CLEER GHG Projections Calculator
User Guide

Guidelines for Quantifying Projected GHG Emissions Reduced or Avoided from Clean Energy Activities Conducted Under the USAID Global Climate Change Initiative

September 2015

TABLE OF CONTENTS

1 INTRODUCTION

The USAID Clean Energy Emission Reduction (CLEER) GHG Projections Calculator provides methodologies and calculations for projecting greenhouse gas (GHG) emissions reduced or avoided from a variety of activities under the Clean Energy Pillar of the Global Climate Change Initiative. This calculator can be used by USAID Operating Units (OUs) and Implementing Partners with clean energy programs and actions to report on Indicator 4.8.2-34:

"Projected greenhouse gas emissions reduced or avoided through 2030 from adopted laws, policies, regulations, or technologies related to clean energy as supported by USG assistance."

The calculator can also be used by other donors, banks, or implementers not affiliated with USAID to project emission reductions due to clean energy actions. This User Guide can assist users of the CLEER GHG Projections Calculator to generate projections of emissions reduced or avoided.

Organization

The User Guide is organized into four main sections:

1. **Introduction**
2. **Instructions** – Provides general information for navigating and inputting data into the Microsoft Excel-based CLEER GHG Projections Calculator.
3. **FAQs** – Provides answers and option for troubleshooting common questions and issues.
4. **Data Collection Needs** – Describes the data required for projecting GHG emissions reduced or avoided.

Downloading the Projections Calculator

The **CLEER GHG Projections Calculator** can be downloaded by USAID staff from the CLEER Calculator website, at https://pages.usaid.gov/E3/GCC/ghg-accounting-tools. It is also available online to all users at www.CLEERtool.org/Support.

2 INSTRUCTIONS

The CLEER GHG Projections Calculator has four main pages—**Instructions**, **Data Input**, **Calculations**, and **Results**—that guide the user to enter the necessary information to project GHGs reduced or avoided through 2030. Users should follow the steps outlined below.

STEP 1 – Review the Instructions

The **Instructions** page of the Calculator contains general information, including the type of action it addresses, definitions, and instructions for entering data.

Navigating the Calculator

Each page of the Calculator includes icons at the top and bottom that allow the user to navigate throughout the Calculator.

The white arrow buttons at the top of each page allow the user to navigate to the next page, the previous page, or the beginning home page at any time.
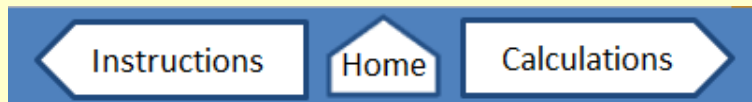
The blue arrow buttons at the bottom of each page guide the user to the next step in the Calculator after entering or reviewing information on each page.

Input Field Color-Coding

The input fields in the Calculator are color-coded based on the type of information needed from the user.

- ♦ **Yellow** fields are for key data inputs and are filled in by the user. Many contain dropdown menus with standard entries.
- ♦ **Gray text** fields display default values provided by the Calculator. The user can choose to override these values if site-specific data is available to improve on these defaults.
- ♦ **Green** and **White** fields contain values calculated by the Calculator. The user cannot alter these fields.

Cell Color Legend
Input Fields
Default Values
GHG Reduction Estimates
Calculations

STEP 2 – Enter General Information about the Action

The second page of the Calculator—**Data Input**—contains three sections for the user to enter specific information about the action. Users should enter general information about the action into Section 1, such as action name, description of the action, location of the action, and year of implementation:

Section 1 - Action Information
Required fields *

About the Action

		Reporting Details and Worksheet Status	
Implementing Mechanism Number*	12345	Point of Contact (Name)	
Implementing Mechanism Name*	Mechanism Name	Contact Email	
Action Name*	Action Name	Contact Phone (Including Country Code)	
Year of Implementation*	2015	Worksheet Status	
Operating Unit		Worksheet Date	
Implementing Partner			

Location of the Action

Description of the Action

Country*	El Salvador
Subnational Region, State, or Province	
City	
Geographic Coordinates	

Users should enter information in as many fields as possible. Fields with a red asterisk ***** are required and must be populated by the user. All required fields must be completed for the Calculator to estimate emission reductions.

