies' **critical areas**

## Key Stakeholders

-  White House
-  Industry
-  Agencies
-  National Labs
-  Congress
-  MUSH Markets



### Policy & Planning

Analyzes energy management mandates and helps agencies plan to meet legislative goals.



### Results & Recognition

Guides data reporting and recognizes significant contributions to energy and water efficiency.



### Analysis & Strategy

Works alongside agencies to identify short- and long-term opportunities to cut costs, save energy, and meet goals.



### Optimization & Maintenance

Provides resources to ensure facilities and fleets are at their optimal state.



### Execution & Funding

Offers funding opportunities and performance contracting assistance.

## Technical Areas

Facilities 

Fleets 

Grid 

# FEMP Support Moves Agencies Forward

Access off-the-shelf resources and request specialized support.



## Request Technical Assistance

FEMP’s project facilitators and technical experts learn about your needs and provide customized support.



## Access Tools

Available tools help collect data, assess resilience, identify opportunities for carbon pollution-free electricity, and much more.



## Join a Community

Communities are available for federal employees & industry stakeholders to share lessons learned and drive decision-making.



## Apply for Funding & Access Support

\$250M in AFFECT funding is available as well as performance contracting support.



## Get Recognition

Nominate individuals, projects, and sites for a variety of available federal recognition programs.



## Take Training

On-site, in-person, and on-demand FEMP-delivered training supports an informed, capable workforce.

### FEMP Tools & Support

-  Smart Facility Accelerator
-  FEDS Spotlight
-  REopt
-  ESPC
-  Technical Resilience Navigator
-  Federal Utility Partnership Working Group
-  Re-tuning Trainings
-  EVI Locate
-  UESC
-  CDF Calculator
-  Treasure Hunts
-  Interagency Task Force
-  Federal Energy & Water Management Awards
-  Energy Exchange
-  AFFECT Funding
-  Electricity Procurement Analysis and much, much more...

# What is Resilience?



## RESOURCEFULNESS

Preparedness with optimized performance of energy and water systems and adequate planning, personnel training, and testing to manage through a disruption



## REDUNDANCY

Availability of back-up resources and islandable onsite generation systems that enable continuity to critical loads during primary system disruptions

# ENERGY & WATER RESILIENCE



## ROBUSTNESS

Ability to maintain critical operations during a disruptive event through building, infrastructure, and redundant system design, as well as system substitution capability



## RECOVERY

Ability to return to normal operating conditions as quickly and efficiently as possible after a disruption

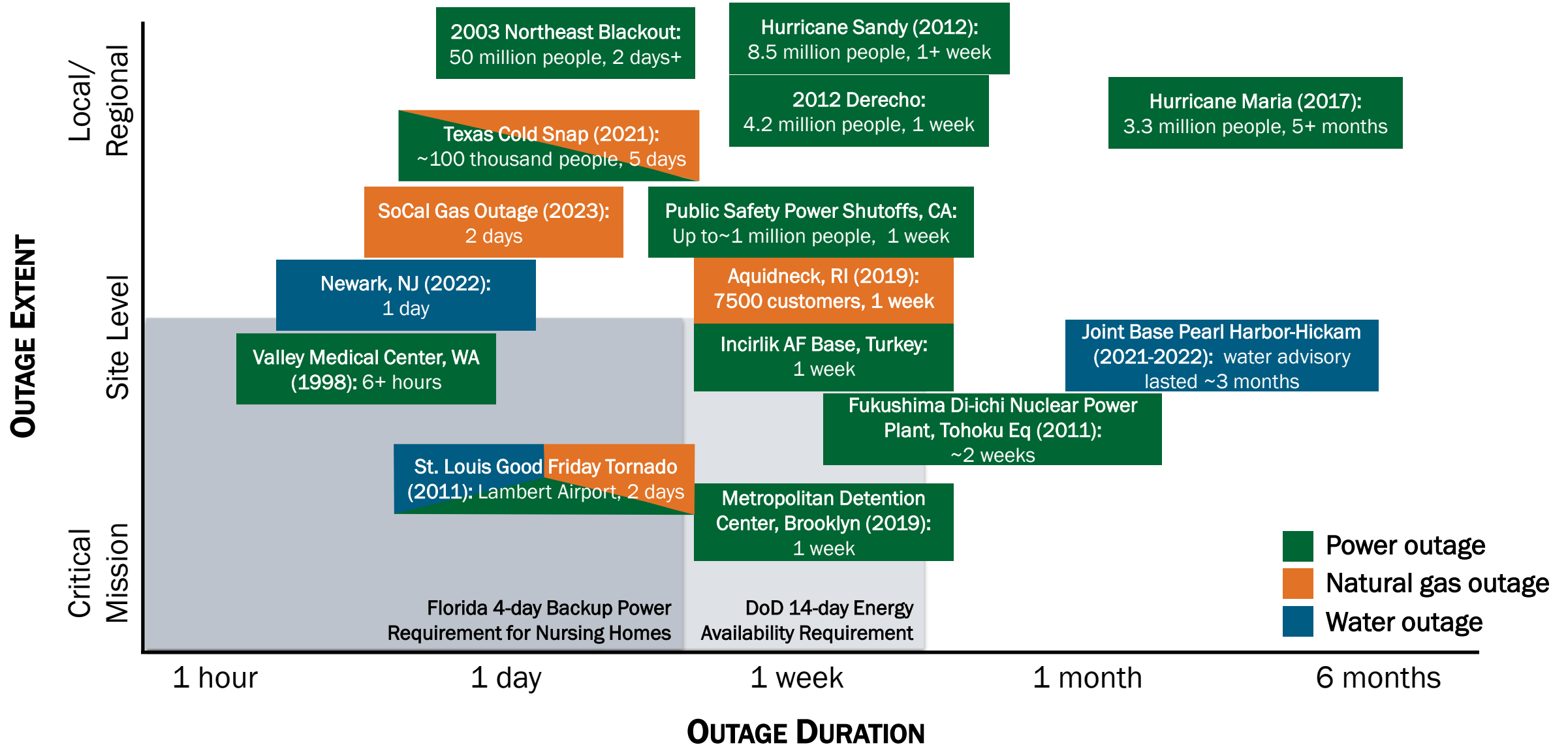
# Enhancing Resilience Through Energy and Water Management

