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AUTOMATED REGISTER V1.0.2: User Manual

Manual for Using

the

Automated Register of Implemented Actions

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DISCLAIMER

1 Introduction

1.1 Automated Register of Implemented Actions

Automated Register of the Implemented Action (The "Register") is designed to assist you in your path towards Superior Energy Performance (SEP) certification and complements the SEP Measurement and Verification (M&V) Protocol.

Completion of this Register **does not** guarantee certification. If you are not pursuing SEP certification, you can still use this register to organize and track your energy performance. This Register will summarize the key details of the implementation of each action, including action description, actual energy savings, source of energy savings determination, and responsible party. All actions affecting the energy performance improvement over the achievement period should be included, regardless of whether the action is associated with ISO 50001 "Action Plans" or "Significant Energy Uses". The Register should reflect energy savings over the reporting period; typically, this will be annual savings.

1.2 About This User Manual

This user manual is drafted to accompany the Quick Guide and the Guidance Document tab that exists in the Register. The purpose of this manual is to provide detailed explanation about the Register, input and output parameters, as well as guidance on how it should be completed and used.

2 The Register

2.1 Getting Started

The current version (V1.0.2) of the Register uses Microsoft Excel and you can access it by using a Mac or a PC device. Figure 1 shows the landing page of the Register.

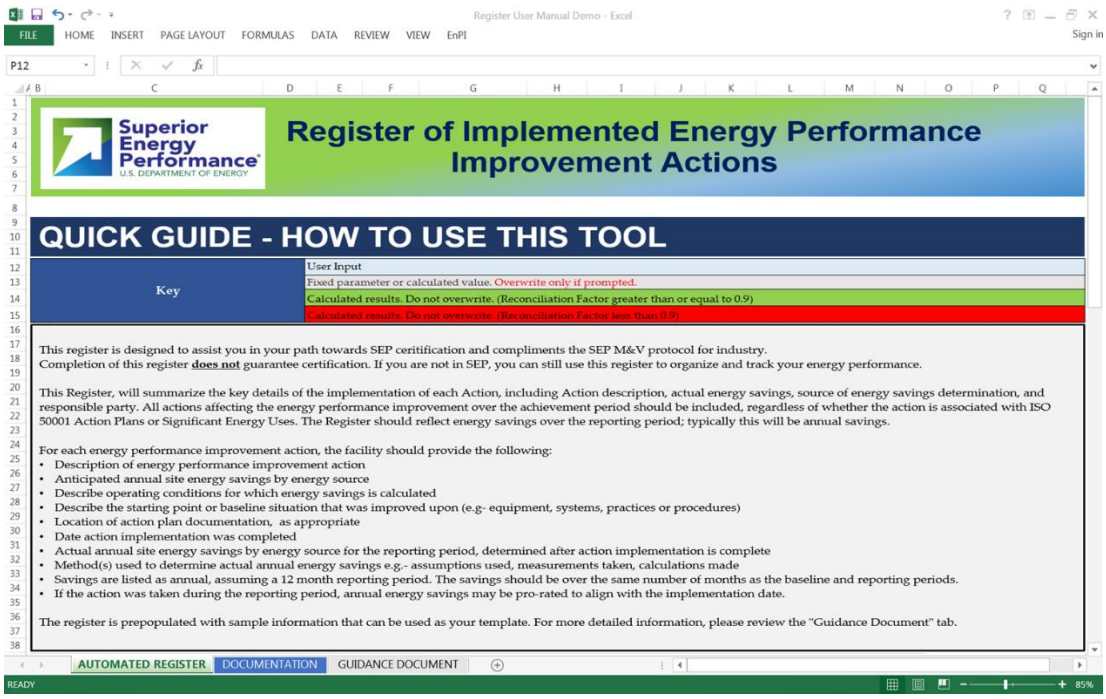


Figure 1: Landing Page of the Register

The Register is made up of three main tabs and two example tabs. In the following sections, we will walk you through each of the main tabs in detail.

