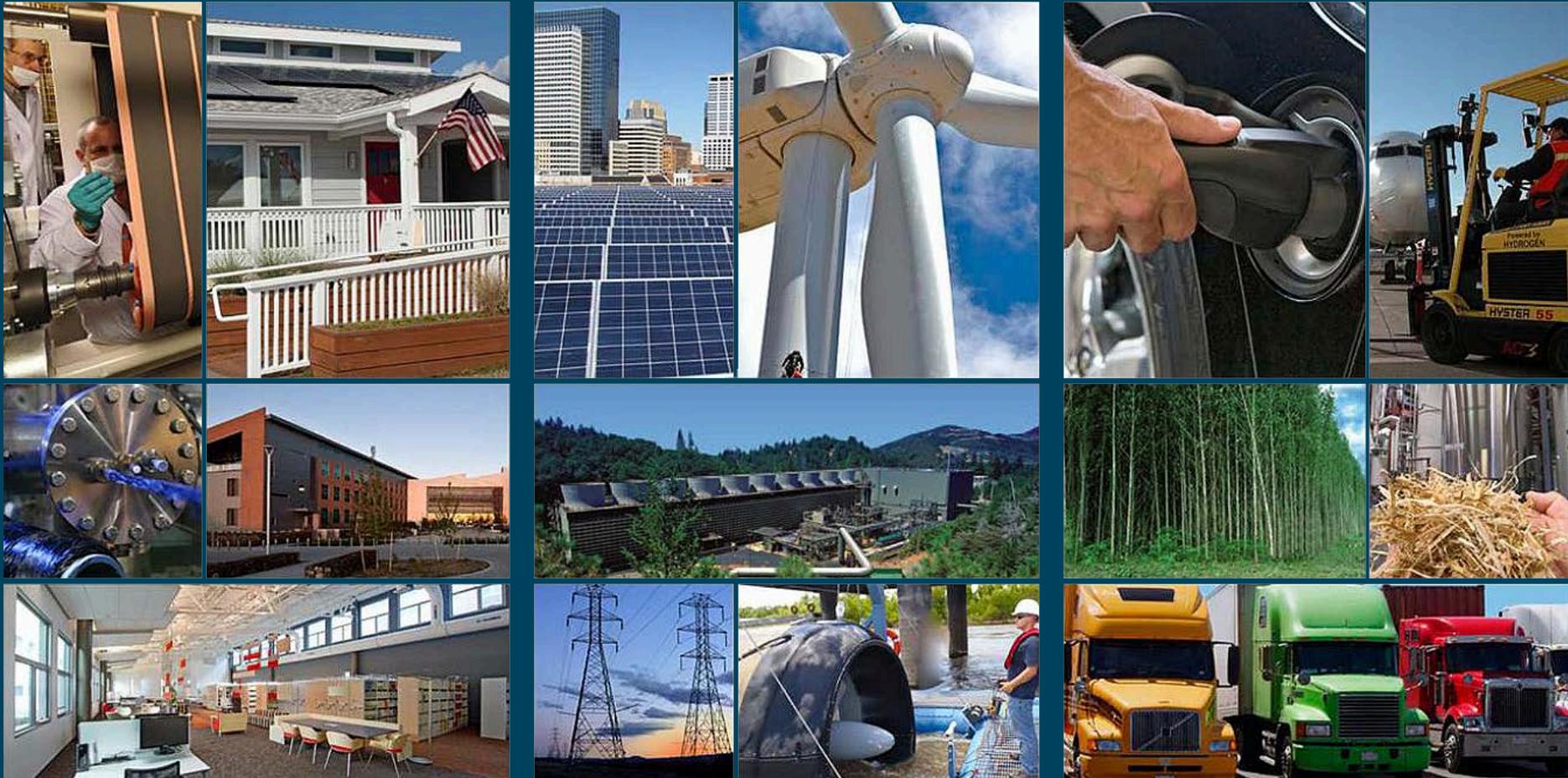


Energy Footprint Tool

Overview and Tour



U.S. DEPARTMENT OF
ENERGY

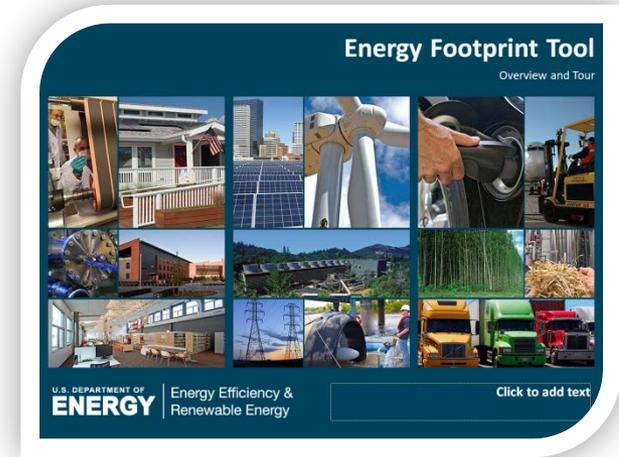
Energy Efficiency &
Renewable Energy

How to use this Document

This document is designed to be used as both a comprehensive presentation and a quick reference for the **Energy Footprint Tool**

To use as a quick reference:

- The [table of contents](#) provides links to all of the key topics covered.
- Each page also includes a direct link back to the table of contents



How to use the Energy Footprint Tool

The **Energy Footprint Tool** is designed to be easy to use with significant built-in documentation. Detailed labels and pop-up help windows on all sheets allow users quickly begin using all features.

What data needs to be gathered?

Monthly Energy Bills should provide all of the required *Energy Consumption* data.

Depending on the *Relevant Variables*, these may or may not be tracked at the plant (ex. production, operating hours) and might need to be looked up (ex. degree days)

Energy Uses may or may not be individually tracked by the plant and could potentially be estimated based on energy consumption or possibly directly measured