Resilience is the ability to anticipate, prepare for, and adapt to changing conditions; to withstand, respond to, and recover rapidly from disruptions through adaptable and holistic planning; and to develop resilience solutions that address operational, institutional, and technical gaps.



\* The Technical Resilience Navigator focuses on energy and water resilience

# Energy and Water Resilience is Increasingly Important



# FEMP Resilience Program Offerings

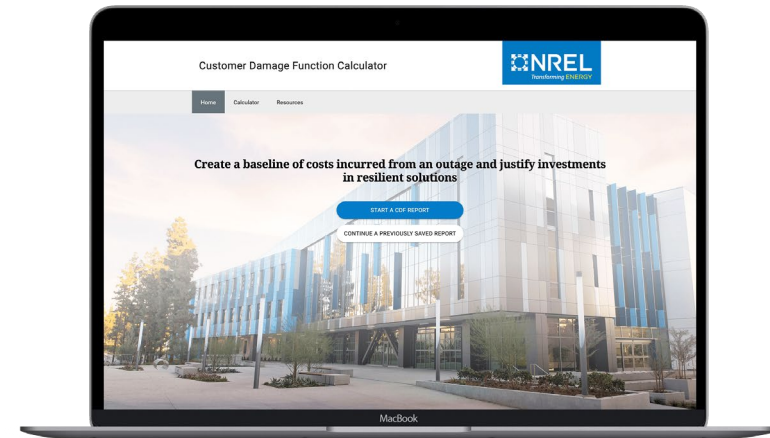
## Resilience Planning

- Agency agnostic tools and resources to guide stakeholders through the process of assessing and implementing projects that enhance site resilience



## Resilience Valuation

- Tools and frameworks to help stakeholders better quantify the benefits from resilience projects or measures