2.2 AUTOMATED REGISTER

2.2.1 Quick Guide

The Quick Guide section will help you understand the basics behind the color coding that is used throughout the Register. The input and output cells are color-coded so that user input, fixed parameters, and calculated results can be easily identified. Figure 2 summarizes this color-coding. Overwriting **gray**, **green**, and **red** cells will result in loss of the equation in that cell. Please save a copy of the original file before modifying those cells to avoid any loss of information.

Key	User Input
	Fixed parameter or calculated value. Overwrite only if prompted.
	Calculated results. Do not overwrite. (Reconciliation Factor greater than or equal to 0.9)
	Calculated results. Do not overwrite. (Reconciliation Factor less than 0.9)

Figure 2: Color Coding Key - Used to Identify Input, Output, and Fixed Parameters

The textbox after the table shown above reiterates the goal of the Register and remind you that for each energy performance improvement action, the facility should provide the following:

- Description of energy performance improvement action.

- Anticipated annual delivered energy savings for each energy type (NOTE: Savings are listed as annual, assuming a 12-month reporting period. The savings shall be over the same number of months as the baseline and reporting periods):
    - Describe operating conditions for which energy savings are calculated.
    - Describe the starting point or baseline situation that was improved upon (e.g., equipment, systems, practices, or procedures).
- Anticipated annual primary energy savings for each energy type.
- Link or location of action plan documentation, as appropriate.
- Date action implementation was completed.
- Actual annual delivered energy savings for each energy type for the reporting period, determined after the implementation of the energy performance improvement action is complete (NOTE: If the action was taken during the reporting period, annual energy savings may be pro-rated to align with the implementation date).
- Actual annual primary energy savings for each type of energy for the reporting period, determined after the implementation of the energy performance improvement action is complete.
- Method(s) used to determine actual annual energy savings.
    - For example, assumptions used, measurements taken, calculations, and conversion factors.

2.2.2 Facility Information

In this section, you should identify the person filling out the Register, date the Register was filled, facility name, baseline period, and the reporting period. Figure 3 shows the Facility Information section.

FACILITY INFORMATION			
Name of the Person Filling This Register:			
Date This Register Was Filled Out DD/MM/YYYY):			
Facility Name:			
Baseline Period (DD/MM/YYYY to DD/MM/YYYY):		to	
Reporting Period (DD/MM/YYYY to DD/MM/YYYY):		to	

Figure 3: Facility Information Input Section

2.2.3 Results

The results section condenses all the inputs into the Reconciliation Factor (RF) which is a way to measure the energy performance improvement for the purposes of

demonstrating SEP conformance and certification. RF is determined through a comparison of the results from the top down and bottom up energy savings.

RESULTS

Primary Energy Savings During the Reporting Period (MMBTU)	Top Down (From linear regression analysis i.e. EnPI tool)	Bottom Up (Calculated from the inputs of this register)	Reconciliation Factor
Total	0	0	#DIV/0!
Electricity		0	Reconciliation Factor (RF) is the ratio of bottom up estimated energy savings to energy savings estimated from the top down adjustment method used to calculate the SEnPI. It should be noted that ideally the RF will be 1.0 or higher (bottom up meets or exceeds top down).
Natural Gas		0	
Coal		0	
Fuel Oil		0	
Propane		0	
Other 1		0	
Other 2		0	

Figure 4: Results Section

Top-down energy savings is determined by using the Top-Down energy performance improvement percentage which is the facility-level improvement, calculated from energy consumption data at the whole facility level. You should enter the Top Down Energy Savings from a linear regression analysis (i.e. EnPI tool). Figure 5 shows the cells from the EnPI tool where the Top Down Energy Savings can be found (in this case forecasted for electricity and natural gas). To learn more about determining top down energy savings, please review section 8 of the SEP M&V Protocol.

