Unit 8

BCAs for Drought Mitigation, Generators,
and Other Types of Projects

Objectives

At the end of this unit, participants will be able to:

- Explain BCA data and documentation requirements for drought mitigation, generators, and other types projects
- Complete a drought mitigation BCA
- Complete a generator BCA

Scope

- Unit 8 Overview & Objectives
- Drought mitigation project basics
- Drought mitigation BCA: BCA Toolkit Exercise and data input overview
- Generator project basics
- Generator BCA: BCA Toolkit Exercise and data input overview
- Overview of how to do BCAs for other hazards/project types not previously covered
- Unit 8 Review

Methodology

This unit will be delivered as an in-person classroom course, and will use a combination of lecture and discussion.

The instructor will introduce the unit and then go through each slide, pausing for questions and short discussion if needed. The instructor should also prompt students to follow along in their Student Manuals.

BCA Toolkit Exercise/Case Studies

When the "BCA Toolkit Exercise" slides appear in the presentation (see Figure 1 below), the instructor should open the BCA Toolkit and have the students also open the Toolkit on their computers. The instructor should then guide the students through completing data entry for the project type(s) being discussed, using the slides that follow to describe the data inputs for that project type. As you enter values into the Toolkit, make sure to point out the comment boxes and show how a user would enter a comment describing where they obtained the value and referring the reviewer to the appropriate document in their project application.

Note that once a particular data input is covered in a slide (or earlier unit) it is not covered again in subsequent project type exercises.

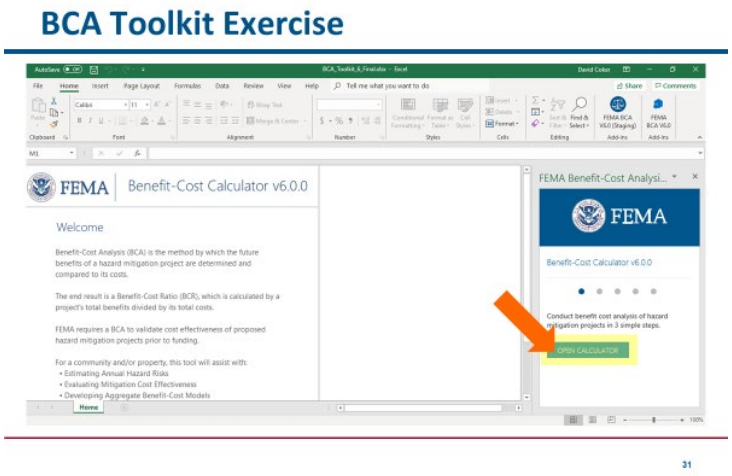


Figure 1: BCA Toolkit Exercise slide

Several case studies are provided as supplements to the training material and may be downloaded at https://www.fema.gov/benefit-cost-analysis. These case studies may be used during the BCA Toolkit exercise portions of the unit. However, instructors are encouraged to use examples from their own Regions or states if appropriate. Students are also encouraged to use projects they might be working on and have the instructors and other students offer suggestions on how to input the data in the BCA Toolkit.

Time Plan

A suggested time plan for each topic in this unit is shown below. More or less time may be required, based on the experience level of the group.

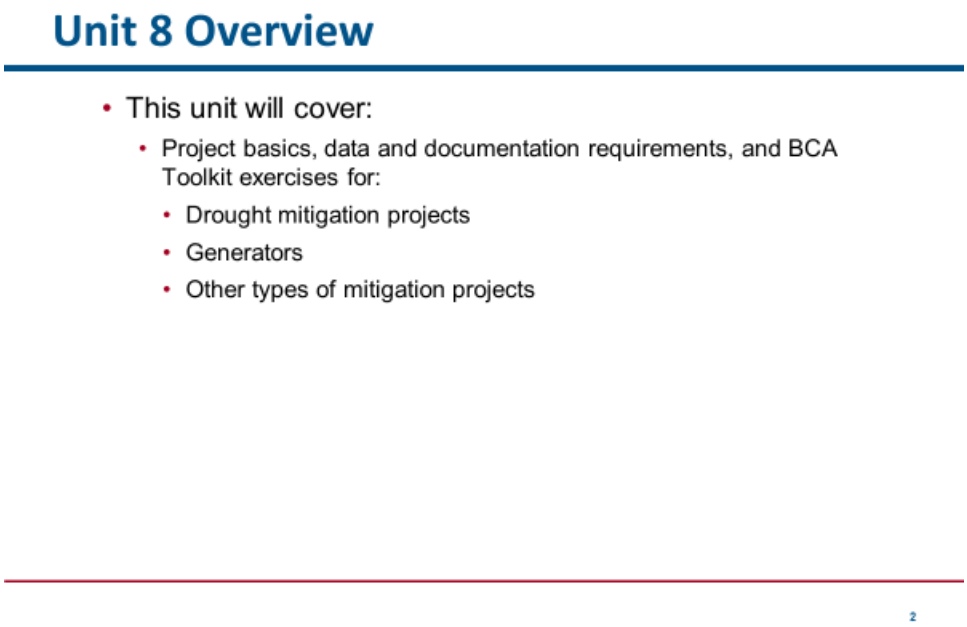
- Unit 8 Overview & Objectives (5 minutes)
- Drought mitigation project basics (10 minutes)
- Drought mitigation BCA: BCA Toolkit Exercise and data input overview (20 minutes)
- Generator project basics (10 minutes)
- Generator BCA: BCA Toolkit Exercise and data input overview (30 minutes)
- Overview of how to do BCAs for other hazards/project types not previously covered (10 minutes)
- Unit 8 Review (5 minutes)