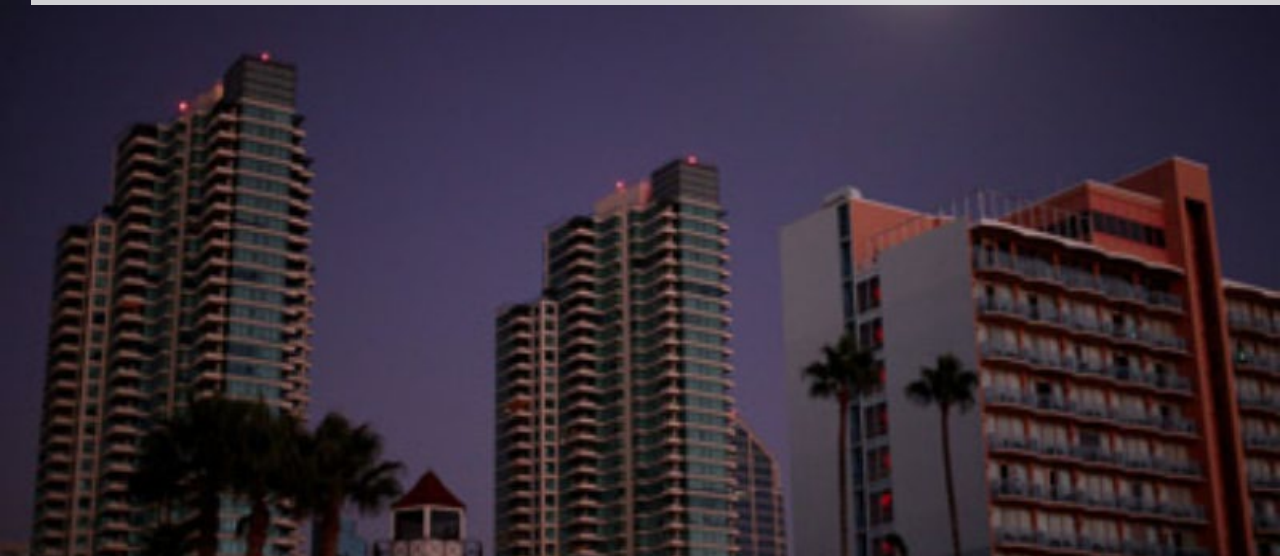
# Resilience Planning & Risk 101

Hannah Rabinowitz, Pacific Northwest National Laboratory





Federal agencies seek to ensure their facilities and operations adapt to and are increasingly resilient to possible threats (intentional) and hazards (accidental or uncontrollable).





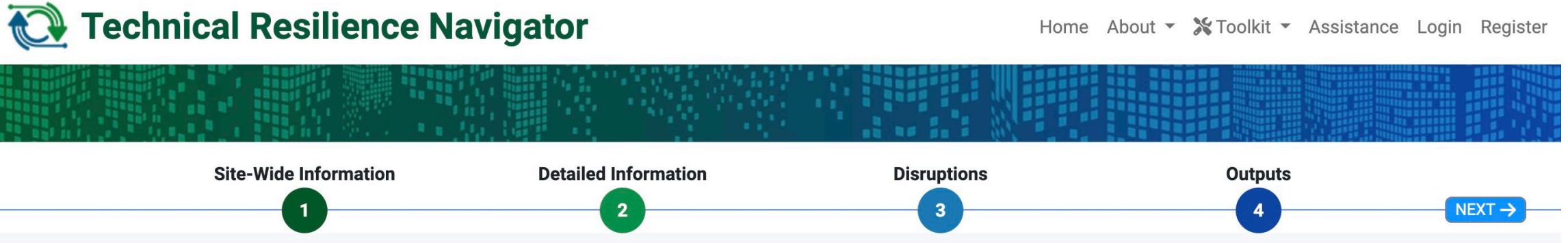
# Achieving Resilience Through Proactive Planning

A site that is energy and water resilient has:

- ★ Optimized systems and operations
- ★ Identified risk, consequences, and cost
- ★ Trained personnel and capabilities
- ★ Actionable strategies to achieve diverse solutions



# Site Resilience Planning Tool: TRN Lite



## Key Outcomes

- Identify site hazards and vulnerabilities in site energy & water systems
- Establish relative risk from different sources
- View potential solutions auto-generated based on key risk drivers