	2008	2009	2010	2011
Actual Electricity Source (MMBTU)	1,863,234	1,973,204	2,277,072	2,461,229
Actual Natural Gas (MMBtu)	637,268	549,437	540,410	535,287
TOTAL (MMBtu)	2,500,501	2,522,641	2,817,482	2,996,516
Adjustment Method	Model Year	Forecast	Forecast	Forecast
Modeled Electricity Source (MMBTU)	1,863,234	2,049,634	2,318,750	2,567,641
Electricity Source (MMBTU) Annual Savings	0	76,429	41,678	106,413
Modeled Natural Gas (MMBtu)	637,268	632,775	621,367	605,950
Natural Gas (MMBtu) Annual Savings	0	83,339	80,957	70,663
Total Modeled Energy Consumption (MMBtu)	2,500,501	2,682,409	2,940,117	3,173,592
SEnPI Cumulative	1.000	0.940	0.958	0.944
Cumulative Improvement (%)	0.00%	5.96%	4.17%	5.58%
Annual Improvement (%)	0.00%	5.96%	-1.79%	1.41%
Annual Savings (MMBtu/year)	0	159,768	122,635	177,076
Cumulative Savings (MMBtu)	0	159,768	282,403	459,479
Avoided CO2 Emissions (Metric Ton/year)	0	19,079	12,290	24,154

Figure 5: Planned Output of the latest EnPI Tool (v4.0)

Bottom-up energy savings is the facility-level energy savings calculated by analysis of individual actions taken at the facility. The Register calculates the Bottom Up Energy Savings, based on the actions entered. Next section, provides a detailed discussion on how to enter, define, and document the Implemented Actions.

2.2.4 Actions

Figure 6 shows the input section and all the necessary input parameters that needs to be defined for each action.

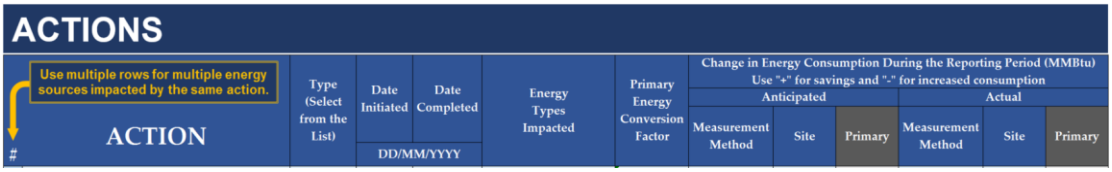


Figure 6: Actions Input Section

As shown in Figure 7, you can use drop down menus to select Action Type, Energy Type(s) Impacted, and Measurement Methods.

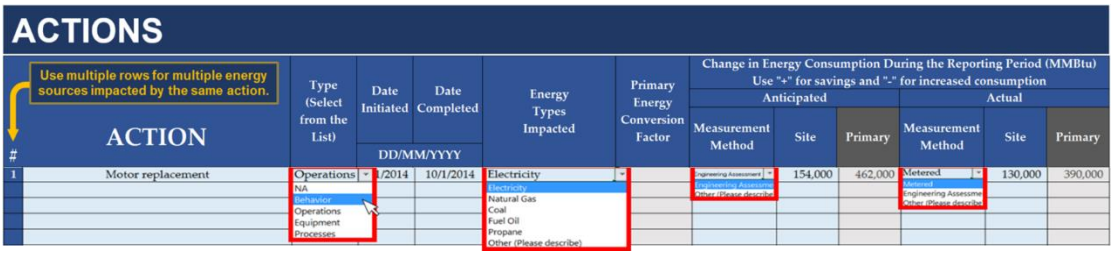


Figure 7: Defining Action Type, Energy Source(s) Impacted, and Measurement Methods

2.2.4.1 Action Title

To enter actions, start by entering the action number and a descriptive title for that action. Dedicate each row to a specific energy type impacted by that action. Use multiple rows for multiple energy sources impacted by the same action.

