# TRN Resource: Grouped Hazard Outage Frequency Values

## Overview

The grouped hazards and threats approach within the Technical Resilience Navigator (TRN) considers aggregate sets of hazards and threats that have the potential to impact energy and water supply systems. Rather than identifying specific hazards and threats and their individual frequencies, the aggregate frequency of all hazards and threats associated with a given outage duration is estimated.

Grouped hazard frequencies are likely to vary by region and site, so where possible, data entered in the TRN should reflect local data and experiences. However, if site-specific data are not available, this document provides frequency values that can serve as fallbacks. Note that the TRN screening analysis only includes frequencies greater than or equal to 1 in 1,000 years, so outage durations that are less frequent are not included in the tables below.

## Electricity

Based on an analysis of the United States Nuclear Regulatory Commission’s [Reactor Operational Experience Results](https://nrcoe.inl.gov/resultsdb/) and the [1987-2018 Loss of Offsite Power data](https://inldigitallibrary.inl.gov/sites/sti/sti/Sort_18393.pdf), the following values may be used in the Risk Assessment module if site-specific frequencies are not available or reliable for different electricity outage durations.

|  |  |
| --- | --- |
| **Outage Duration** | **Frequency of Occurrence** |
| 1 hour | Likely (once a year) |
| 1 day | Anticipated (1 in 10 years) |
| 1 week | Unlikely (1 in 100 years) |
| 1 month | Extremely unlikely (1 in 1,000 years) |
| 6 months | *<< 1 in 1,000 years* |

## Natural Gas

Data included in the report, [Assessment of Natural Gas and Electric Distribution Service Reliability](https://www.gti.energy/wp-content/uploads/2018/11/Assessment-of-Natural-Gas-Electric-Distribution-Service-Reliability-TopicalReport-Jul2018.pdf), indicate that natural gas outages are quite rare, particularly in comparison to electricity outages. Table 1 in the report suggests that planned and unplanned natural gas outages are roughly 1/100 as frequent as planned and unplanned electricity outages. Given that data, the following values may be used if site-specific frequencies are not available or reliable for different natural gas outage durations.

|  |  |
| --- | --- |
| **Outage Duration** | **Frequency of Occurrence** |
| 1 hour | Unlikely (1 in 100 years) |
| 1 day | Extremely unlikely (1 in 1,000 years) |
| 1 week | *<< 1 in 1,000 years* |
| 1 month | *<< 1 in 1,000 years* |
| 6 months | *<< 1 in 1,000 years* |

## Water

Similar data for water outages are not readily available. Additionally, water outages are likely to be highly dependent on local system factors such as infrastructure age, design and preventive maintenance practices. However, in general, it is anticipated that water outages are likely to be less frequent than corresponding electricity outages. The following values may be used if site-specific frequencies are not available or reliable for different water outage durations.

|  |  |
| --- | --- |
| **Outage Duration** | **Frequency of Occurrence** |
| 1 hour | Anticipated (1 in 10 years) |
| 1 day | Unlikely (1 in 100 years) |
| 1 week | Extremely unlikely (1 in 1,000 years) |
| 1 month | *<< 1 in 1,000 years* |
| 6 months | *<< 1 in 1,000 years* |