# Risk Informed Resilience Planning

**What can go wrong?**

*(A scenario)*

**How likely is it?**

*(A probability or frequency)*

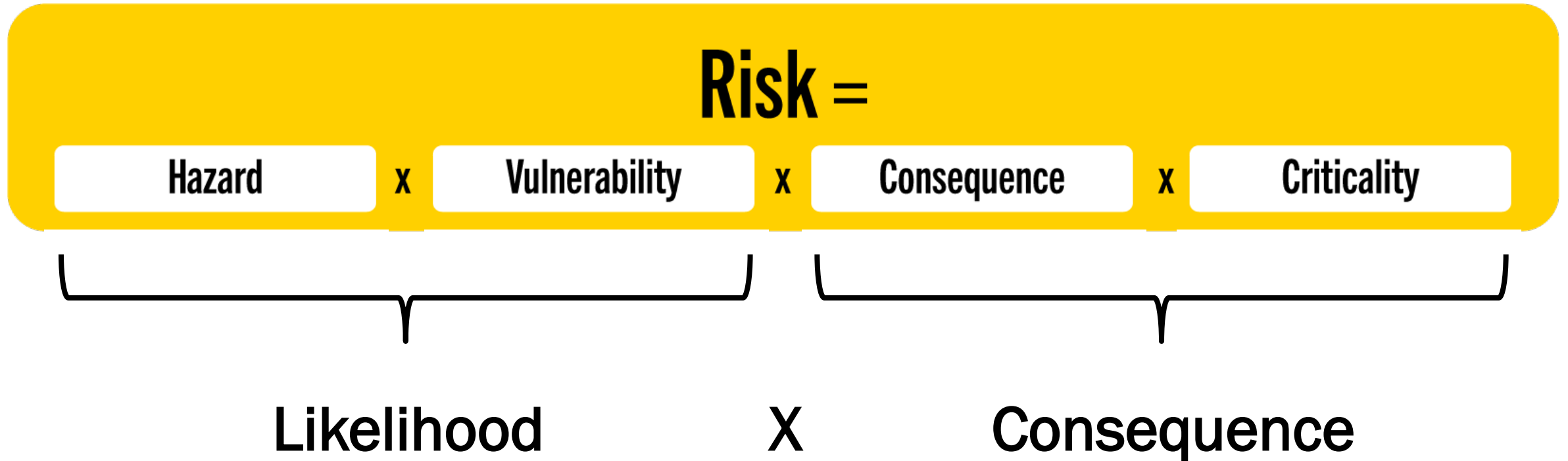
**How bad would it be?**

*(A consequence severity)*

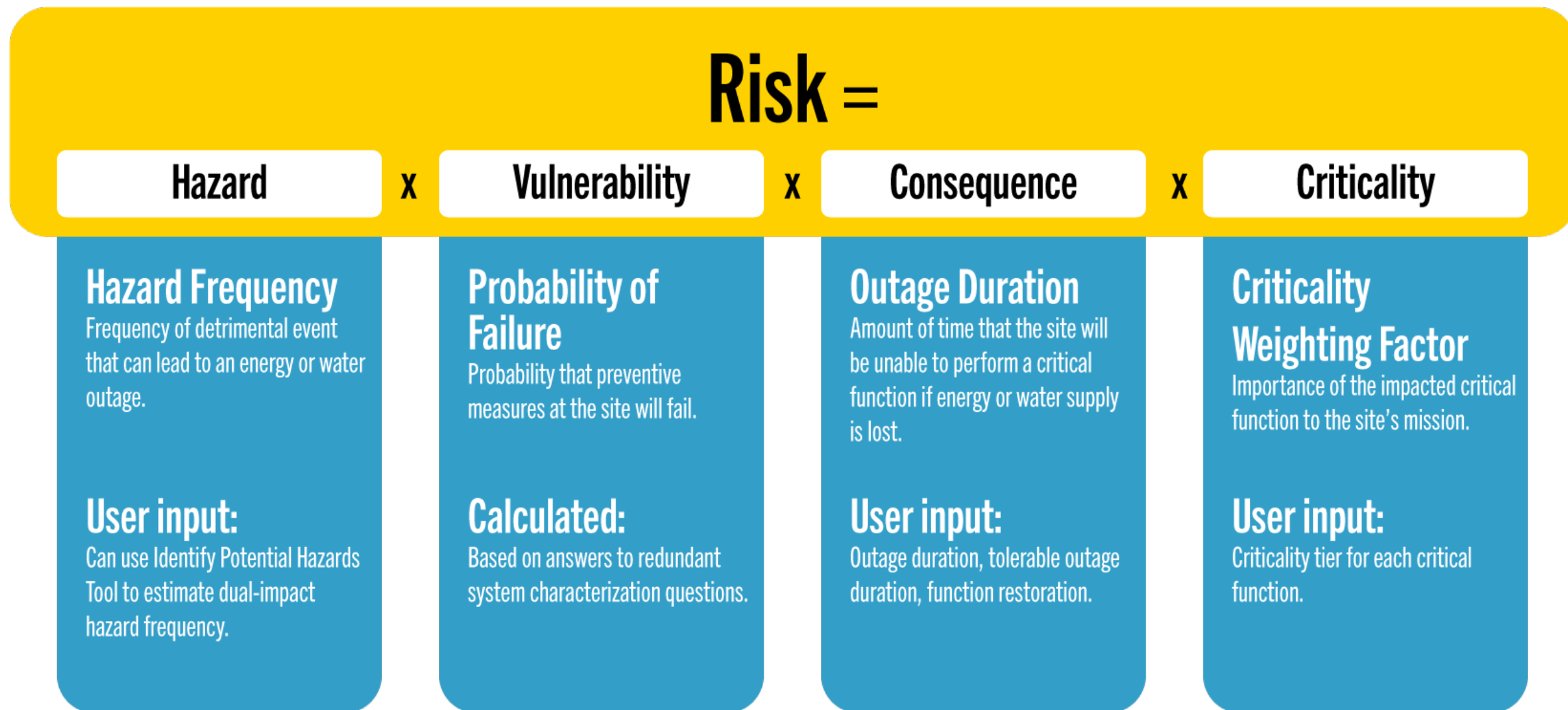
The TRN Lite follows best practices in risk assessment.

By identifying drivers of risk, users can focus on creating solutions in areas likely to have the biggest impact.