STEP 3 – Enter Energy-Related Information and Data

Users should enter additional information about the action's energy use into Section 2 of the **Data Input** page, such as:

♦ The type of clean energy action
♦ The fuel used under the action
♦ The amount of fuel or electricity generated, consumed, or saved under the action
♦ The type of fuel or electricity replaced by the action
♦ The expected change in impacts over time

Section 2 - Energy Information and Data
Required fields *

What is the clean energy result of the action? *	Renewable Electricity Generation	Clear All Inputs
Will the action replace direct fuel consumption (e.g., for heating, cooking, or lighting)? If so, select 'Yes'. If the action will replace electricity (e.g., from the grid or on-site generators), please select 'No'. *	Yes	
Select the type of fuel reduced/avoided by the action: *	Charcoal	
Do the impact of your action remain constant each year, or do you expect the impacts to change over time (e.g. grow)? *	Impact Remains Constant	
Enter the amount of fuel reduced/avoided from this action during the Year of Implementation: *	1,000	Gigajoules (GJ)

All fields in Section 2 should be completed in order, starting from the top. These questions vary between each clean energy action type. **Section 4 Data Collection Needs** of this document describes the data needs for the Calculator by action type.

STEP 4 - Accept or Modify Default Values

Users should review the default values presented in Section 3 of the **Data Input** page. This section of the Calculator displays the default values used in calculations, based on the responses the user provided in Section 2.

Section 3 - Default values

Please review the default values used below and "Accept" or "Modify" the values.

Default energy impacts projection inputs

Technology degradation rate[1]:   0.5%

Default emission factor values

Charcoal Emission factor (gCO₂e/GJ):   118,192

After reviewing the values displayed, OUs should determine if they have the information necessary to improve on these defaults. For example, the Calculator provides a country average grid emission factor for electricity consumption. The user may wish to override the default value with operating or build margin emission factors, if applicable. The user can then choose to modify the values, or accept and continue.

Modify Default Values   Accept Default Values and Review Calculations

If the user chooses to modify the default values, the data fields will be changed to editable inputs. The user can choose to repopulate the data fields with the default values by clicking the "Return to Default Values" button.

Section 3 - Default values

Please review the default values used below and "Accept" or "Modify" the values.

Default energy impacts projection inputs

Technology degradation rate: 0.5%

Default emission factor values

Charcoal Emission factor (gCO₂e/GJ):   118,192

Optional: Graph of the annual energy impacts of your action.   Return to Default Values   Use Modified Values and Review Calculations

STEP 5 - Document Assumptions

All assumptions or comments about the action and its energy use should be documented in the **Assumptions** section provided at the bottom of the page. OUs should record any information about the action or data that support the inputs entered into the Calculator. Examples include whether the data represents a partial year or is incomplete, whether data was directly measured or estimated, the

source of alternate values, or how and why alternative values were calculated. This information will be useful for anyone reviewing the accuracy and transparency of the emission reduction estimates.

Assumptions
Document any assumptions or comments regarding the activity or any of the data used for the estimation.

Review Calculations ▷

Once all the questions have been answered and data entered, proceed to the next page by clicking the "Review Calculations" blue arrow.

STEP 6 - Review Your Calculations

On the **Calculations** page, users should review all values used to generate the estimate of reductions, which include inputs, Calculator-provided default values, and the emission reduction estimate. The Calculator displays calculations and emission reduction estimates separately for each year, from the year of implementation through 2030.

Emissions Reduced or Avoided Calculations
NA = Not Applicable due to the options selected.

Renewable Electricity Generation

	Values
Type of baseline:	Fuel Combustion
Type of fuel replaced:	Charcoal

	Fuel Consumed in the Baseline				Baseline Emission Factor		Conversion		Emission Reductions
	Gigajoules (GJ)		GigaJoules (GJ)		gCO$_2$e/GJ		grams to metric tons		tCO$_2$e
2014	323.0	=	323.0	×	118,192	/	1,000,000	=	38.2
2015	321.4	=	321.4	×	118,192	/	1,000,000	=	38.0
2016	319.8	=	319.8	×	118,192	/	1,000,000	=	37.8
2017	318.2	=	318.2	×	118,192	/	1,000,000	=	37.6
2018	316.6	=	316.6	×	118,192	/	1,000,000	=	37.4
2019	315.0	=	315.0	×	118,192	/	1,000,000	=	37.2
2020	313.4	=	313.4	×	118,192	/	1,000,000	=	37.0
2021	311.9	=	311.9	×	118,192	/	1,000,000	=	36.9
2022	310.3	=	310.3	×	118,192	/	1,000,000	=	36.7
2023	308.8	=	308.8	×	118,192	/	1,000,000	=	36.5
2024	307.2	=	307.2	×	118,192	/	1,000,000	=	36.3
2025	305.7	=	305.7	×	118,192	/	1,000,000	=	36.1
2026	304.1	=	304.1	×	118,192	/	1,000,000	=	35.9
2027	302.6	=	302.6	×	118,192	/	1,000,000	=	35.8
2028	301.1	=	301.1	×	118,192	/	1,000,000	=	35.6
2029	299.6	=	299.6	×	118,192	/	1,000,000	=	35.4
2030	298.1	=	298.1	×	118,192	/	1,000,000	=	35.2

