

**Anaerobic Digester System**  
**Enterprise Budget Calculator**  
**User Manual**

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The views expressed are the authors' and do not necessarily reflect those of the Economic Research Service or the USDA.

## **Introduction**

The Anaerobic Digester (AD) System Enterprise Budget Calculator is intended for dairy owners, AD system industry experts, and AD researchers to be able to easily calculate the economic value of a variety of technology and price scenarios. Note that in order for the VBA coded navigation buttons to operate, the Excel workbook needs to be saved as a “macro-enabled” workbook or with the .xlsm extension. When you open the budget calculator, Excel will issue you a security prompt asking if you want to Enable Macros because VBA code written by malicious individuals has the potential to be a significant security threat. The VBA code for the budget calculator is from a trusted source, so click “Enable Macros”. (To avoid triggering this notice in the future you can save the file in what Excel calls a “trusted location” as explained in the Appendix.)

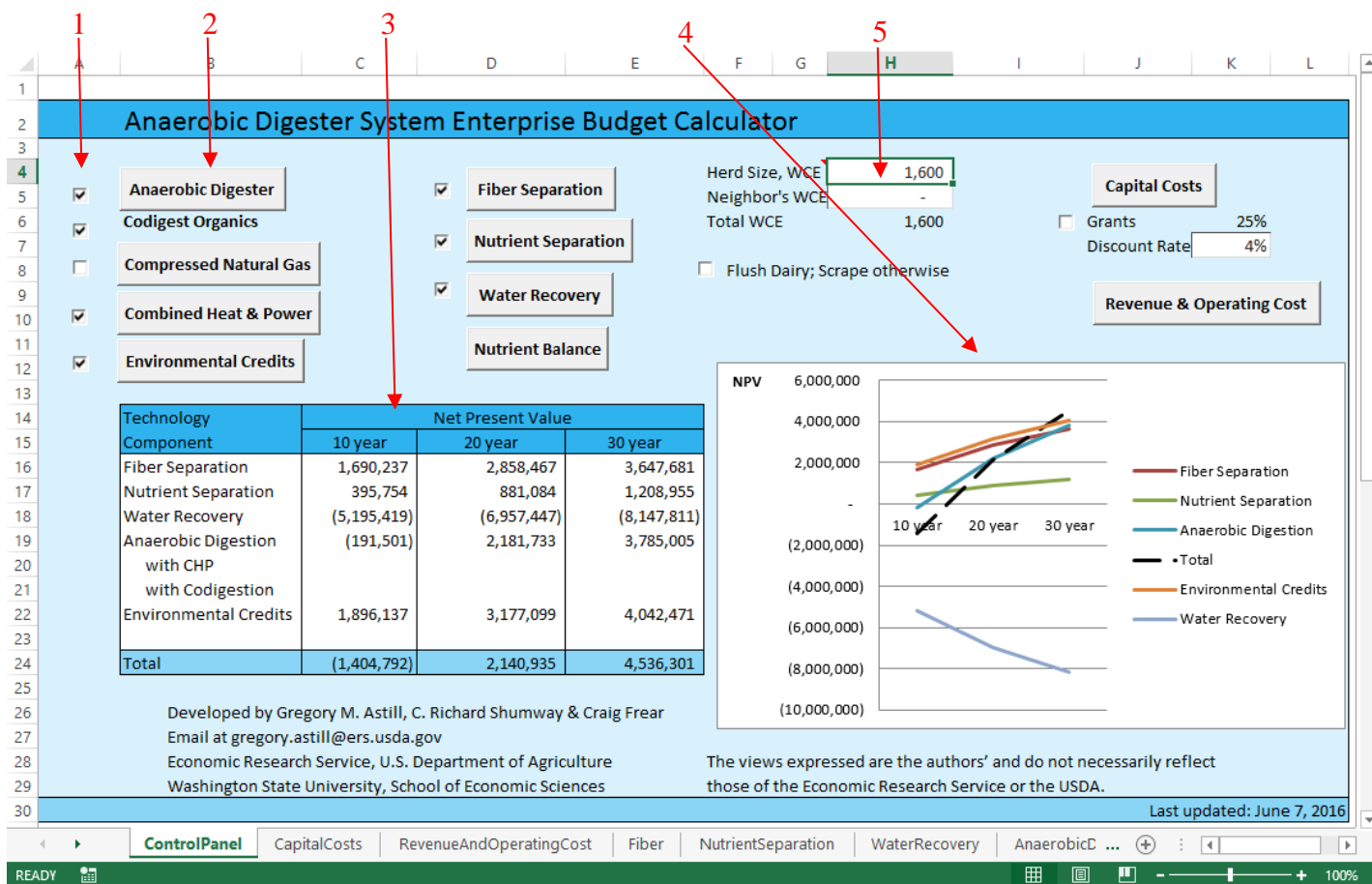
In the version we have made available for distribution, there are two types of changes for you to make: checking and un-checking technology options or typing alternative values into editable cells. Editable cells are bordered with black and have grey text. Changing the values of some cells not marked as editable may produce unexpected results.