# Risk Methodology



# Risk Methodology



# Estimating Risk Inputs and Interpreting Risk Outputs

## Risk Inputs

- Inputs include direct numerical entry, Y/N selections, and selections from dropdown menus
- Expected to be approximate, based on informed judgement by subject matter experts
- Inputs can be refined as additional information is collected

## Risk Outputs

- Risk ranking allows identification of key risk drivers, including
  - Critical functions
  - Critical loads
  - Hazards
  - Facilities
- Allows the development of solutions to target areas that have the highest potential to reduce energy and water risk at the site



# TRN Lite Overview

Doug Elliott, Pacific Northwest National Laboratory

# History & Benefits

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- FEMP's energy and water resilience program responded to agency needs and Congressional direction to provide resilience planning tools and resources to help with site-level resilience planning
- By identifying major sources of risk to energy and water consuming loads, the TRN enables federal sites to develop targeted resilience solutions
- The TRN Lite builds on this work by streamlining the inputs and automating outputs from the process
  - Follows the same risk methodology as the full TRN
  - Fewer inputs helps to reduce the time needed to generate results

# TRN vs. TRN Lite

TRN	TRN Lite
Most sites take 6+ months to complete	Anticipated to take 1-4 hours to complete
Goes through a detailed resilience assessment process	Streamlined data inputs (omits some required inputs including energy and water requirements; requires a less formal stakeholder interview process)
Includes formal sensitivity analysis capabilities	Easy to quickly change data inputs, allowing for quick assessment of the impacts of different inputs on results
Provides graphical and tabular representation of risk drivers	Additional visual analytics of risk drivers, allowing for drivers to be assessed from multiple perspectives
Helps users identify risk drivers (i.e., critical loads and hazards that drive risk)	Identifies risk drivers and proposes potential resilience solutions that can address them
Solutions are developed and tailored for site energy and water requirements, then evaluated and prioritized for risk reduction potential, emissions impact, site-specific criteria, and cost	Does <b>not</b> include solution prioritization actions nor project development and financing actions



Site-Wide Information

1

Detailed Information

2

Disruptions

3

Outputs

4

[NEXT →](#)

The TRN Lite is a streamlined version of the Technical Resilience Navigator. Following the same methodology, the TRN Lite provides users with a faster resilience assessment by reducing the number of inputs required relative to a complete TRN assessment. The TRN Lite ends with a short-list of potential solutions based on key risk drivers identified in the risk assessment. For a comprehensive solution development effort that includes institutional considerations and allows users to review and prioritize solutions based on potential resilience benefits, complete a full TRN assessment as your next step.

[Start Now](#)



Technical Resilience Navigator is a resource of the U.S. Department of Energy Federal Energy Management Program.

[Contact Us](#) | [Federal Energy Management Program](#) | [Office of Energy Efficiency & Renewable Energy](#) | [Security & Privacy](#)