Energy Footprint - ENERGY CONSUMPTION

Month	kWh	Electricity	Gas	Oil	Coal	Other	Total
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Year Total							

Energy Footprint - RELEVANT VARIABLES

Month	HDD	Production	Operating Hours	Production	Operating Hours	Production	Operating Hours
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Year Total							

Energy Footprint - ENERGY USES

Month	kWh	Electricity	Gas	Oil	Coal	Other	Total
Jan							
Feb							
Mar							
Apr							
May							
Jun							
Jul							
Aug							
Sep							
Oct							
Nov							
Dec							
Year Total							

Table of Contents (click links to jump to section)

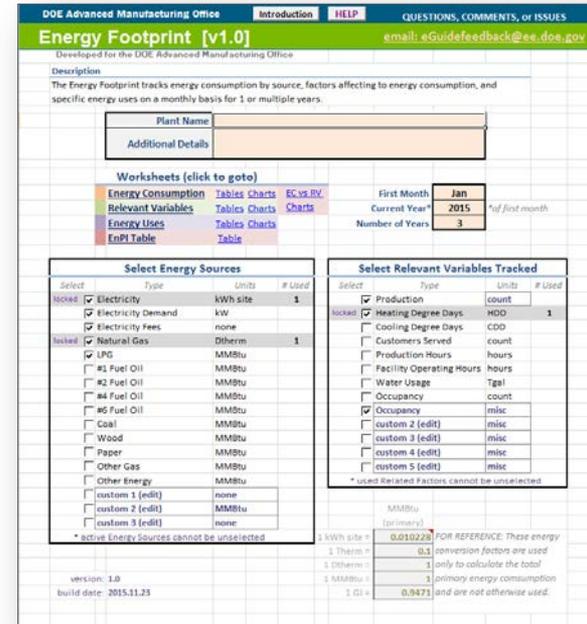
[Introduction to the Energy Footprint Tool](#)

[Summary of Key Sheets](#)

[Key Terms](#)

Spreadsheet Details [[description structure](#)]:

- Main: [Layout](#) [Notes](#)
- Energy Consumption: [Layout](#) [Notes](#)
- EC Charts: [Layout](#) [Notes](#)
- Relevant Variables: [Layout](#) [Notes](#)
- RV Charts: [Layout](#) [Notes](#)
- EC-RV: [Layout](#) [Notes](#)
- Energy Uses: [Layout](#) [Notes](#)
- EU Charts: [Layout](#) [Notes](#)
- EnPI Table: [Layout](#) [Notes](#)
- Raw Data: [Layout](#) [Notes](#)