Renewable energy generation systems are assumed to emit zero GHGs per kWh generated; thus activity emissions are equal to zero.

After reviewing the data and calculations, proceed to the next page by clicking the "View Results".

STEP 7 - View Your Results

The **Results** page summarizes the action information and total emission reductions, indicated by the dark green fields. Total GHGs Reduced/Avoided from Year of Implementation through 2030 for this action, in metric tons of carbon dioxide equivalent (tCO$_2$e), can be added to GHG reductions from other clean energy actions and entered into the FACTS Info database for reporting on Indicator 4.8.2-34.

Results and Summary

Action Information Summary

Implementing Mechanism Number	
Implementing Mechanism Name	
Action Name	
Action Implementation Year	2014
Country	Algeria
Clean Energy Result	Renewable Electricity Generation

Total Projected GHG Reductions

Total GHGs Reduced/Avoided from Year of Implementation through 2030

Baseline Emissions (tCO$_2$e)		Activity Emissions (tCO$_2$e)		Emission Reductions (tCO$_2$e)
623.7	-	0.0	=	623.7

> Total GHGs Reduced or Avoided from year of implementation through 2030, according to indicator 4.8.2-34. Report this value in FACTS Info.

Projected GHG Reductions, disaggregated according to Indicator 4.8.2-34

GHGs Reduced/Avoided from Year of Implementation through 2020

Baseline Emissions (tCO$_2$e)		Activity Emissions (tCO$_2$e)		Emission Reductions (tCO$_2$e)
263.3	-	0.0	=	263.3

> Total GHGs Reduced or Avoided disaggregated according to Indicator 4.8.2-34.

GHGs Reduced/Avoided from 2021 through 2025

Baseline Emissions (tCO$_2$e)		Activity Emissions (tCO$_2$e)		Emission Reductions (tCO$_2$e)
182.5	-	0.0	=	182.5

GHGs Reduced/Avoided from 2026 through 2030

Baseline Emissions (tCO$_2$e)		Activity Emissions (tCO$_2$e)		Emission Reductions (tCO$_2$e)
177.9	-	0.0	=	177.9

In addition to the total reductions through 2030, the emission reductions are presented in cumulative totals for three time periods:

- from the year of implementation through 2020
- 2021 through 2025, and
- 2026 through 2030.

The estimates are also presented graphically, both in annual and cumulative amounts.

For programs with multiple actions where multiple clean energy results occur, emission reductions from each action should be calculated individually using the CLEER GHG Projections Calculator, then aggregated across missions or countries to reflect overall program emission reductions reported to FACTS Info.

A supplemental chapter to the CLEER Protocol for the Projections methodology is currently under development. Documentation of data and assumptions is available in the Projections Calculator.

3 FREQUENTLY ASKED QUESTIONS

1) Where do I get input data?

Input data, such as energy consumption and/or savings for each action type, should be requested from the action implementing partners (IPs).

2) Why is the Calculator not calculating emission reductions?

Confirm that information or data have been entered into all the required fields (indicated by a *****). For example, if the country location of the action or the amount of energy generated under the action is not populated, then the Calculator will not calculate emission reductions.

3) Where can I change default values?

Alternate values can be entered by clicking the "Modify Default Values" button on the **Data Input** page of the Calculator, which will allow the user to override the default values provided in the Calculator. Be sure to document the reasoning behind overriding the default values, as well as the source of the alternate value (e.g., how it was calculated or chosen).

4) Where can I find alternate values for overriding default values?