Total Time (Estimated): 1 hour 30 minutes

Materials

- Unit 8 Visuals
- Unit 8 Instructor Guide
- Unit 8 Student Manual
- Computer/BCA Toolkit Version 6.0

Unit 8 Overview



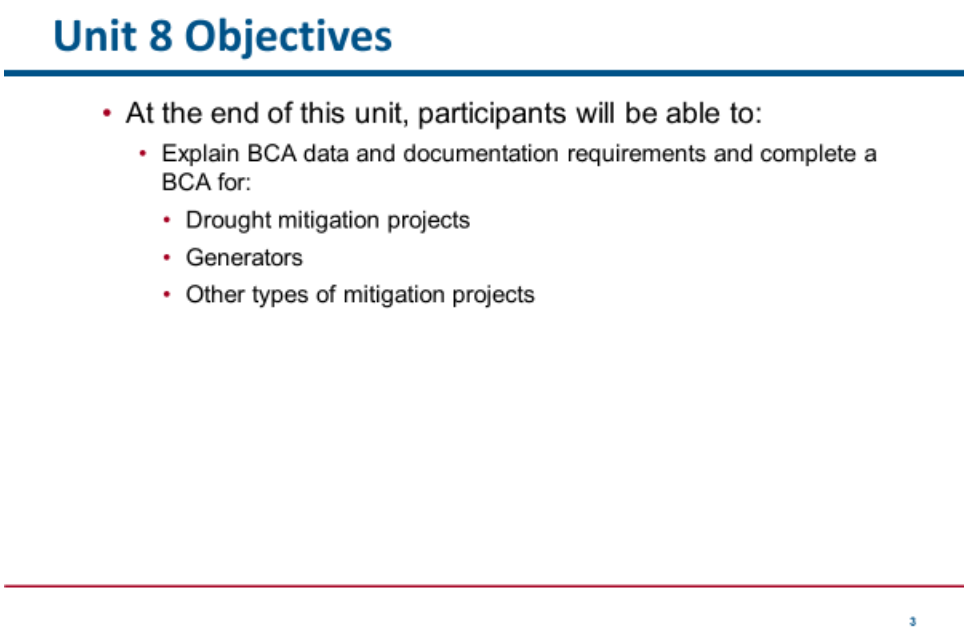
Visual 1: Unit 8 Overview

Instructor:

This unit will cover:

- Project basics, data and documentation requirements, and BCA Toolkit exercises for:
  - Drought mitigation projects
  - Generators
  - Other types of mitigation projects

Unit 8 Objectives



Visual 2: Unit 8 Objectives

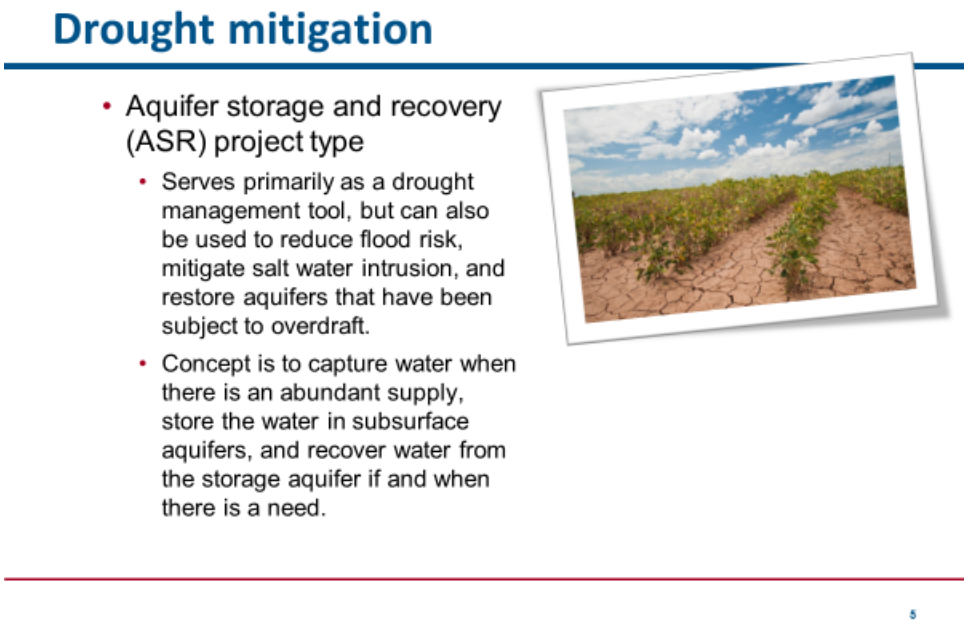
Instructor:

Unit 8 has several objectives. At the end of this unit, students should be able to:

- Explain BCA data and documentation requirements for drought mitigation and generator projects
- Complete a drought mitigation BCA
- Complete a generator BCA

