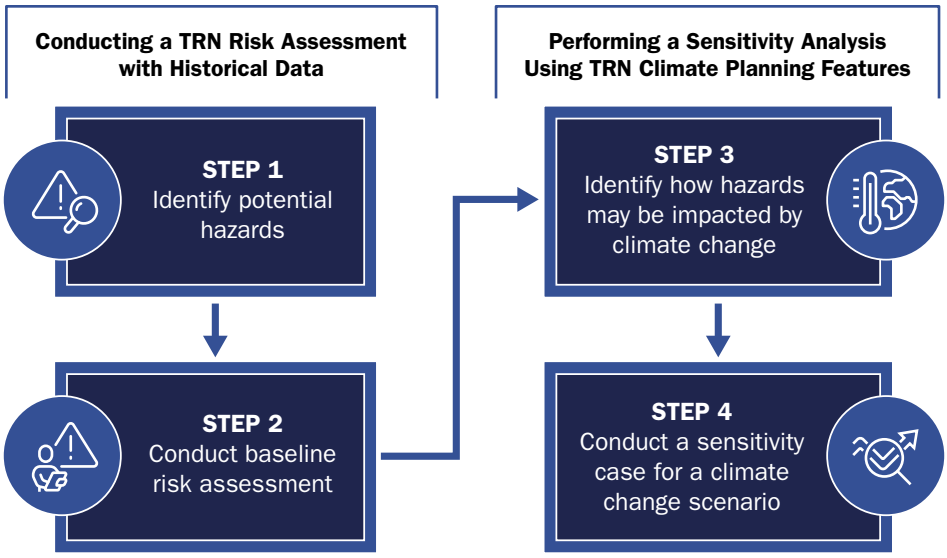
FEMP
Federal Energy Management Program

Using TRN Resources to Incorporate Climate Change in Resilience Assessments

The Technical Resilience Navigator (TRN) is a resilience planning webtool that helps users assess risks to a site's critical functions from energy and water utility disruptions and develop solutions that reduce risk. The disruptions considered may include hazards that could be impacted by climate change. The TRN recently added a new "Climate Change Resources" tool to supplement the existing "Identify Potential Hazards" tool (both accessible via the Toolkit menu at trn.pnnl.gov). Together, these two tools allow users to 1) identify the likely annual frequency of relevant natural hazards at a site that may impact energy and water infrastructure based on historical data, and 2) access state, regional, and national resources on climate change with information about how climate change may affect these hazards. This document provides current and potential TRN users with a step-by-step guide to accessing and incorporating climate change information into site resilience planning. By doing so, users may improve their site's ability to anticipate, prepare for, and adapt to changing conditions, as well as withstand, respond to, and recover rapidly from disruptions.



This fact sheet discusses how, over the course of four steps (see above figure), a current or potential TRN user can:

- Access national and state-level resources on climate change
- Find key information within climate change resources
- Apply this information within the TRN to generate risk results informed by climate change

Conducting a TRN Risk Assessment with Historical Data

Step 1: Identify Potential Hazards

To identify the potential hazards that could impact a site and their historical frequency, use the TRN's "Identify Potential Hazards" tool. Enter the zip code, and the tool will show the hazards that have historically affected that area. Additionally, the annual frequencies of these hazards (based on data from Federal Emergency Management Agency's National Risk Index) is displayed. Click the first check box to see the hazards that have the potential to be impacted by climate change, based on the 4th National Climate Assessment. To determine the projected frequency or severity of these hazards under a climate change scenario, additional research is necessary (see Step 3).

