**CDF Calculator Checklist**

Collect Inputs Required for Analysis

In order to estimate the impact of not taking action, the organization can answer a number of questions posed by the Customer Damage Function (CDF) calculator. This will involve potentially leveraging previously collected Technical Resilience Navigator information and a series of interviews with various organization stakeholders such as facility managers, operations and maintenance staff, and mission personnel. These inputs revolve around questions related to three main topics:

1. The initial fixed cost incurred when the impacted facility or facilities lose electric/water service
2. Identification of what can spoil and over what duration (flow and stock costs)
3. Answers to questions about the continuing cost of an unusable facility.

By answering a series of questions for each main topic, the organization will start to get a picture of how costs could be incurred over time for a multi-day or even multi-week event. Using the checklist provided as part of creating a **Customer Damage Function**, this data can be collected.

Input Data into the CDF Calculator

The CDF calculator estimates the potential losses that result from inaction. If these losses present an unacceptable risk over time, then one or more resilience solutions should be implemented to address those risks.

After the data is collected, it can be used as inputs for the CDF calculator. The results are presented as a curve with the x-axis showing the duration of the outage and the y-axis showing the equivalent economic losses for that duration step. The CDF calculator estimates the risk of not acting versus using a resilience solution that will address all of the identified risks.

The goal is that the CDF calculator will allow the user to estimate the value of each resilience solution in terms of interruption duration and customer economic losses.

**Customer Damage Function Checklist**

One method to assess utility interruption costs is through customer surveys. There are existing customer surveys designed for certain sectors of the economy―mainly industrial, commercial, and residential. However, impacts will be very site specific, depending on the organizational needs and missions.

Surveys are associated with hypothetical scenarios that may vary in several ways (e.g., duration of outage, time/type of day, season). For this survey, two hypothetical scenarios were developed that vary in duration and emergency level at the base:

1. Scenario A: There is a power outage and the lack of power supply lasts for one hour, four hours, eight hours, or 24 hours. The site is not in an emergency situation.
2. Scenario B: There is an outage, and a natural disaster or terrorist attack event is simultaneously occurring in the area. The lack of power supply lasts for one hour, four hours, eight hours, or 24 hours; the site is under an emergency situation, and the site and its mission has to remain operational.

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Scenario A** | Outage due to minor event on the power grid | | | | | | | |
|  | 1 hour | 4 hours | 8 hours | 1 day | 1 week | 2 weeks | 1 month | 6 months |
| Mission and organizational impacts |  |  |  |  |  |  |  |  |
| Were mission-critical functions affected? If so, what was the cost? |  |  |  |  |  |  |  |  |
| What was the cost of restarting mission activities? |  |  |  |  |  |  |  |  |
| Were any human lives put in danger? |  |  |  |  |  |  |  |  |
| Was any equipment damaged? Repaired/replaced? Estimated cost? |  |  |  |  |  |  |  |  |
| Were any personnel ordered to remain or sent home? If so, how many? |  |  |  |  |  |  |  |  |
| Was the security of the base affected? |  |  |  |  |  |  |  |  |
| Other mission-related costs due to loss of power? |  |  |  |  |  |  |  |  |
| Infrastructure impacts |  |  |  |  |  |  |  |  |
| Did the natural gas, potable water, sewer systems, traffic/street/ parking lot lights, and alarms remain functional? If not, what was the cost? |  |  |  |  |  |  |  |  |
| Support personnel: Did the base have to pay overtime to police, firefighters, emergency response workers, or others to deal with the outage? If so, what was the cost? |  |  |  |  |  |  |  |  |
| Backup generators |  |  |  |  |  |  |  |  |
| How many of the backup diesel generators started? How long did it take? Did any backup systems fail to start? What was the impact? |  |  |  |  |  |  |  |  |
| What was the fuel cost of running the backup generators? |  |  |  |  |  |  |  |  |
| Commercial facilities | $7/kWpeak for the first hour |  | $20/kWpeak for 8 hours | $50/kWpeak for 24 hours |  |  |  |  |
| Were normal operating hours curtailed? If so, what was the economic impact? |  |  |  |  |  |  |  |  |
| Were any food/products spoiled? Estimated cost? |  |  |  |  |  |  |  |  |
| Residential facilities |  |  |  |  |  |  |  |  |
| What would base residents be willing to pay to avoid a similar outage in the future? |  |  |  |  |  |  |  |  |
| Other costs |  |  |  |  |  |  |  |  |
|  |  |  |  |  |  |  |  |  |
| **Scenario B** | Outage due to event on the power grid plus natural disaster or terrorist attack | | | | | | | |
|  | 1 hour | 4 hours | 8 hours | 1 day | 1 week | 2 weeks | 1 month | 6 months |
| Mission and organizational impacts |  |  |  |  |  |  |  |  |
| Were mission critical functions affected? If so, what was the cost? |  |  |  |  |  |  |  |  |
| What was the cost of restarting mission activities? |  |  |  |  |  |  |  |  |
| Were any human lives put in danger? |  |  |  |  |  |  |  |  |
| Was any equipment damaged? Repaired/replaced? Estimated cost? |  |  |  |  |  |  |  |  |
| Were any personnel ordered to remain/sent home? If so, how many? |  |  |  |  |  |  |  |  |
| Was the security of the base affected? |  |  |  |  |  |  |  |  |
| Other mission related costs due to loss of power? |  |  |  |  |  |  |  |  |
| Infrastructure impacts |  |  |  |  |  |  |  |  |
| Did the natural gas, potable water, sewer systems, traffic/street/ parking lot lights, and alarms remain functional? If not, what was the cost? |  |  |  |  |  |  |  |  |
| Support personnel: Did the base have to pay overtime to police, firefighters, emergency response workers, or others to deal with the outage? If so, what was the cost? |  |  |  |  |  |  |  |  |
| Backup generators |  |  |  |  |  |  |  |  |
| How many of the backup diesel generators started? How long did it take? Did any backup systems fail to start? What was the impact? |  |  |  |  |  |  |  |  |
| What was the fuel cost of running the backup generators? |  |  |  |  |  |  |  |  |
| Commercial facilities |  |  |  |  |  |  |  |  |
| Were normal operating hours curtailed? If so, what was the economic impact? |  |  |  |  |  |  |  |  |
| Were any food/products spoiled? Estimated cost? |  |  |  |  |  |  |  |  |
| Residential facilities |  |  |  |  |  |  |  |  |
| What would base residents be willing to pay to avoid a similar outage in the future? |  |  |  |  |  |  |  |  |
| Other costs |  |  |  |  |  |  |  |  |
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