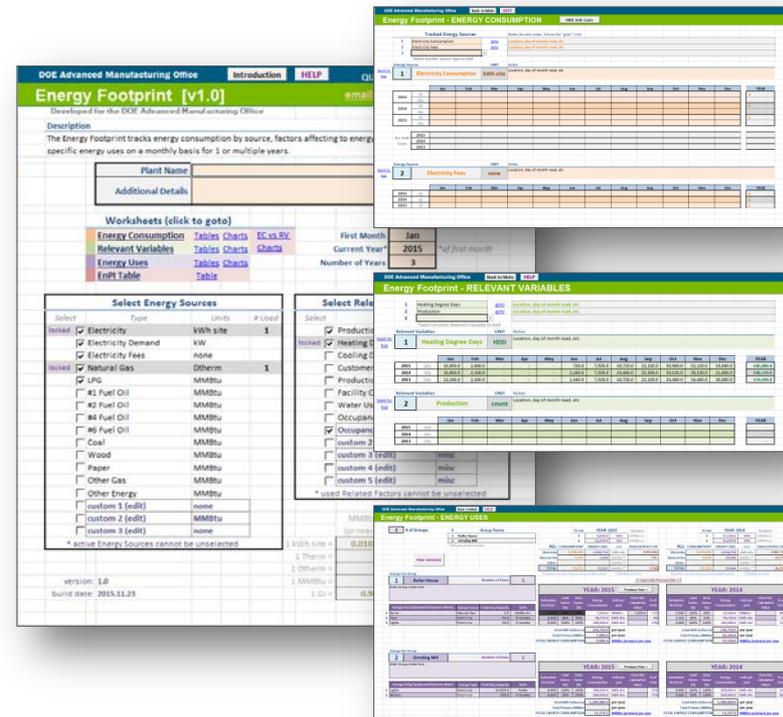


Introduction

The **Energy Footprint Tool** is designed to allow users to easily track energy consumption, relevant variables, and energy uses.

Key tracking & features include:

- **Energy Consumption**
 - Up to 20 Tracked Energy Sources
- **Relevant Variables**
 - Up to 20 Tracked Variables
- **Energy Use**
 - Up to 10 Energy Use Groups
 - Up to 30 Components Each
- **Charts for all tracked data**
- **Export to the EnPI tool**



Summary of Key Sheets

Main – Overview of footprint tool with key settings

Energy Consumption – Monthly energy consumption and cost data

EC Charts – Energy consumption charts

Relevant Variables – Monthly and yearly data for relevant variables

RV Charts – Relevant variable charts

EC-RV – Charts comparing selected energy consumption with relevant variables

Energy Uses – Yearly energy uses tracked by group and specific use

EU Charts – Charts of energy uses

EnPI Table – Exportable data table compatible with EnPI analysis tool

Raw Data – All entered energy consumption and relevant variables data in one large table

Key Terms

Energy Consumption

Defined as the “quantity of energy applied” (source ISO 50001:2011), it is the amount of energy consumed

Energy Source

The type of energy consumed: electricity, natural gas, fuel oil, etc. Electricity is broken into 3 components: electricity consumption, demand, and fees

Relevant Variables

Variables that likely contribute to energy consumption and use: production, operating hours, heating degree days, etc.

Energy Use

Defined as the “manner or kind of application of energy”, this often refers to energy use by specific equipment and applications

Load Factor

Average load relative to the full load of the equipment

Duty Factor

Average ratio of run time to operating hours

EnPI

Stands for *Energy Performance Indicator* and is defined as the “quantitative value or measure of energy performance” (source ISO 50001:2011)