2.2.4.2 Action Type

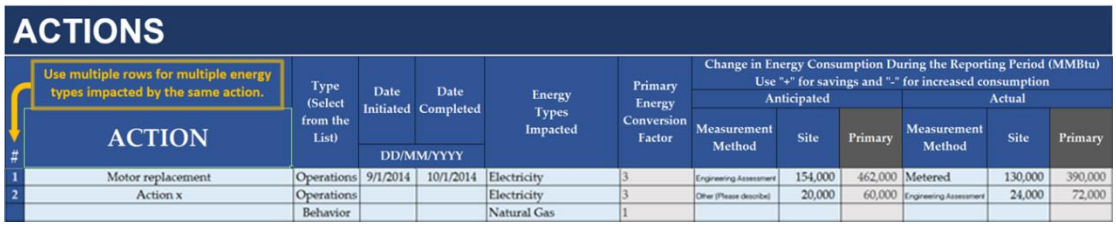
Actions should fall into one of the available four categories (Behavior, Operations, Equipment, and Processes). Select NA if the selected action does not fall into those categories and use the documentation tab for further explanation.

2.2.4.3 Initiation and Completion Dates

Identify the date on which the facility started implementing each action as well as the date when the action implementation was complete. Use MM/DD/YYY format when entering initiation and completion dates.

2.2.4.4 Energy Types Impacted

Select energy type(s) impacted from the drop down menu for each action. Dedicate each row to just one energy type and use multiple rows if multiple energy types are impacted by the same action. Figure 8, shows an example of an action that has impacted two energy types (Electricity and Natural gas).



ACTIONS

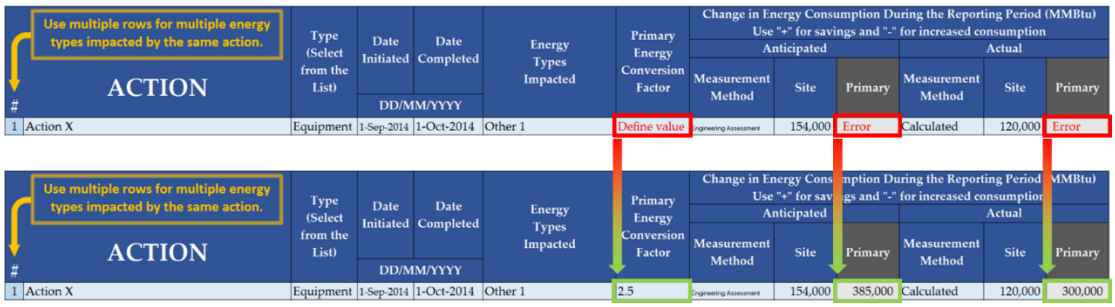
#	ACTION	Type (Select from the List)	Date Initiated (DD/MM/YYYY)	Date Completed (DD/MM/YYYY)	Energy Types Impacted	Primary Energy Conversion Factor	Change in Energy Consumption During the Reporting Period (MMBtu) Use "+" for savings and "-" for increased consumption – Anticipated: Measurement Method	Anticipated: Site	Anticipated: Primary	Actual: Measurement Method	Actual: Site	Actual: Primary
	Use multiple rows for multiple energy types impacted by the same action.											
1	Motor replacement	Operations	9/1/2014	10/1/2014	Electricity	3	Engineering Assessment	154,000	462,000	Metered	130,000	390,000
2	Action x	Operations			Electricity	3	Other (Please describe)	20,000	60,000	Engineering Assessment	24,000	72,000
		Behavior			Natural Gas	1						

Figure 8: Example of an Action (Action 2) Impacting Multiple Energy Sources, Thus Multiple Rows are Used

You can use the dropdown menu to select your Energy Types Impacted. The drop down menu lists the most common energy types, which includes: Electricity, Natural Gas, Fuel Oil, Coal, and Propane. If the desired fuel types are not listed, please select "Other" and provide further detail in the documentation tab.

2.2.4.5 Primary Energy Conversion Factor

If the energy type is listed in the dropdown menu, the Register's built-in library will automatically populate the Primary Energy Conversion Factor. If you selected "Other" as your impacted energy source, you will be promoted to manually enter the conversion factor. If the conversion factor is not defined, you will see "Error" messages appear in the next columns. Figure 9 shows this process.