Drought mitigation projects

Drought mitigation



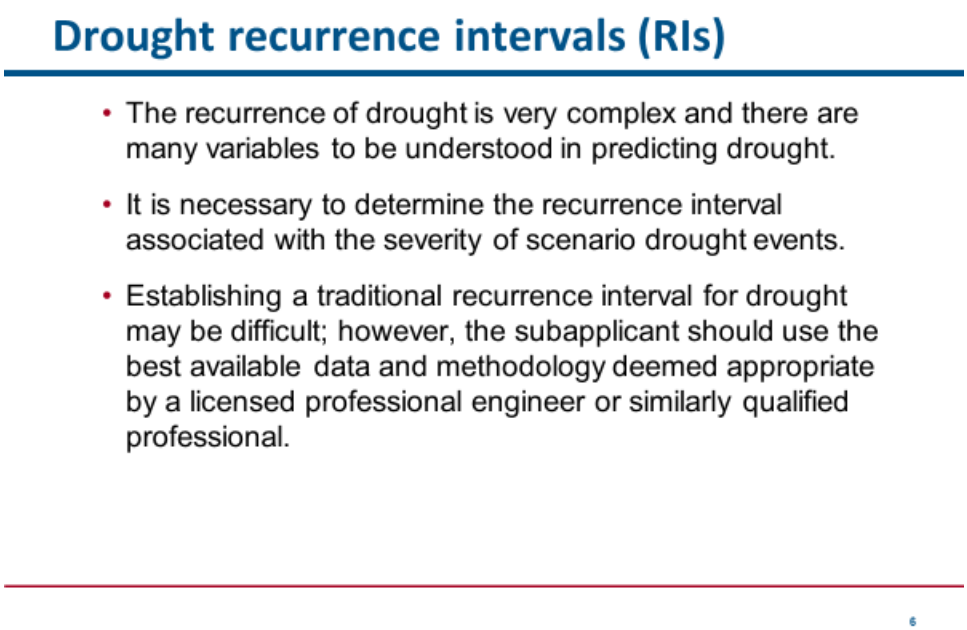
Visual 3: Drought mitigation

Instructor:

Aquifer storage and recovery (ASR) project type:

- Serves primarily as a drought management tool, but can also be used to reduce flood risk, mitigate salt water intrusion, and restore aquifers that have been subject to overdraft.
- Concept is to capture water when there is an abundant supply, store the water in subsurface aquifers, and recover water from the storage aquifer if and when there is a need.

Drought recurrence intervals (RIs)



Visual 4: Drought RIs

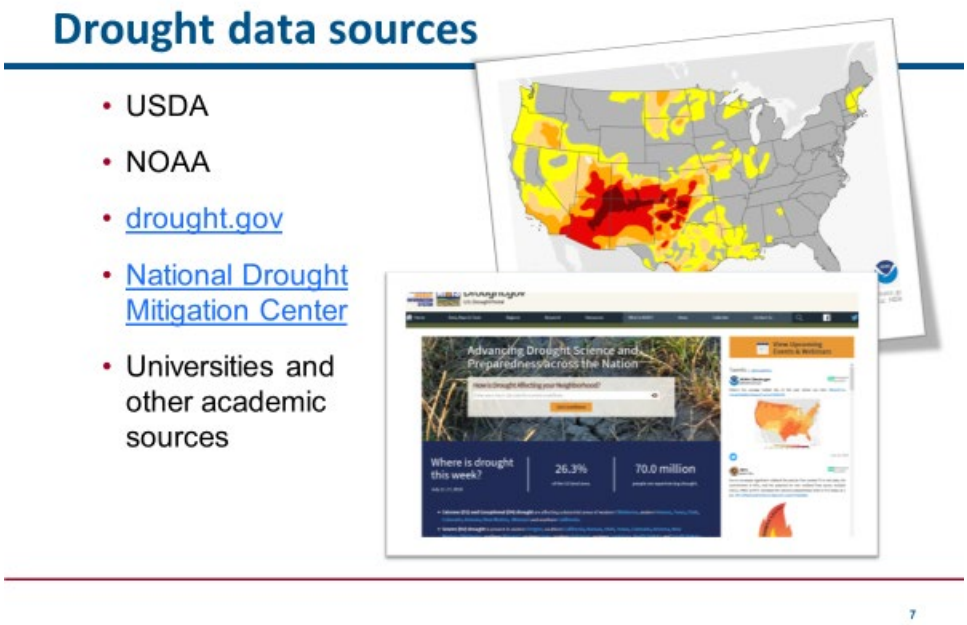
Instructor:

The recurrence of drought is very complex and there are many variables to be understood in predicting drought.

It is necessary to determine the recurrence interval associated with the severity of scenario drought events.

Establishing a traditional recurrence interval for drought may be difficult; however, the subapplicant should use the best available data and methodology deemed appropriate by a licensed professional engineer or similarly qualified professional.

Drought data sources



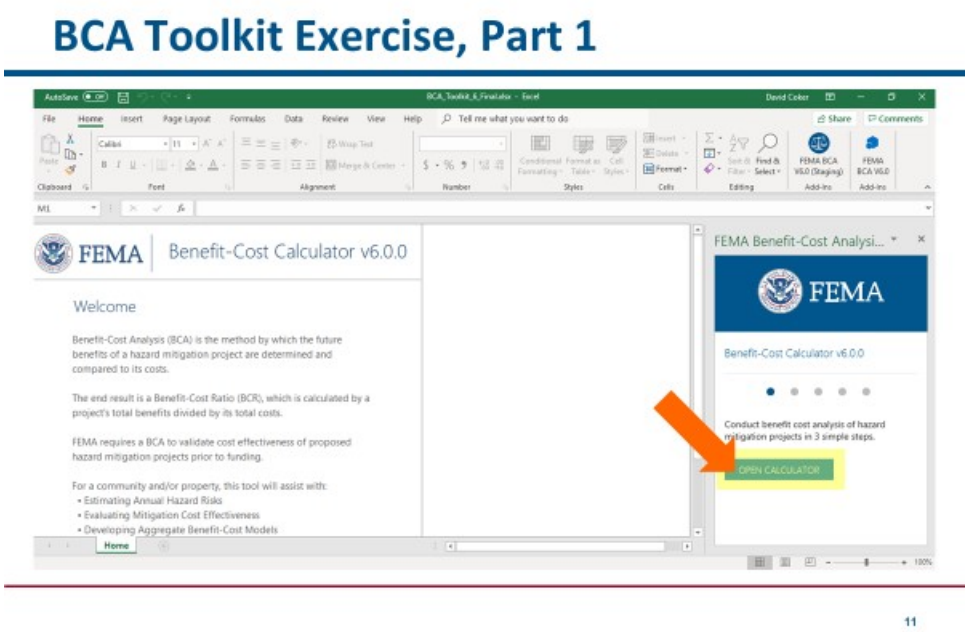
Visual 5: Drought data sources

Instructor:

Data sources for drought information and recurrence intervals may include:

- USDA
- NOAA
- drought.gov
- National Drought Mitigation Center
- Universities and other academic sources

BCA Toolkit Exercise



Instructor:

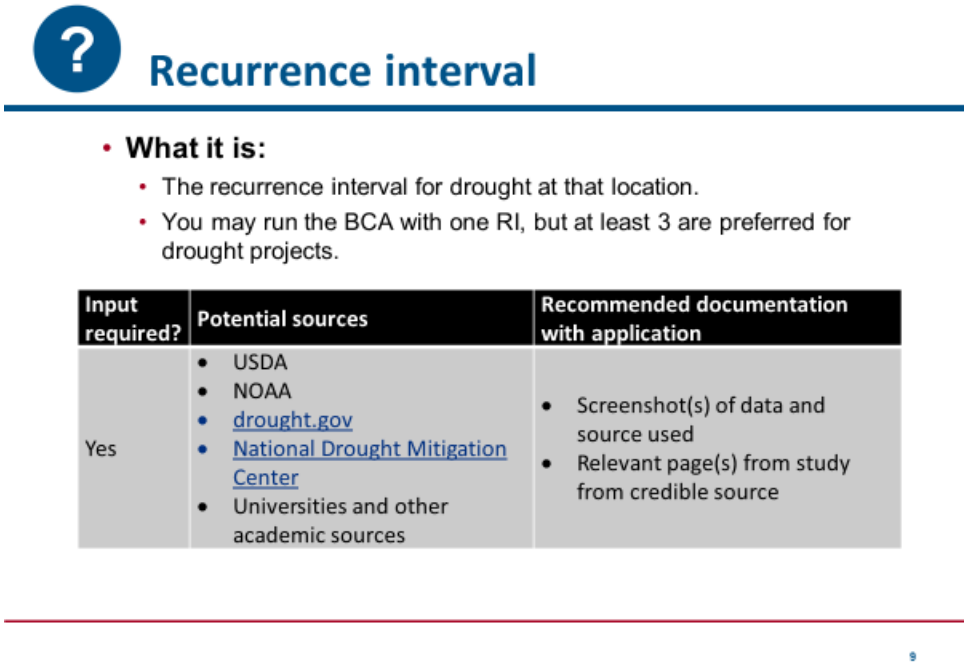
We will now show how to complete a drought mitigation project in the BCA Toolkit. The following slides describe the data inputs, sources, and documentation requirements.

The instructor should open the BCA Toolkit on their computer and instruct the students to do the same. Use the following slides to describe each data point as it is input. You may use one of the provided case studies (or another example from a Region or state) to guide the students through data entry on the Project Configuration and then the Project Information screens.

Case studies may be downloaded at https://www.fema.gov/benefit-cost-analysis.

You may also show students the Data Documentation Templates for this project type, which may be found at https://www.fema.gov/benefit-cost-analysis.

Recurrence interval



Visual 6: Recurrence interval

What it is:

- The recurrence interval for drought at that location.

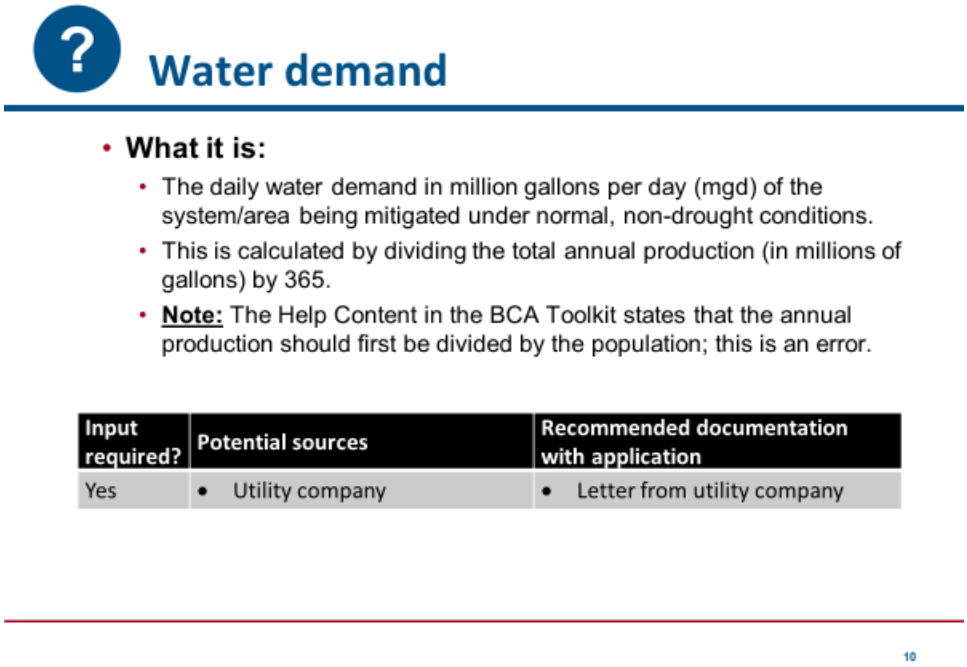
Source(s):

- USDA
- NOAA
- drought.gov
- National Drought Mitigation Center
- Universities and other academic sources

Recommended BCA documentation with application:

- Screenshot(s) of data and source used
- Relevant page(s) from study from credible source

Water demand



Visual 7: Water demand

What it is:

- The daily water demand of the system/area being mitigated under normal, non-drought conditions.
- This is calculated by dividing the total annual production (in millions of gallons) by 365.
- **Note:** The Help Content in the BCA Toolkit states that the annual production should first be divided by the population; this is an error.