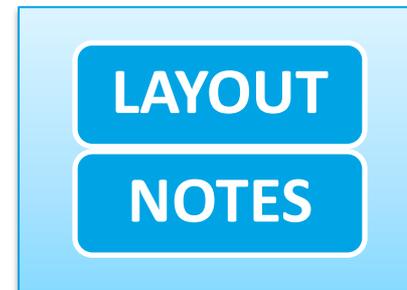
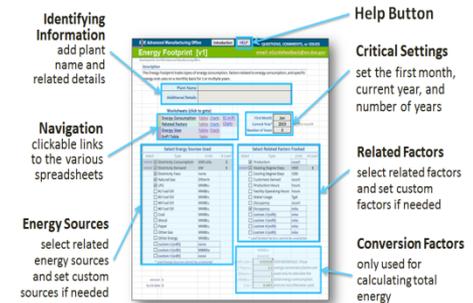
Structure of Sheet Descriptions

LAYOUT

Screenshot of the sheets provide details about the layout, highlighting key components

NOTES

List of functions, features, and tips related to the sheet



- To enter a new years worth of data, change the **Current Year** to the new year and increase the **Number of Years** by 1
- Selected **Energy Sources** and **Related Factors** cannot be changed after they have been directly connected with data and will be grayed out and tagged with the word *locked*.
- The *Introduction* popup can be stopped from automatically opening by checking the box in the lower left of the popup.
- The links to the **Energy Consumption** and **Related Factors** charts only appear if associated data has been entered.
- Changing **First Month** does not adjust entered data. If the **First Month** is changed after the data has been entered, the data will be aligned with different months.

Identifying Information
add plant name and related details

Navigation
clickable links to the various spreadsheets

Energy Sources
select related energy sources and set custom sources if needed

Help Button

Critical Settings

set the first month, current year, and number of years

Relevant Variables

select relevant variables and set custom variables if needed

Conversion Factors

only used for calculating total energy consumption and by energy use

DOE Advanced Manufacturing Office | Introduction | **HELP** | QUESTIONS, COMMENTS, or ISSUES
 email: eGuidefeedback@ee.doe.gov

Energy Footprint [v1.0]
 Developed for the DOE Advanced Manufacturing Office

Description
 The Energy Footprint tracks energy consumption by source, factors affecting to energy consumption, and specific energy uses on a monthly basis for 1 or multiple years.

Plant Name: _____
 Additional Details: _____

Worksheets (click to goto)
 Energy Consumption | Tables | Charts | EC vs RV
 Relevant Variables | Tables | Charts | Charts
 Energy Uses | Tables | Charts
 EnPI Table | Table

First Month: Jan
 Current Year*: 2015
 Number of Years: 3

Select	Type	Units	# Used
<input checked="" type="checkbox"/>	Electricity	kWh site	1
<input checked="" type="checkbox"/>	Electricity Demand	kW	
<input checked="" type="checkbox"/>	Electricity Fees	none	
<input checked="" type="checkbox"/>	Natural Gas	Dtherm	1
<input checked="" type="checkbox"/>	LPG	MMBtu	
<input type="checkbox"/>	#1 Fuel Oil	MMBtu	
<input type="checkbox"/>	#2 Fuel Oil	MMBtu	
<input type="checkbox"/>	#4 Fuel Oil	MMBtu	
<input type="checkbox"/>	#6 Fuel Oil	MMBtu	
<input type="checkbox"/>	Coal	MMBtu	
<input type="checkbox"/>	Wood	MMBtu	
<input type="checkbox"/>	Paper	MMBtu	
<input type="checkbox"/>	Other Gas	MMBtu	
<input type="checkbox"/>	Other Energy	MMBtu	
<input type="checkbox"/>	custom 1 (edit)	none	
<input type="checkbox"/>	custom 2 (edit)	MMBtu	
<input type="checkbox"/>	custom 3 (edit)	none	

Select	Type	Units	# Used
<input checked="" type="checkbox"/>	Production	count	
<input checked="" type="checkbox"/>	Heating Degree Days	HDD	1
<input type="checkbox"/>	Cooling Degree Days	CDD	
<input type="checkbox"/>	Customers Served	count	
<input type="checkbox"/>	Production Hours	hours	
<input type="checkbox"/>	Facility Operating Hours	hours	
<input type="checkbox"/>	Water Usage	Tgal	
<input type="checkbox"/>	Occupancy	count	
<input checked="" type="checkbox"/>	Occupancy	misc	
<input type="checkbox"/>	custom 2 (edit)	misc	
<input type="checkbox"/>	custom 3 (edit)	misc	
<input type="checkbox"/>	custom 4 (edit)	misc	
<input type="checkbox"/>	custom 5 (edit)	misc	