#	ACTION	Type (Select from the List)	Date Initiated (DD/MM/YYYY)	Date Completed (DD/MM/YYYY)	Energy Types Impacted	Primary Energy Conversion Factor	Change in Energy Consumption During the Reporting Period (MMBtu) Use "+" for savings and "-" for increased consumption – Anticipated: Measurement Method	Anticipated: Site	Anticipated: Primary	Actual: Measurement Method	Actual: Site	Actual: Primary
	Use multiple rows for multiple energy types impacted by the same action.											
1	Action X	Equipment	1-Sep-2014	1-Oct-2014	Other 1	Define value	Engineering Assessment	154,000	Error	Calculated	120,000	Error
	Use multiple rows for multiple energy types impacted by the same action.											
1	Action X	Equipment	1-Sep-2014	1-Oct-2014	Other 1	2.5	Engineering Assessment	154,000	385,000	Calculated	120,000	300,000

Figure 9: Selecting an Energy Source not Listed in the Dropdown Menu.

2.2.4.6 Change in Energy Consumption

Next, enter anticipated and actual energy consumption during the reporting period as well as the method used to come up with those values. Measurement methods can be defined using a drop down menu. When entering change in energy consumption during the reporting period, please use "+" for savings and "-" for increased consumption.

Once you have entered all your implemented actions in the "Automated Register" tab, please go to the "Documentation" tab and provide necessary documentation for all actions. Next sections walks you through your action plan documentation.

2.3 DOCUMENTATION

Use the documentation tab to provide further information regarding each action in the automated register sheet. For each action, please document the location of the action plan documentation, description of the action, and a detailed documentation on how the energy savings are calculated. The documentation should include equations, assumptions, parameters, operating condition before and after the action implementation. Please refer to the sample actions provided in the sample register and use that as a template.

	Action	Location of Action Plan Documentation	Name of Responsible Party/Person	Existing Condition to Be Modified	Planned Action	Anticipated Energy Savings During the Reporting Period (show relevant calculations)	Actual Energy Savings During the Reporting Period
1	Motor replacement	Building 90, Room 3127	Arian Aghajanzadeh	Old inefficient (85% nominal efficiency) 75HP grinding motor needs replacement.	Replace existing with Premium Efficiency motor (94% nominal efficiency).	Energy savings = motor size x C x average load factor x operating hours x (1/eff.old - 1/eff.new) motor size = 75HP and is determined from the nameplate C = conversation from HP to kW (0.74 kW/HP) average load factor = 75% determined through consultation with system operator operating hours = 8760 hours as determined through consultation with system operators eff.new = nameplate nominal efficiency, 94% eff.old = nameplate nominal efficiency, 85%	Energy savings = motor size x C x average load factor x operating hours x (1/eff.old - 1/eff.new) motor size = 75HP and is determined from the nameplate C = conversation from HP to kW (0.74 kW/HP) average load factor = 70% determined through consultation with system operator. **Load factor lower than anticipated, due to increased speed of efficient motor.** operating hours = 8760 hours as determined through consultation with system operators eff.new = nameplate nominal efficiency, 94% eff.old = nameplate nominal efficiency, 85%

Figure 10: Action Plan Documentation

2.3.1.1 Link or Location of Action Plan Documentation

You should provide a physical location or a link to where the action plan documentation can be found.

2.3.1.2 Name of Responsible Party

Please provide the name of the responsible party in charge of the action. The responsible party should be able to provide documentation regarding the implemented action and should be able to support the values, assumptions, and measurements that are listed in the register.

2.3.1.3 Existing Condition to be Modified

In this cell, the user should describe the current operating conditions (i.e. efficiencies, temperature, pressure, etc.) before implementation of the action.

2.3.1.4 Planned Action

The detailed description of the planned action. Try to specifically define the action type and the energy types it impacted. If any of your selection in the first tab requires further explanation, please use this box to provide more information.

2.3.1.5 Detailed Calculations for Anticipated and Actual Energy Savings

This is the most important part of the register. You should be as detailed as possible when filling out this section. To document your calculations please list all the equations used, assumptions made, values used, and sources where those values came from (e.g. consultation with plant operators, CRC Handbook, etc.). The examples in the register are a good source to get you started.