The Appendices of the CLEER Protocol include default values used in the CLEER Calculator modules, as well as additional emission factors and technological defaults that a user may choose to input. Users may also desire to input other known values that may be more accurate to the region or action than the default values, many of which are national or international average factors.

5) What type of assumptions/comments should I document?

OUs should document any information about the action or data that support the inputs entered into the Calculator. Examples include whether the data represents a partial year or is incomplete, whether data was directly measured or estimated, the source of alternate values, or how and why alternative values were calculated.

6) What value do I report?

OUs should report Total GHGs Reduced/Avoided from Year of Implementation through 2030 as the value for Indicator 4.8.2-34, which is calculated on the **Results** page of the Calculator. This value will include all emissions reduced or avoided as a result of the action. Programs with multiple actions should use the Calculator to calculate the GHG Indicator for every action, and then aggregate the values across actions to report the sum of reductions for the GHG Indicator.

7) What if I have data and specifics on the amount of technology installed or adopted but not energy generated/saved?

If energy data is not known, OUs can use the technology-specific CLEER calculators to estimate the energy impacts of their action and use that to estimate projections using the GHG Projections Calculator, available at www.CLEERtool.org. Technology-specific *projection calculators* are currently under development.

8) **What if I do not understand an input field?**

When you click on an input cell, a message may appear with further guidance on the input field.

9) **Where can I find more information?**

For more details on **Indicator 4.8.2-34**, see the GCC Indicator Handbook at
http://f.state.sbu/Pages/Indicators.aspx

The **CLEER Protocol** presents guidelines for quantifying GHG emission reductions from USAID clean energy actions for the previous fiscal year. It contains similar data and assumptions as the CLEER GHG Projections Calculator. The Protocol is available at www.CLEERtool.org.

4 DATA COLLECTION NEEDS

The CLEER GHG Projections Calculator can be used to calculate GHG emission reductions from clean energy actions when the amount of energy generated or saved is known. Action types include:

- ♦ Renewable Electricity Generation
  - o An action that increases or enables new capacity to generate electricity from renewable sources by replacing conventional sources of power (e.g., grid power or diesel generators).
- ♦ Fuel Switching
  - o An action that exchanges a conventional energy source with a less emissive or alternative energy source.
- ♦ Energy Efficiency
  - o An action that reduces the amount of energy consumed by the end user through technology upgrades or energy efficient practices.

Table 1 identifies necessary data the user should collect for estimating GHG emission reductions, which may vary by action. The table provides supporting information such as the definition, potential source, and typical values or units.

Table 1: Clean Energy GHG Calculator Data Collection Needs

Source	Parameter	Definition	Typical Value/Units
User-Provided	**Fuel Type**	The type of traditional or alternate fuel consumed in the baseline and/or action in the reporting year	See a list of potential fuel types in Appendix D of the CLEER Protocol
User-Provided	**Electricity Generated or Consumed**	Quantity of electricity consumed or generated by the action in the reporting year	Kilowatt-hours (kWh) Megawatt-hours (MWh)
User-Provided	**Activity Fuel Consumed**	Amount of alternate fuel consumed in the reporting year	Gigajoules (GJ), or one of the volumetric units, by fuel type.
User-Provided	**Baseline Fuel Consumed**	Amount of traditional fuel consumed in the baseline of the reporting year	Gigajoules (GJ), or one of the volumetric units, by fuel type.
User-Provided	**Percent Fuel Savings**	Percent of fuel savings as a result of the action in the reporting year	Percent (0-99%)
Default: IEA (2014)	**Grid Line Loss Factor**	Average annual grid line loss due to transmission and distribution (%)	Percent (0-99%)
Default: IEA (2014)	**Grid Electricity Emission Factor**	Average GHG emission factor for grid electricity, coal, oil, and natural gas, by country	tCO_2e/kWh of electricity
Default: WEO (2015)	**Grid Electricity Emission Factor Projections**	Average GHG emission factor for grid electricity, by region	tCO_2e/kWh of electricity

Default: IPCC (2006)	**Fuel-Specific Emission Factor**	GHG emission factor for specific fuel types	tCO$_2$e/GJ of fuel

Figure 1, Figure 2, and Figure 3 outline the questions, user selection options, and required input data for the **CLEER GHG Projections Calculator**. For each path, all corresponding data inputs are necessary for projecting GHGs reduced or avoided.