* active Energy Sources cannot be unselected

	MMBtu (primary)	
kWh site =	0.010228	
1 Therm =	0.1	
1 Dtherm =	1	
1 MMBtu =	1	
1 GJ =	0.9471	

FOR REFERENCE: These energy conversion factors are used only to calculate the total primary energy consumption and are not otherwise used.

version: 1.0
 build date: 2015.11.23

- To enter a new years worth of data, change the **Current Year** to the new year and increase the **Number of Years** by 1
- Selected **Energy Sources** and **Relevant Variables** cannot be changed after they have been directly connected with data and will be grayed out and tagged with the word *locked*.
- The *Introduction* popup can be stopped from automatically opening by checking the box in the lower left of the popup.
- The links to the **Energy Consumption** and **Relevant Variables** charts only appear if associated data has been entered.
- Changing the **First Month** does not adjust entered data. If the **First Month** is changed after the data has been entered, the data will be aligned with different months.

Energy Consumption sheet

LAYOUT

[GO TO Table of Contents](#)

Tracked Energy Sources
includes only selected
Energy Source types

Energy Source Units
pulled from Main sheet

Energy Sources #
the ID number for
the specific energy
source data

Energy Source Notes
Can include details
like meter location,
utility, building, etc

**Energy Source Cost
and Unit Data**
entered by
year and month

Yearly Totals

Unit Costs
can be
hidden or
displayed as
needed

The screenshot displays the 'Energy Footprint - ENERGY CONSUMPTION' spreadsheet. It features a 'Tracked Energy Sources' table with columns for source ID, name, and unit. Below this are data tables for 'Electricity' (kWh) and 'Natural Gas' (Dtherm). Each data table includes monthly consumption (Qty) and cost (\$), as well as yearly totals. A 'Per Unit Costs' section is also present at the bottom of each data table. The spreadsheet includes navigation links like 'Back to Main' and 'HELP', and a 'Notes' field for each source.

Energy Source Format Repeats
unit fields are hidden for unit-less
energy sources

- Up to 20 **Energy Sources** can be tracked
- Units fields only appear for **Energy Sources** that include units. For example, *Electricity Fees* do not include units
- To add a new **Tracked Energy Source**, select it from the dropdown menu in the blank space
- Only the last **Tracked Energy Source** can be removed. This can be done by deleting the **Energy Source** from the list.
- To add an **Energy Source** to the dropdown menu, go to the **Main** sheet and select the additional **Energy Source**
- *Unit Costs* can be used to quickly identify data errors
- Even when rows are hidden, the data is not deleted or overwritten