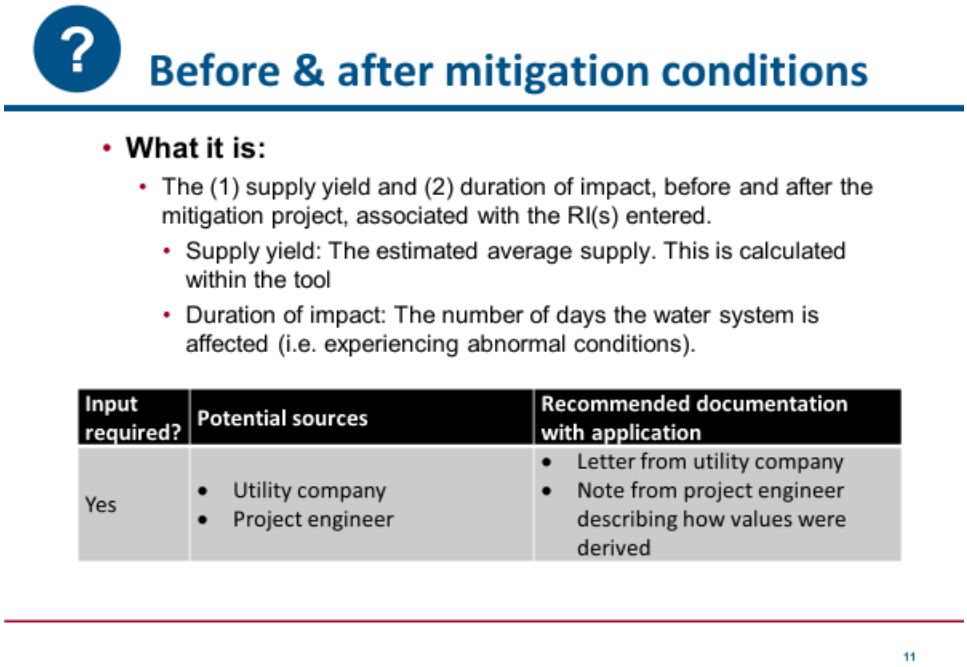
Source(s):

- Utility company

Recommended BCA documentation with application:

- Letter from utility company

Before and after mitigation conditions



Visual 8: Before and after mitigation conditions

What it is:

- The (1) supply yield and (2) duration of impact, before and after the mitigation project, associated with the RI(s) entered.
    - Supply yield: The estimated average supply. This is calculated within the tool
    - Duration of impact: The number of days the water system is affected (i.e. experiencing abnormal conditions).

Why it's important:

- The BCA Toolkit compares the before and after mitigation conditions to calculate the project benefits.

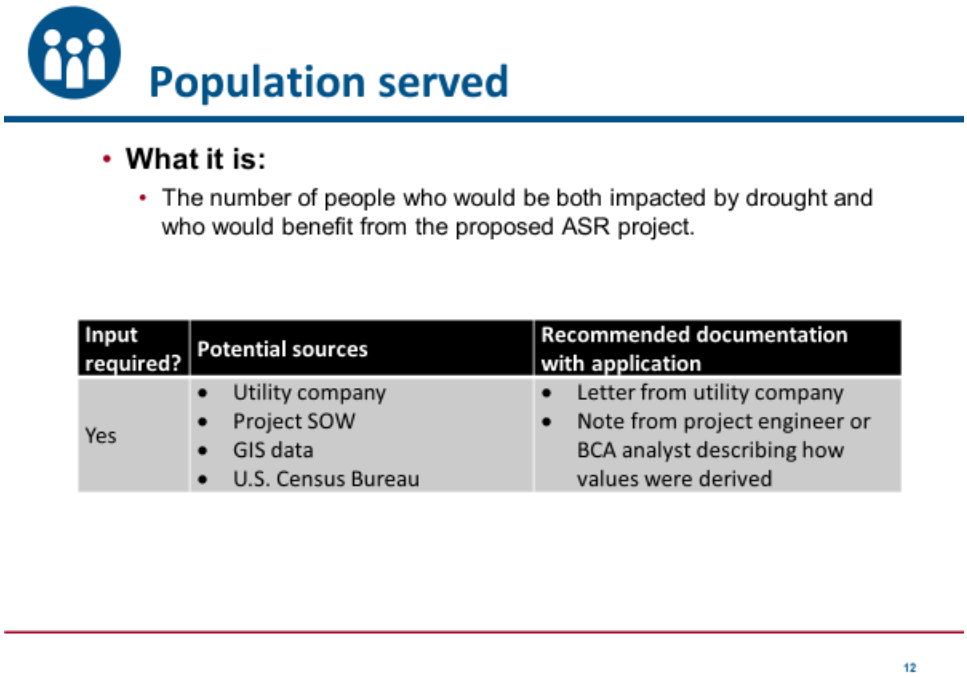
Source(s):

- Utility company
- Project engineer

Recommended BCA documentation with application:

- Letter from utility company
- Note from project engineer describing how values were derived

Population served



Visual 9: Population served

What it is:

- The number of people who would be both impacted by drought and who would benefit from the proposed ASR project.