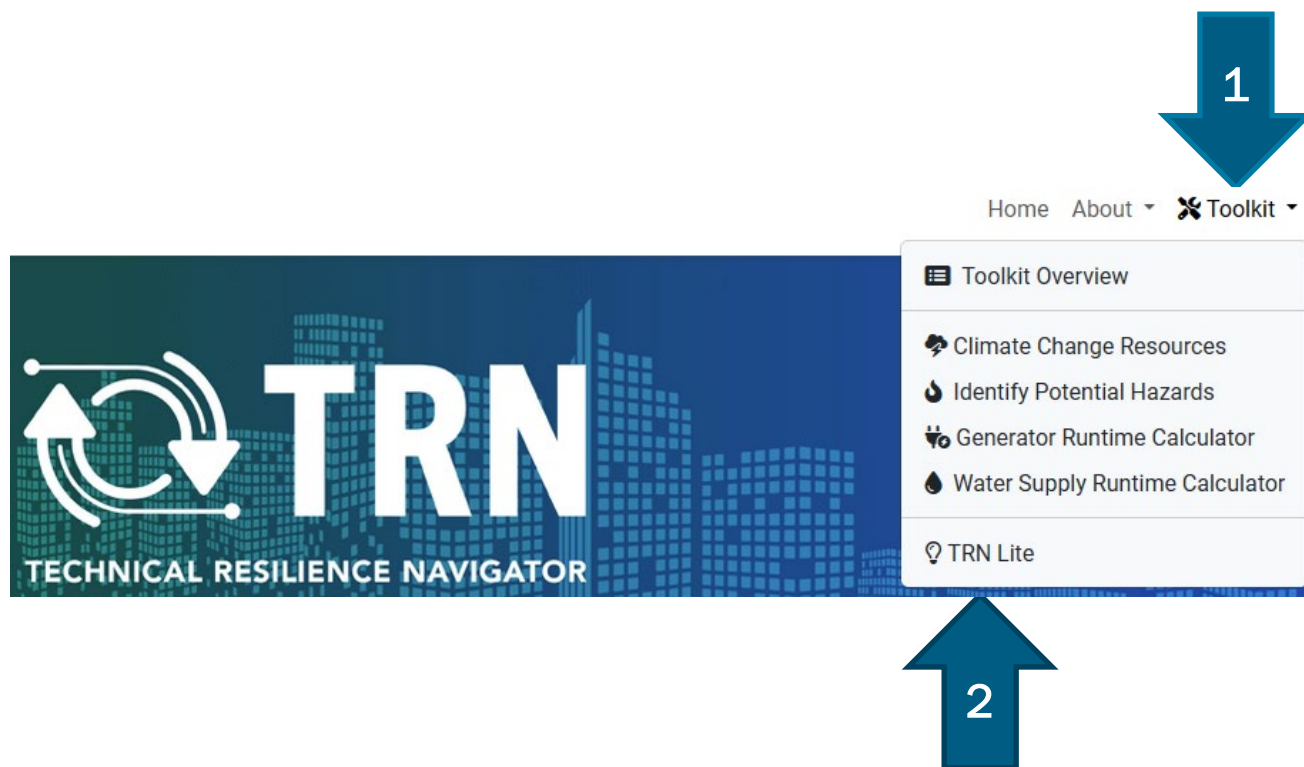
# TRN Lite – Data and Time Requirements

- TRN Lite assessment should take ~ 0.5 days
- To speed up your TRN Lite assessment, you'll need the following information readily accessible
  - Flood zone data
  - Lists of critical functions, critical loads, facility names, energy and water redundant systems
  - Redundant system design documents
  - Historical hazard information
  - Critical function restoration plans
- If this data is difficult to obtain, estimates from informed subject matter experts can also work

# Getting Started

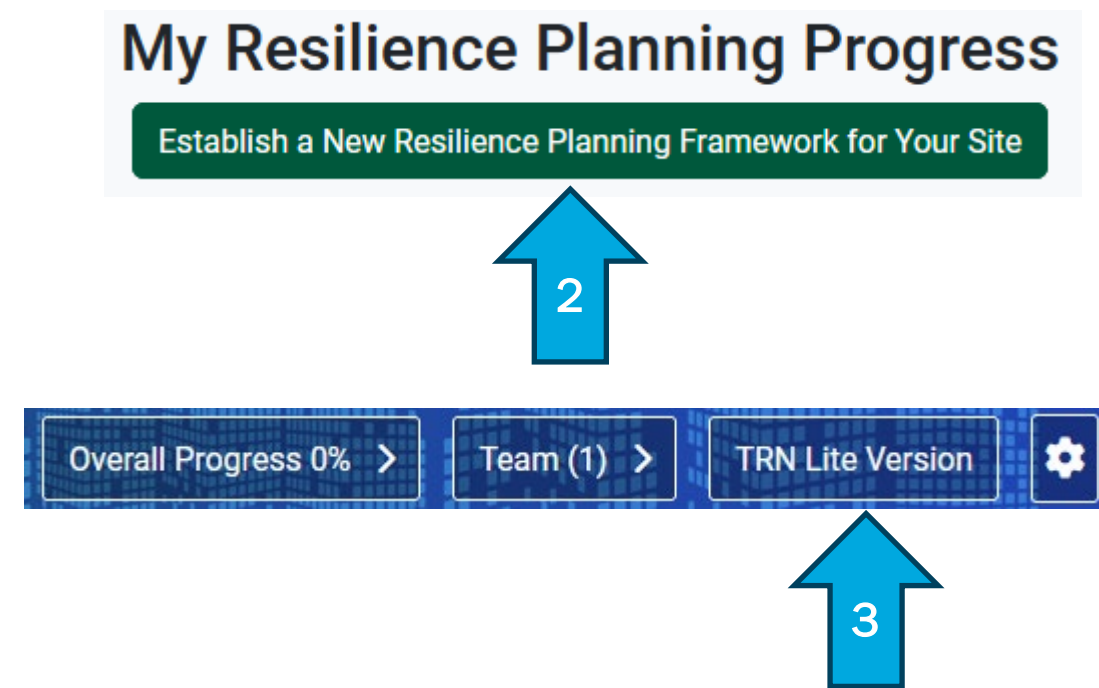
## To try (no login required):

1. Visit [trn.pnnl.gov](https://trn.pnnl.gov) and click “Toolkit”
2. Click “TRN Lite”



## To actively use tool/save data:

1. Visit [trn.pnnl.gov](https://trn.pnnl.gov) and log in
2. Establish a new Framework
3. Click “TRN Lite Version”



# TRN Lite Web Application: Tips & Tricks

## Security

- To save data or work collaboratively, all team members must create TRN accounts
  - Don't forget to validate your email address!
- Don't enter sensitive data into TRN Lite web forms
- Downloadable option available

