

FEMA'S BENEFIT COST-ANALYSIS TOOL FOR GENERATORS

General Guidance

The purpose of this document is to provide potential subapplicants with general guidance on FEMA's Hazard Mitigation Assistance (HMA) benefit-cost analysis (BCA) tool. The BCA is a required subapplication component. This guidance is not intended to provide complete information, but rather to outline basic requirements and considerations as subapplicants begin the analysis process. Cal OES is available to answer technical questions about BCAs and can be contacted by e-mailing HMA@caloes.ca.gov.

Generator Benefit-Cost Analysis

Generators provide backup power to allow for continuous operation of a facility when the primary power source is interrupted. Power losses are unusual in the context of FEMA grant programs, because they are not related to any specific natural hazard, although high winds and wildfires are often associated with such events. These may also be random interruptions (caused by equipment failure, anomalous events such as animals chewing wires and mylar balloons contacting lines, and planned shutdowns by providers).

BCA Software and Methodology

FEMA requires the use of its BCA software (version 6 for all BCAs). Subapplicants can get the software by visiting [FEMA's Benefit-Cost Analysis Guidance and Tools website](https://www.fema.gov/media-library/assets/documents/179903): <https://www.fema.gov/media-library/assets/documents/179903>.

The methodology for completing BCAs for proposed backup power (generator) projects the "damage-frequency assessment" (DFA) approach. The basis of a DFA analysis is establishing a series of points of known correspondence between the frequencies of power interruption events and the damage they have caused, or may cause in the future. In the case of power interruptions, damages are limited to the loss of function at a facility. All the inputs and the ways that they are derived must be fully explained and documented in the materials submitted to OES as part of the subapplication package. See the notes below regarding documentation and a technical report.

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Data used in the Analysis

Data used in a BCA for a generator project is relatively straightforward. Such a BCA requires information about the frequencies and durations of power outages at the subject site, and specific data about the service provided by the facility. There are two main sources of information about the frequencies and durations of power outages. The first is information from the electric utility. Most utilities are required to issue annual system reliability reports, which can usually be obtained via internet searches. These are often called *System Average Interruption Frequency Index* and *System Average Interruption Duration Index (SAIFI and SAIDI)*. These have data about both when interruptions have occurred, and how long they lasted. These reports are generally very long, and divide systems into many sub-subsystems and circuits, so it is essential to use the correct data from the reports. It is also important to include the reports or germane subsections in the BCA materials that are submitted to Cal OES with the project subapplication.

The second most common source of power loss information is from the facility operator itself, though this is far less reliable than power provider records. When the latter are not available, facility operators may develop tables of power outages based on local knowledge or other records (such as when a portable generator is required). This information must include both the approximate power loss dates and the durations. In many cases this is simply estimated, as facility operators may not keep records of specific events.

A third potential source of power loss data is the utility planned shutoffs (Public Safety Planned Shutoffs). As of 2020, these are relatively new, but have been implemented in various parts of the State over the last year. At this point it is somewhat difficult to derive frequency data because of a short statistical period in which they have occurred, but this information may be useful as a supplement to other data in a BCA.

With regard to damages, the analyst must have facility-specific information as described in the subsection immediately below.

A **Damage-Frequency Assessment BCA** requires the following data.

1. A series of at least two relationships between the **frequency** of flood events and the **damages** associated with them.

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2. The **frequencies** of power loss events are somewhat difficult to determine in many cases. If the information gathered by the analyst includes the years in which power losses occurred, the easiest approach is to enter these in the appropriate place in the FEMA BCA software, and let the program calculate the frequency automatically.
3. In the case of power losses, **damages** are losses of function for public facilities (FEMA does not fund generators for private residences). The FEMA BCA software has default data for specific types of critical facilities (discussed above), and once the analyst has entered facility-specific information, the software will calculate the damages. In the case of non-critical facilities, the damages are based on the annual budget of a facility, and the analyst must have this information as part of the BCA. All the information entered in this phase of the BCA must be fully documented.
4. The estimated effectiveness of the proposed generator project – see subsection below.
5. Project cost and project maintenance cost.

Benefits

Benefits of generator projects are avoided losses of function when power is lost. For example, if a utility cannot pump water when power is lost, then the benefit of a generator is continuous water supply to customers. The same idea applies to other public operations and facilities, such as electric power, sewage treatment (and associated pumping, police, fire and EMS services). The FEMA software provides default information about the value of these services, and the analyst needs only to provide a few basic inputs such as the number of customers served (utilities) and the area served and distance to the nearest analogous service (police, fire and EMS). These values must come from a valid source, and must be documented.

Project Useful Life and Project Effectiveness

The project useful life for generators is 19 years, per FEMA and OMB guidance. In rare cases, this value may be greater, but any deviation from the 19-year figure must be documented in detail with information from a qualified source, and there is no guarantee FEMA reviewers will accept variations. OES strongly suggests that subapplicants use the 19-year figure unless there is a significant reason not to. FEMA offers no guidance on the project effectiveness of generators. Effectiveness has two components. The first of these is whether the

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generator provides full power to a facility, or only emergency minimal power. If the generator does not provide full power, then the analyst may use a partial loss of function. The other element in effectiveness is how long the generator is effective, i.e. how long will it run. This is generally a function of the fuel source – if the fuel is a continuous feed of natural gas or if diesel or propane fuel sources are replenished, then the effectiveness is 100%. If fuel is limited and cannot be replenished, then the effectiveness of a generator in the BCA should be adjusted accordingly, i.e. after a certain period of time, then power is once again lost to a facility.

Documentation

Cal OES and FEMA require subapplicants to provide documentation for all data that is used in a BCA. This must be included with the materials that are submitted as part of the application package.

Best Practices

Cal OES strongly recommends that each subapplicant BCA be supplemented by a brief technical report that summarizes the approach to the analysis, the data that was used, the sources of the data, and the results of the analysis.

Subapplicants should provide electronic copies of any data sources that are used in a BCA, such as power loss records (see discussion above).

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