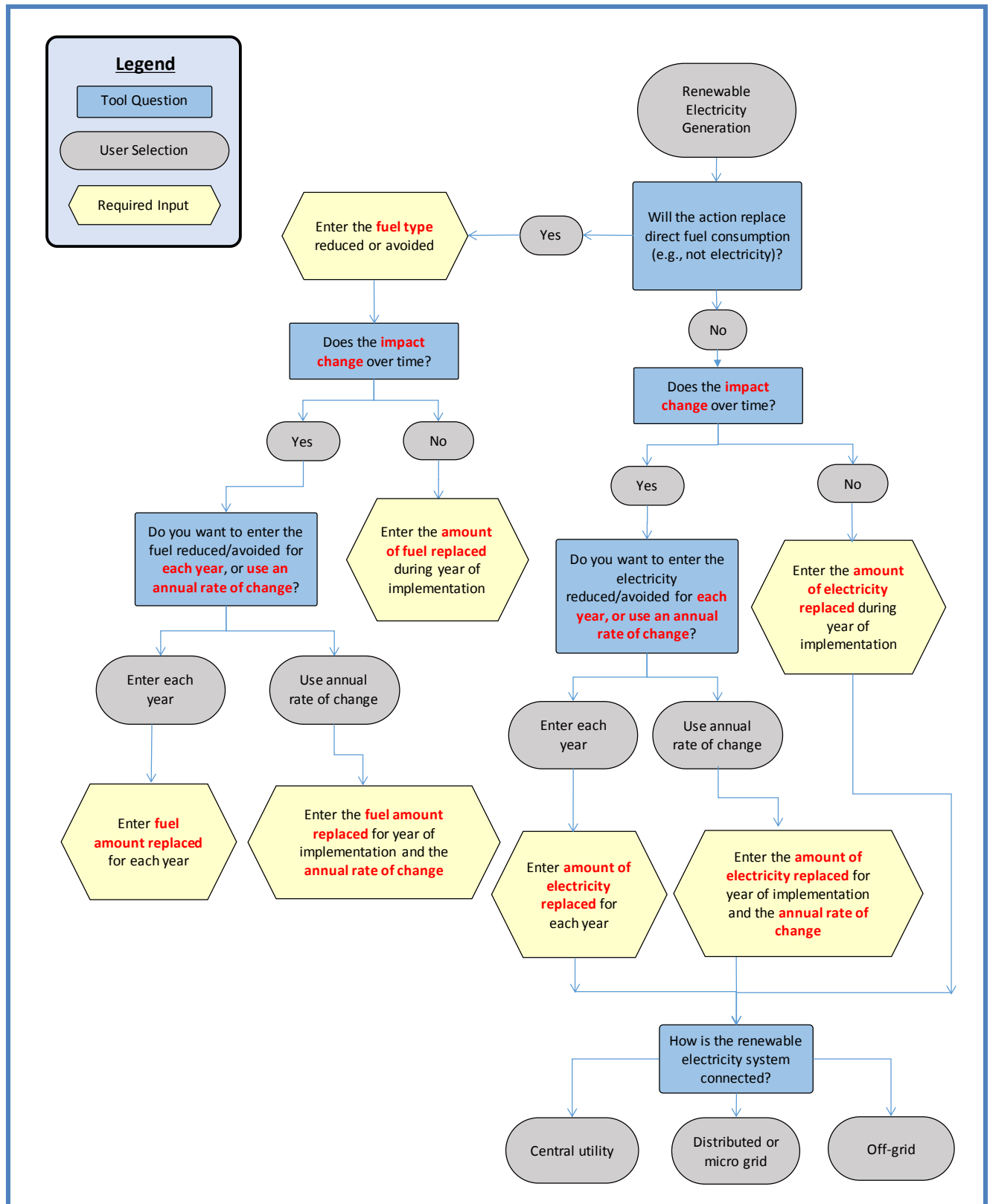**Figure 1: Clean Energy GHG Projections Calculator Pathway: Renewable Energy**