## Tool Tips

- Provide additional considerations and background information helpful to inputting data
- Represented by question marks next to take headers

The screenshot shows the 'Redundant Systems' section of the TRN Lite web application. The interface includes a progress bar at the top with four steps: 1. Site-Wide Information, 2. Detailed Information (current step), 3. Disruptions, and 4. Outputs. Below the progress bar, there are four sub-sections: Critical Loads, Restoration Plans, Redundant Systems (highlighted), and Map to Critical Loads. The 'Redundant Systems' section contains a text prompt: 'Does the site have any redundant energy or water systems? If so, click "Add Redundant System" and provide information on its characteristics. Each redundant system should have a unique name.' Below this is a table with the following columns: Redundant System, Time to Initiate (hrs), Estimated Run Time (hrs), and Start-Up Responses. A tooltip points to the 'Time to Initiate' column header, stating: 'This is how long the critical load requirements can be supplied with the current redundant system and its stored or otherwise available energy or other resources.' The table has one row with the following data: Diesel generator B, 1, 120, and a list of start-up responses: 'Written schedules and procedures are in place and followed', 'Documentation of maintenance and testing', 'Manual start-up', and 'No written, up-to-date start-up procedures with training'. An 'Edit' button is located at the end of the row.

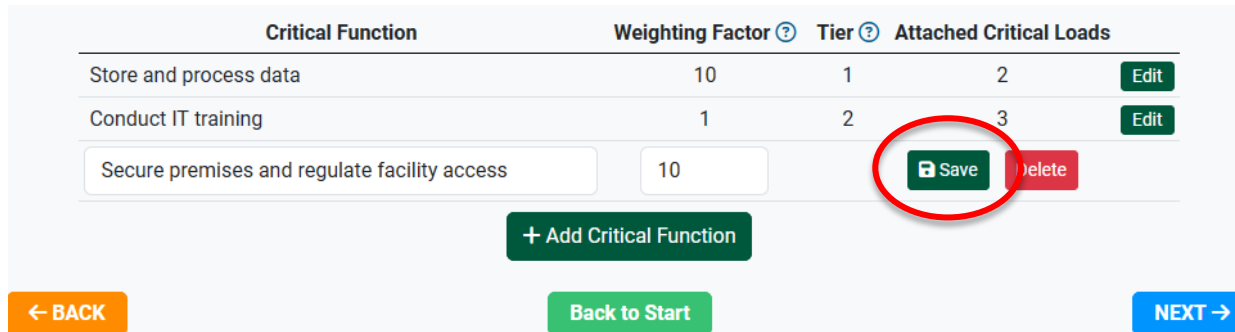
Redundant System ?	Time to Initiate (hrs) ?	Estimated Run Time (hrs) ?	Start-Up Responses
Diesel generator B	1	120	<ul style="list-style-type: none"><li>Written schedules and procedures are in place and followed</li><li>Documentation of maintenance and testing</li><li>Manual start-up</li><li>No written, up-to-date start-up procedures with training</li></ul>



# TRN Lite Web Application: Tips & Tricks

## Saving Data

- Remember to press save on data input forms before changing tabs/pages!

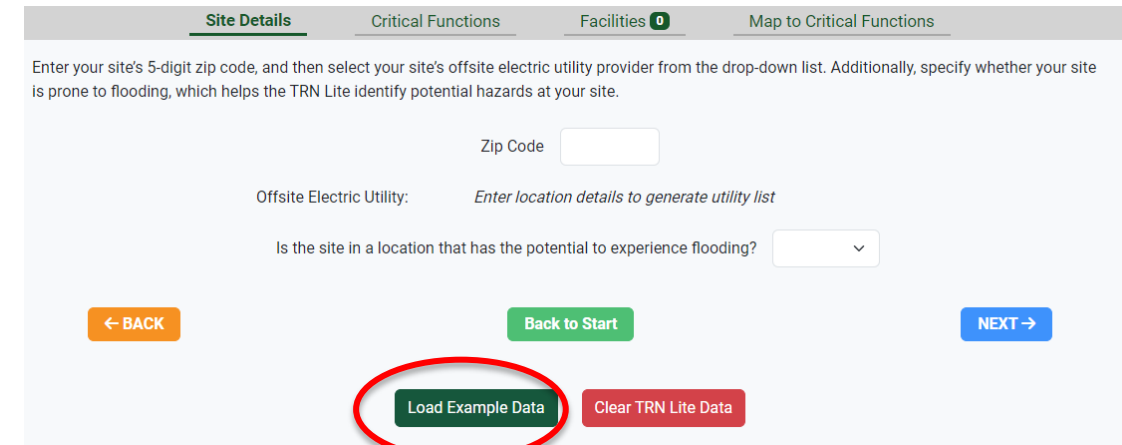


Critical Function	Weighting Factor ?	Tier ?	Attached Critical Loads
Store and process data	10	1	2
Conduct IT training	1	2	3
Secure premises and regulate facility access	10		

Buttons: ← BACK, + Add Critical Function, Back to Start, NEXT →, Save, Delete, Edit

## Example Data

- Notional example Department of Energy office site in Spring, TX
- Helps users understand what:
  - Inputs they can expect to enter
  - Outputs and insights they can expect to gain



Site Details | Critical Functions | Facilities 0 | Map to Critical Functions

Enter your site's 5-digit zip code, and then select your site's offsite electric utility provider from the drop-down list. Additionally, specify whether your site is prone to flooding, which helps the TRN Lite identify potential hazards at your site.