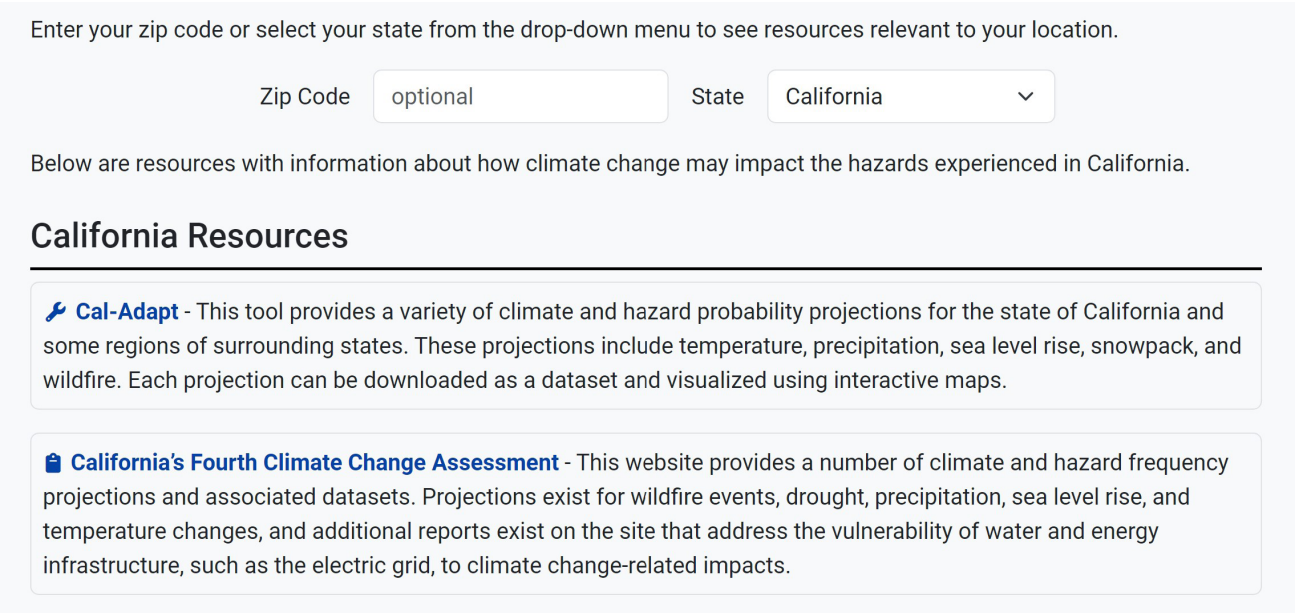
Step 2: Conduct Baseline Risk Assessment

Collect data based on current and historical site information and hazard occurrences and conduct risk analysis to generate baseline risk results for a site. There are several resources available within the TRN to help walk users through the risk assessment. The key hazard information required for a risk analysis are the frequency and severity of the hazard. In the TRN, severity is represented by the duration of an outage that could be caused by the hazard. After inputting all required data, users can view baseline risk results, including key risk drivers.

Performing a Sensitivity Analysis Using TRN Climate Planning Features

Step 3: Identify how Hazards may be Impacted by Climate Change

The TRN's "Climate Change Resources" tool can help to identify resources providing information about how hazards of interest may change in severity and frequency due to climate change. The tool does not include information on U.S. territories or international facilities. To see state-specific resources, enter a zip code or select the state from the drop-down menu.



TRN "Climate Change Resources" Tool: California State Resources

Out of the 50 U.S. states and the District of Columbia, 36 have produced state-level resources and some states have regional resources. In all cases, national-level resources that provide state- to county-level resolution information about climate projections for particular hazards are also provided.

These resources can be used to identify key information, including how the frequency or severity of relevant hazards may change in the future based on climate change projections. Some states also have webtools or other resources that can be used to view projection data.

With this data, a user can apply projected changes in hazard characteristics to the historical trends identified in Step 1 to build climate scenarios that can be evaluated in their risk assessment. If, for example, precipitation is expected to occur with higher frequency or intensity, it may be reasonable to characterize a climate scenario for risk assessment assuming that riverine flooding will become more frequent or severe in the future.

Step 4: Create a Sensitivity Case for a Climate Change Scenario

Once a user has investigated how climate change may lead to changes in the hazards expected to impact their site, a sensitivity analysis can reveal how the site's risk drivers may change under these different climate change scenarios. The TRN Risk Assessment Module's "Sensitivity Analysis" feature enables users to modify information about a site to identify if there are risk drivers that are persistent under multiple climate change scenarios and whether there are risk drivers that become more of a concern under specific scenarios. In each sensitivity case, the user can alter the frequency and duration of electrical, water, and natural gas outages at a given site in response to projected changes in the frequency and severity of various natural hazards. For example, if a climate sensitivity case indicates that riverine flooding will become a more significant risk driver under climate change, planners may want to prioritize hardening of onsite energy and water systems to flooding.

To do this analysis using the TRN Sensitivity Analysis feature, check "Update Dual-Impact Hazards" to modify estimates for outage durations and frequencies, relative to the base case. Enter the "Analysis" tab to see tables and graphs that compare risk drivers from climate change sensitivity cases to those identified in the base case or other sensitivity cases. For users working on a TRN Lite analysis, the Sensitivity Analysis feature can be accessed by creating a full TRN framework.

Conclusion

Understanding a site's baseline conditions and risk drivers is important for enhancing resilience. Taking future conditions into consideration at a site allows sites to develop forward-looking solutions to address their risk drivers. Through TRN's "Identify Potential Hazards" tool, "Climate Change Resources" tool, and Sensitivity Analysis feature, users can leverage climate-change-informed risk results to inform the development and prioritization of risk-reducing energy and water solutions.

Key Links

- Technical Resilience Navigator
- Technical Resilience Navigator Identify Potential Hazards
- Technical Resilience Navigator Climate Change Resources

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For more information, visit:
energy.gov/femp

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