Figure 2: Clean Energy GHG Projections Calculator Pathway: Fuel Switching
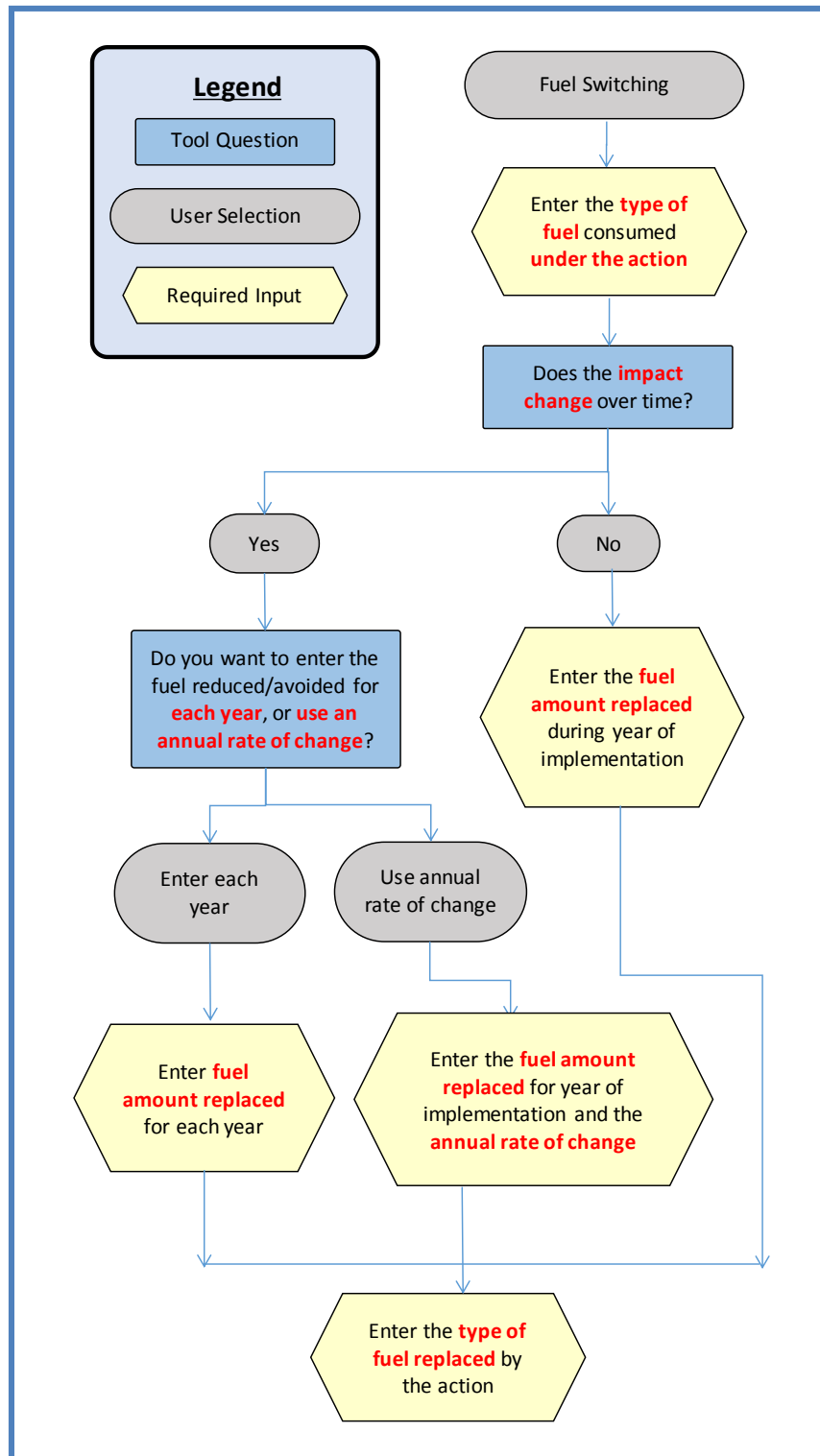
Figure 3: Clean Energy GHG Projections Calculator Pathway: Energy Efficiency

Legend

Tool Question

User Selection

Required Input

Energy Efficiency

Enter the **type of fuel** consumed under the action

Does the **impact change** over time?

Yes

No

Do you want to enter the fuel reduced/avoided for **each year**, or **use an annual rate of change**?

Enter the **amount of energy consumed** after the efficiency measures have been installed in the year of

Enter each year

Use annual rate of change

Enter **amount of energy reduced or saved** for each year

Enter the **amount of energy consumed** in the year of implementation and the **annual rate of change**

Do you know the **amount of energy** that would have been consumed in the abscence of the action, or **percent energy savings** due to the action?

Amount

Percent

Enter the **baseline energy consumption**

Enter the **percent** energy savings