Zip Code:

Offsite Electric Utility:

Is the site in a location that has the potential to experience flooding? ☐

Buttons: ← BACK, Back to Start, NEXT →, Load Example Data, Clear TRN Lite Data

# TRN Lite Web Tool Demo

Kathryn Otte, Pacific Northwest National Laboratory

# Learn More at...

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- **TRN Lite**
  - <https://trn.pnnl.gov/lite>
- **TRN**
  - [Technical Resilience Navigator Overview](#)
  - [Technical Resilience Navigator – Risk Assessment Overview](#)
  - [Developing and Prioritizing Resilience Solutions within the Technical Resilience Navigator](#)
- **Climate Resilience**
  - [Climate Change Considerations: Energy and Water Resilience Planning](#)

# Getting Assistance with the TRN Lite

Ethan Epstein. U.S. Department of Energy

# Pilots & Technical Assistance

- **FEMP is actively working with agencies to pilot the TRN Lite**
  - Partner sites are receiving one-on-one assistance, including in-person site visits to help enter data and interpret findings
- **FEMP has funding available to support sites interested in completing a TRN Lite assessment**
  - Both in-person and virtual support are available
  - FEMP provides subject matter expertise while agency provides team of site-specific experts
  - During TA, FEMP links agency participants to other FEMP resources and opportunities to support project implementation

# Benefits of Technical Assistance

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- Savings to your site by partnering with FEMP
- Quicker assessments
- Identification of a wider variety of resources
- Access to subject matter experts in risk and resilience analysis

# POCs for Technical Assistance

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- **FEMP Technical Assistance Request Portal**
  - <https://www7.eere.energy.gov/femp/assistance/>
- **Ethan Epstein**
  - [ethan.epstein@hq.doe.gov](mailto:ethan.epstein@hq.doe.gov)
- **PNNL Team – Julia Rotondo**
  - [julia.rotondo@pnnl.gov](mailto:julia.rotondo@pnnl.gov)



# Q&A

Julia Rotondo, Pacific Northwest National Laboratory

# Notice

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# FEMP 50 – A Celebration of Federal Energy Management



- Celebrate 50 years of Federal Energy Management with a week of accredited training, collaborating, and celebrating success!
- Training sessions focus on FEMP successes, current programs, historic retrospective
- Registration will be required and limited for in person

Tuesday September 12 (Hybrid)	
9:30 – 10:45 AM	Welcome (In-person & Virtual)
11:00 – 12:00 PM	Tools and Resources to Meet Agency Goals (In-person & Virtual)
12:00 – 12:30 PM	Break
12:30 – 2:00 PM	Concurrent Workshops & Meet-Ups
2:30 – 4:30	Leadership Remarks & FEDS Spotlight
4:30 – 5:00	DOE Atrium Reception
5:00 – 7:00 PM	No Host Networking
Wednesday September 13 (Virtual)	
10:00 – 11:30 PM	Decarbonization, Electrification, and CFE
11:30 – 12:30 PM	Break
12:30 – 2:00 PM	Concurrent Workshops & Meet-Ups (In-person)
12:30 – 2:00 PM	Advancing Federal Energy and Water in a Changing Climate
2:30 – 3:30 PM	Building Design, Data, and Performance
3:30 – 4:30 PM	Utility Engagement & Performance Contracting for Decarbonization and CFE Goals
5:00 – 7:00 PM	No Host Networking (In-person)

September 12 – 13, 2023, Washington, D.C. and Virtual



March 26 - 28 2024  
Pittsburgh, Pennsylvania

### At Energy Exchange 2024, you will:

- Hear federal leadership's key priorities and insightful solutions
- Attend agency-driven trainings to understand and address dynamic and growing challenges
- Collaborate with peers and agencies during dedicated networking opportunities
- Explore new and innovative technologies from industry experts at the Trade Show



**Registration opens soon!**

For more information, visit  
**[Energy-Exchange.com](https://Energy-Exchange.com)**

**Interested in starting your resilience planning journey?**

**Visit [trn.pnnl.gov](https://trn.pnnl.gov) today!**