Why it's important:

- The economic value of loss of water (i.e., damages) is dependent upon the number of people impacted by a drought.

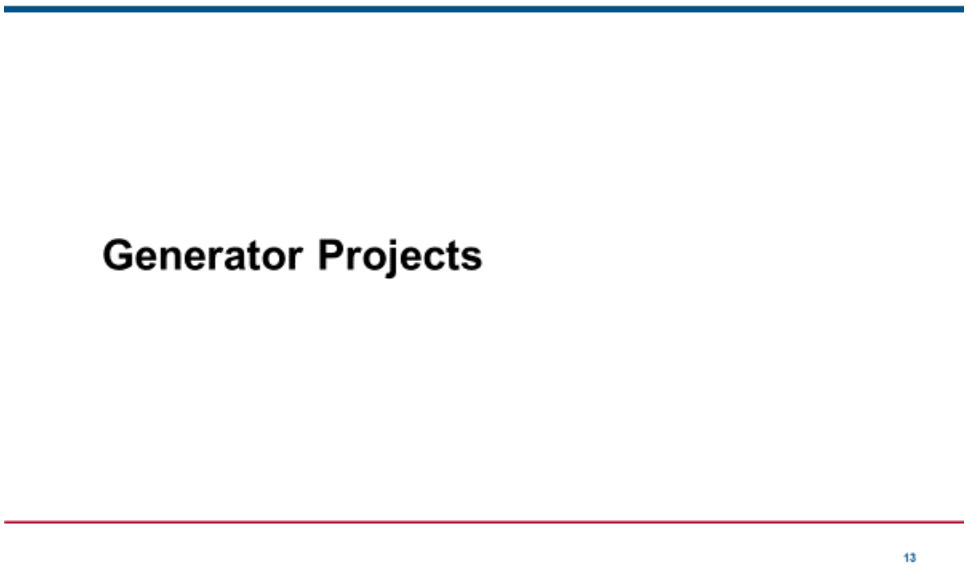
Source(s):

- Utility company
- Project SOW
- GIS data
- U.S. Census Bureau

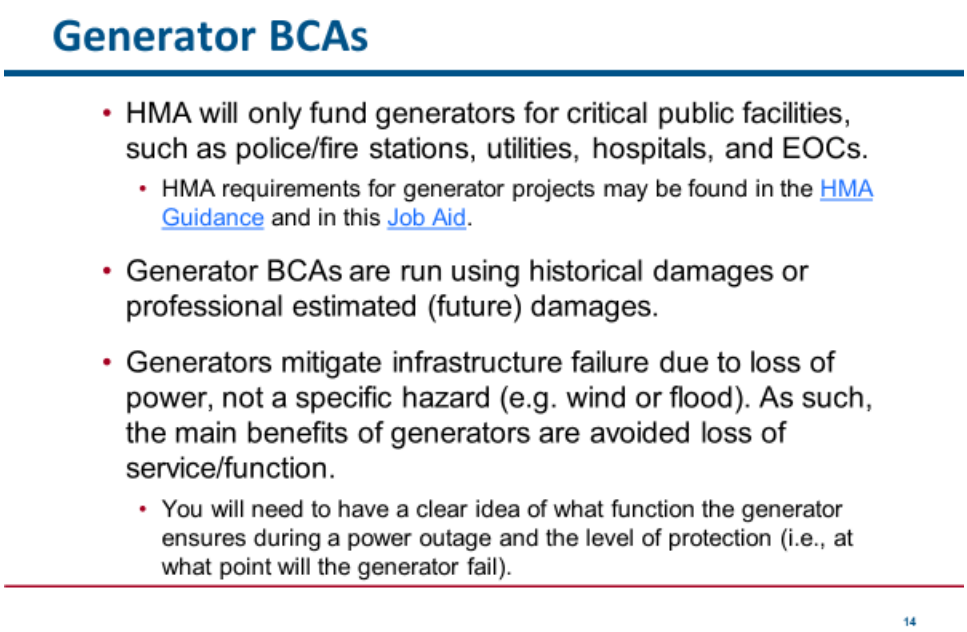
Recommended BCA documentation with application:

- Letter from utility company
- Note from project engineer or BCA analyst describing how values were derived

Generator projects



Generator BCAs



Visual 10: Generator BCAs

Instructor:

This unit discusses how to perform a BCA for generator projects. It does not cover overall project requirements for generators. Refer to the HMA Guidance and the generator Job Aid for eligibility questions.

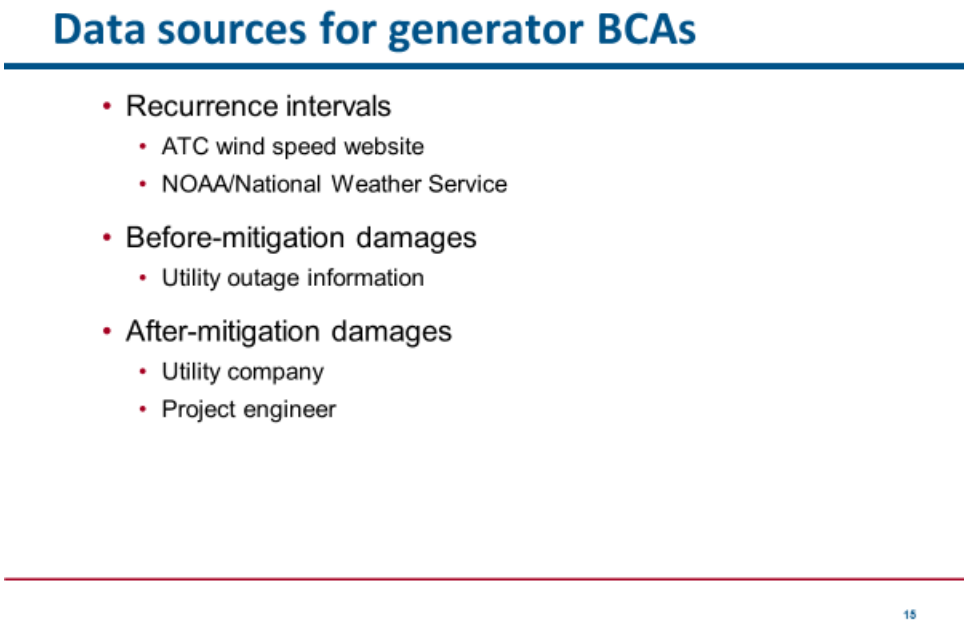
HMA will only fund generators for critical public facilities, such as police/fire stations, utilities, hospitals, and EOCs. HMA requirements for generator projects may be found in the HMA Guidance and in this Job Aid.