We suggest that after opening the workbook, you save a working copy that you can make changes to and save as a specific scenario. Revert back to the original copy to establish unchanged values again.

This User Manual is organized as follows. The next section explains the main sheet of the budget calculator named the Control Panel, after which the general structure of the calculator. The subsequent sections walk through the specific accounting sheets, technology sheets, and constraint sheets.

## Control Panel

The user can turn on and off main technology groups by checking the boxes [1] on the Control Panel sheet. Navigation buttons [2] have the name of the technology written on them and will open the technology page. The table [3] displays the NPV by technology component and by total project, while the graph [4] displays the same values. Editable cells [5] appear recessed and have gray text.



The only values that can be changed on the Control Panel sheet are the Herd Size, Neighbor's WCE, and the Discount Rate. (Cost and revenue estimates were calibrated between 1,600 and 15,000 WCE sized digesters. AD sizes outside of this range should be interpreted with caution.) All other values are available on the specific technology sheets (Anaerobic Digester, Compressed Natural Gas, Combined Heat & Power, Environmental Credits, Fiber Separation, Nutrient Separation, and Water Recovery). The Capital Cost sheet and Revenue & Operating Cost sheet aggregate monetary accounting information from the technology sheets. The Nutrient Balance sheet tracks the use of water, nitrogen, potassium, and fiber solids between technology components.

## Budget Calculator Structure

The budget calculator is built on three levels. The highest level is visible from the Control Panel. Results for the entire AD technology system appear in the table and graph at the bottom of the sheet. You are able to turn on and off technologies and see how those changes affects the NPV of the entire project.

You can select any combination of the dairy technologies for a scenario within their relationship constraints. Water Recovery requires Phosphorous Solids in Nutrient Separation, and Nutrient Separation requires Fiber Separation. Codigest Organics, Compressed Natural Gas, Combined Heat & Power, and Environmental Credits all require Anaerobic Digester. The user must select either Combined Heat & Power or Compressed Natural Gas. You will see that attempting to use dependent technology combinations without the primary technology will result in zero values for the dependent technologies.

High Level	Middle Level	Low Level
Scenarios & Results	Accounting	Technologies
Control Panel	Nutrient Balance Capital Costs Revenue & Operating Cost	Anaerobic Digester └Codigest Organics └Compressed Natural Gas or └Combined Heat & Power └Environmental Credits Fiber Separation └Nutrient Separation └Water Recovery

The middle level is contained in the accounting sheets (Capital Cost and Revenue and Operating Cost) which aggregate information used on or coming from the low level technology sheets.

There are seven technology sheets at the low level that contain specific accounting details for fixed costs, operating costs, and revenues that are aggregated on the accounting sheets: Fiber Separation, Nutrient Separation, Water Recovery, Anaerobic Digester, Compressed Natural Gas, Combined Heat and Power and Environmental Credits. Each technology sheet has production & balance values on the far left, capital costs in the center and revenue and capital costs on the right. On the very far right are primary data sources used to calculate parameter values for varying sizes of dairies, but are not to be adjusted.


## Acknowledgements

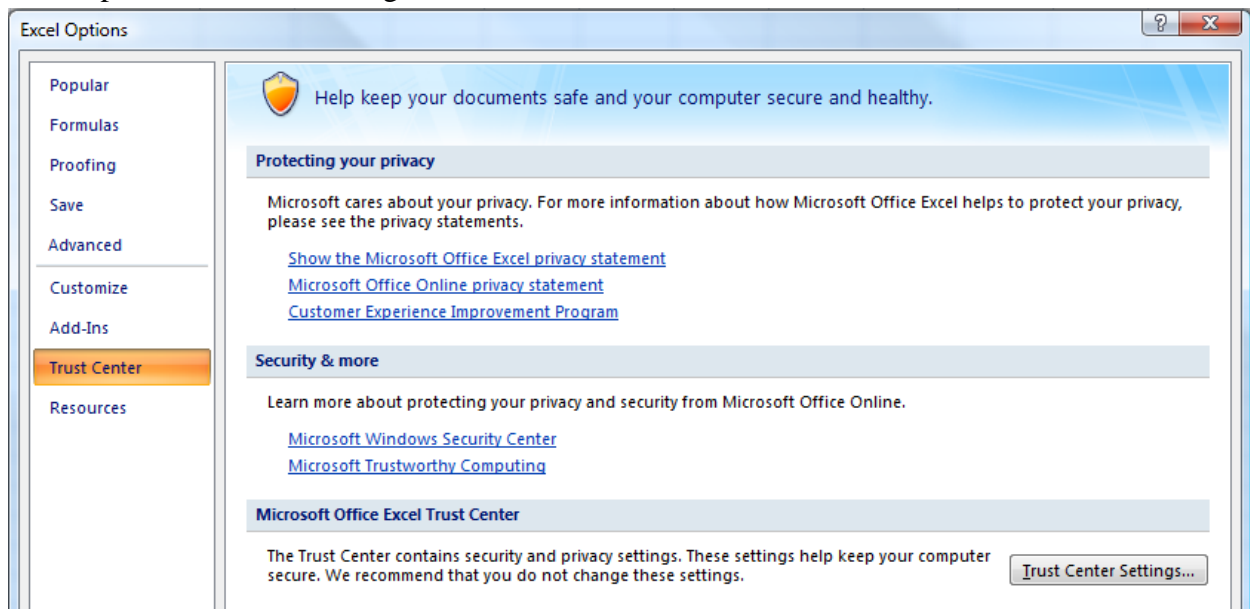
This research was supported by funding through award #2012-6800219814 from the USDA National Institute for Food and Agriculture.

## Appendix

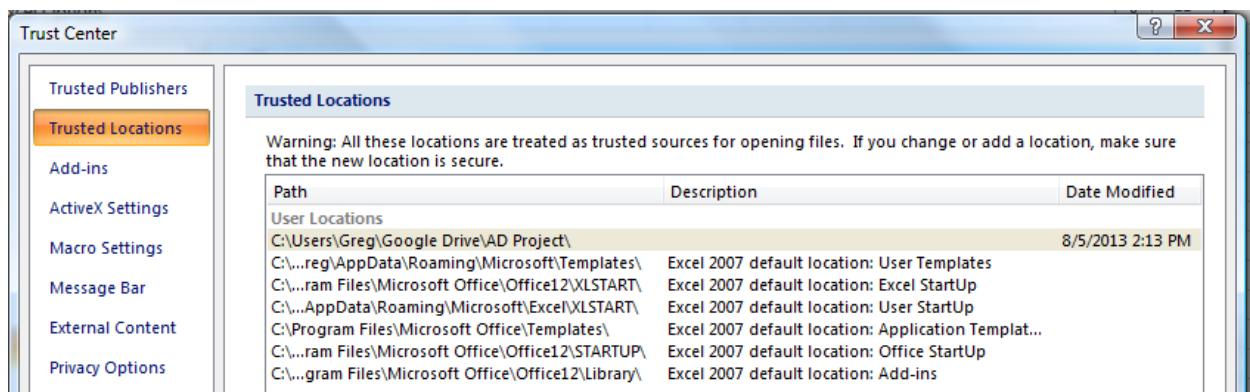
### Trusted Location for Macro-Enabled Workbooks

The following instructions apply to Excel 2007, and if they do not work for you, google “Excel *version#* macro security trusted location” where *version#* is 2013, 2000 or whichever version of Excel you are using.

To manage your trusted locations and Macro security settings, click the Office button , click Excel options at the bottom right and then click the Trust Center tab.



Then click the Trust Center Settings in the bottom right corner. On the Trusted Locations tab you can add folders where Excel will trust the VBA content of the files saved there. Excel will no longer issue a security notification for files saved in the trusted location.



## VBA Code

Microsoft's Visual Basic for Applications is a powerful programming language that can be used to automate tasks and create custom operations.

Press Alt + F11 to open the Visual Basic Editor. The right pane contains the VBA code. Green text are comments and begin with an apostrophe ('). The left pane contains the locations where the VBA code is stored. As much as possible, comments have been provided to explain what the code does.