Generator BCAs are run using historical damages or professional estimated (future) damages.

Generators mitigate infrastructure failure due to loss of power, not a specific hazard (e.g. wind or flood). As such, the main benefits of generators are avoided loss of service/function.

You will need to have a clear idea of what function the generator ensures during a power outage and the level of protection (i.e., at what point will the generator fail). Generator projects are often straightforward, but can get tricky when they are put on facilities that serve multiple functions. For example, you want to put a generator on a school that serves as an emergency shelter. The generator is not for the school, it is for the emergency shelter function.

Data sources for generator BCAs



Visual 11: Data sources for generator BCAs

Instructor:

Data sources for generator BCAs might include:

For recurrence intervals:

- ATC wind speed website
- NOAA/National Weather Service

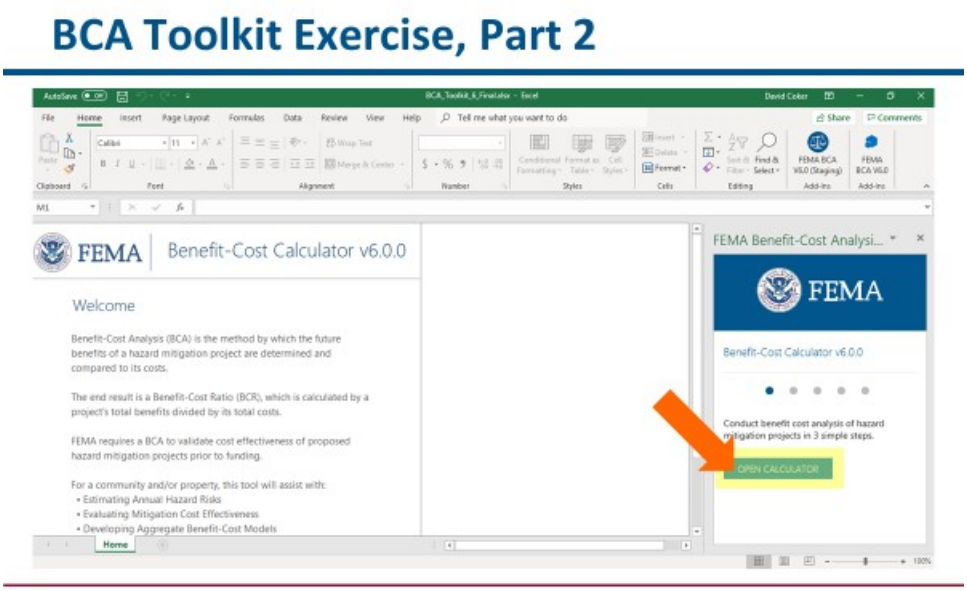
For before-mitigation damages:

- Utility outage information

For after-mitigation damages:

- Utility company
- Project engineer

BCA Toolkit Exercise



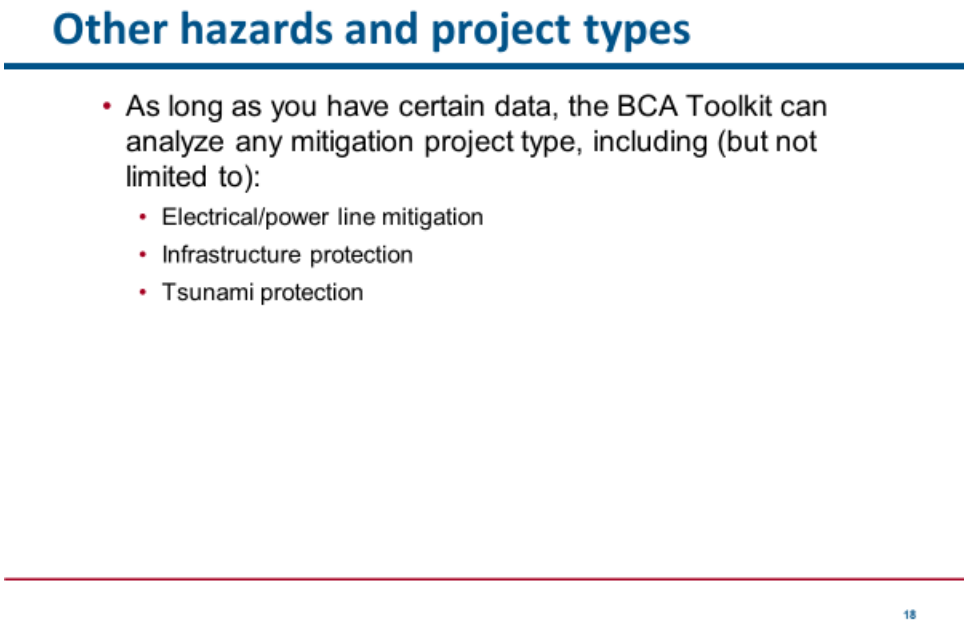
Instructor:
We will now show how to complete a generator project in the BCA Toolkit. The following slides describe the data inputs, sources, and documentation requirements.

The instructor should open the BCA Toolkit on their computer and instruct the students to do the same. Use the following slides to describe each data point as it is input. You may use one of the provided case studies (or another example from a Region or state) to guide the students through data entry on the Project Configuration and then the Project Information screens.

Case studies may be downloaded at https://www.fema.gov/benefit-cost-analysis.

You may also show students the Data Documentation Templates for this project type, which may be found at https://www.fema.gov/benefit-cost-analysis.

Other hazards and project types



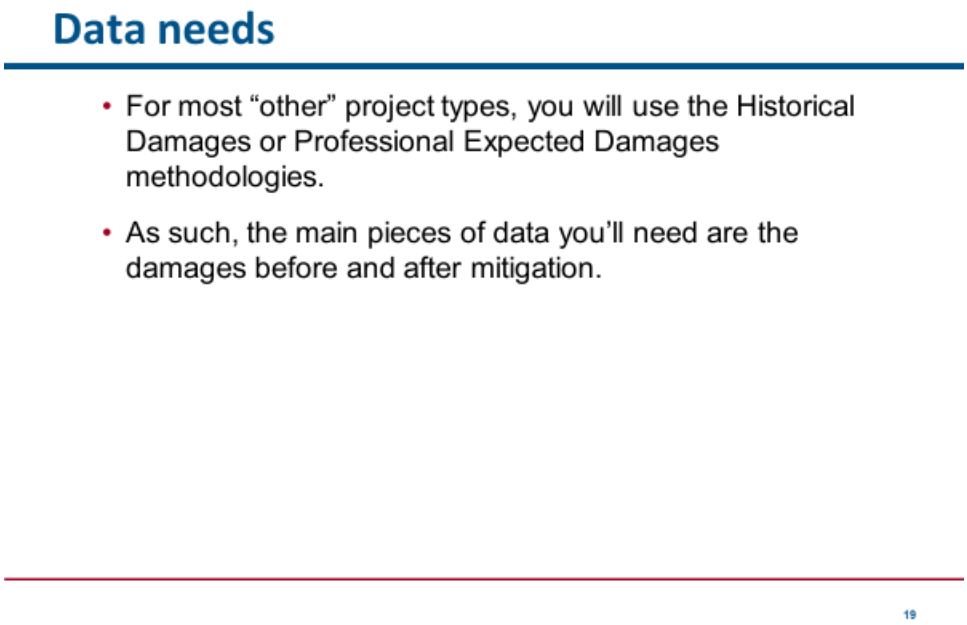
Visual 12: Other hazards and project types

Instructor:

As long as you have certain data, the BCA Toolkit can analyze any mitigation project type, including (but not limited to):

- Electrical/power line mitigation
- Infrastructure protection
- Tsunami protection

Data needs



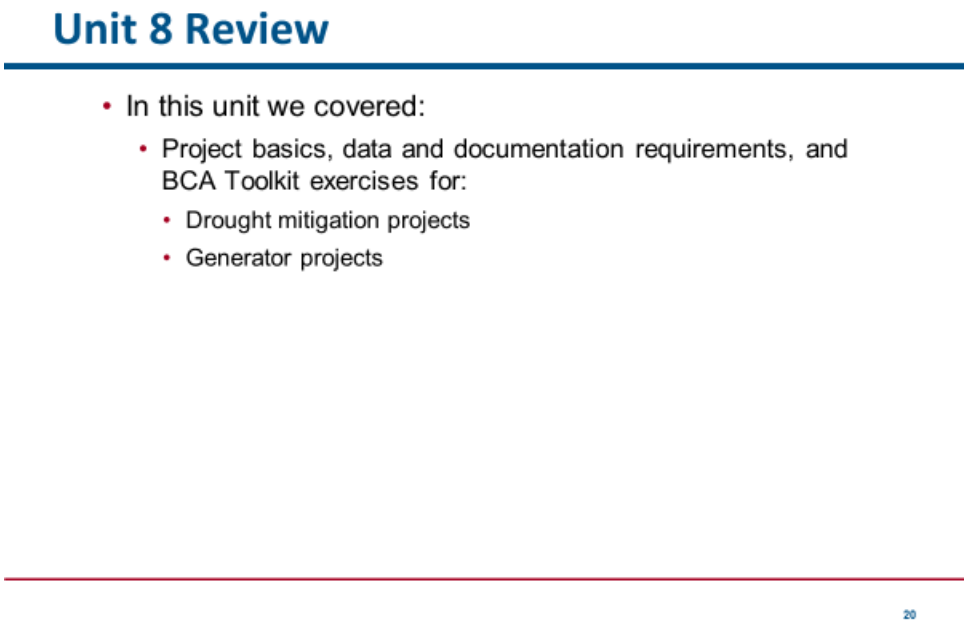
Visual 13: Data needs for other project types

Instructor:
For most "other" project types, you will use the Historical Damages or Professional Expected Damages methodologies.

As such, the main pieces of data you'll need are the damages before and after mitigation.

If time allows, the instructor may use one of the provided case studies to show an example of a less-common project type. The instructor may also solicit feedback from the students about whether there is a particular hazard or project type they would like to see an example for.

Unit 8 Review



Visual 14: Unit 8 Review

Instructor:

In this unit we covered:

- Project basics, data and documentation requirements, and BCA Toolkit exercise for:
  - Drought mitigation projects
  - Generator projects