Selected Energy Source

Charts display selected energy source

Related Data Tables

Tables of charted data

Energy Source Notes

Notes pulled from Energy Consumption sheet

Monthly Data Charts

Displays monthly costs and energy consumption for each tracked year

Yearly Data Charts

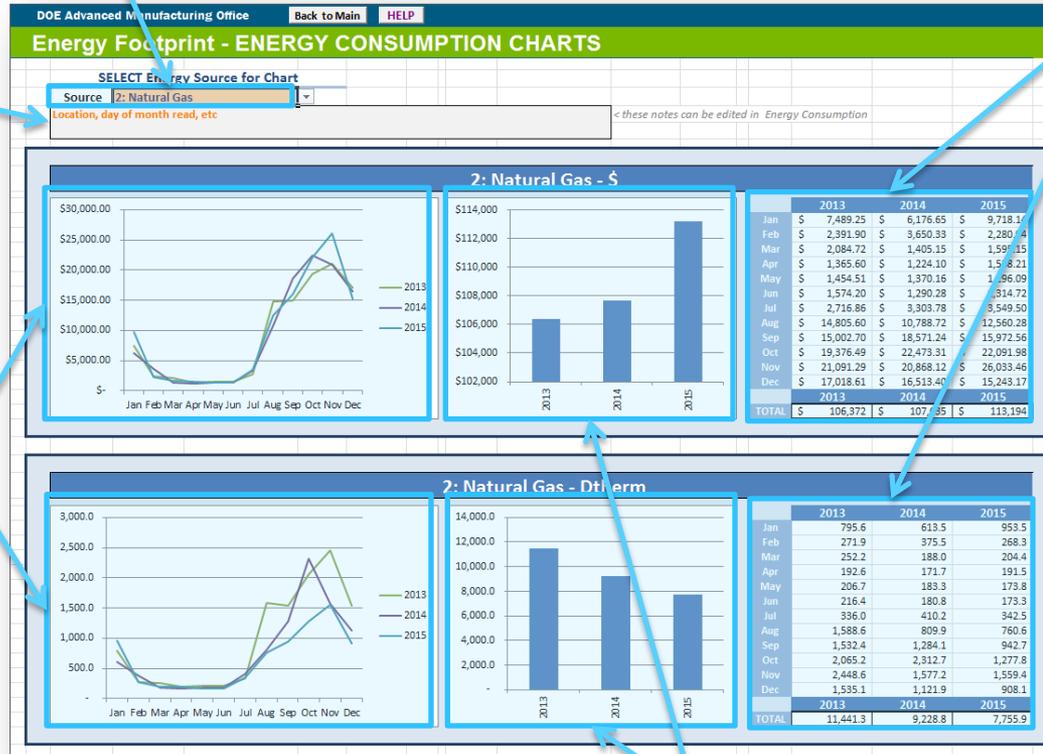
Displays total yearly costs and energy consumption

Cost Related

Charts and tables

Energy Consumption Related

Charts and tables. Hidden if unit-less energy source selected



- The ***EC Charts*** sheet will be hidden until **Tracked Energy Sources** are added to the ***Energy Consumption*** sheet
- Change the selected **Energy Source** to change the charts
- The notes associated with the **Energy Source** will also be displayed
- Additional aggregate Energy Consumption data can be charted if applicable including; *Total Electricity, Total Natural Gas, Total Other*, and overall *Total Energy*
- The usage charts will be hidden if the selected **Energy Source** is unit-less
- Changing the selected **Energy Source** will also update the selected **Energy Source** on the ***EC-RV*** sheet

Tracked Relevant Variables
includes only selected Relevant Variable types

Relevant Variables Units
pulled from Main sheet

Relevant Variables Notes
Can include details like building, tracking method, source, etc

Relevant Variables #
ID number of the tracked sources

Relevant Variables Data
entered by year and month

Yearly Totals

Energy Footprint - RELEVANT VARIABLES																
1	Heating Degree Days	goto	Location, day of month read, etc													
2	Production	goto	Location, day of month read, etc													
*Select Another Relevant Variable to Add		UNIT	Notes													
back to top	1	Heating Degree Days	HDD	Location, day of month read, etc												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YEAR
	2015	Qty		10,800.0	2,880.0	-	-	-	720.0	7,920.0	18,720.0	22,320.0	30,960.0	33,120.0	19,440.0	146,880.0
	2014	Qty		10,800.0	2,160.0	-	-	-	2,160.0	7,920.0	19,440.0	25,200.0	29,520.0	29,520.0	21,600.0	148,320.0
	2013	Qty		12,240.0	2,160.0	-	-	-	1,440.0	7,920.0	18,720.0	22,320.0	24,480.0	24,480.0	20,880.0	134,640.0
back to top	2	Production	count	Location, day of month read, etc												
				Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	YEAR
	2015	Qty														-
	2014	Qty														-
	2013	Qty														-

Relevant Variables Format Repeats

- Up to 20 **Relevant Variables** can be tracked
- To add a new **Relevant Variables**, select it from the dropdown menu in the blank space
- Only the last **Relevant Variables** can be removed by deleting the Energy Source from the list
- To add a **Relevant Variables** to the dropdown menu, go to the **Main** sheet and select the additional **Relevant Variables**
- Even when rows are hidden, the data is not deleted or overwritten

Selected Relevant Variable

Charts displayed selected relevant variable

Total or Average

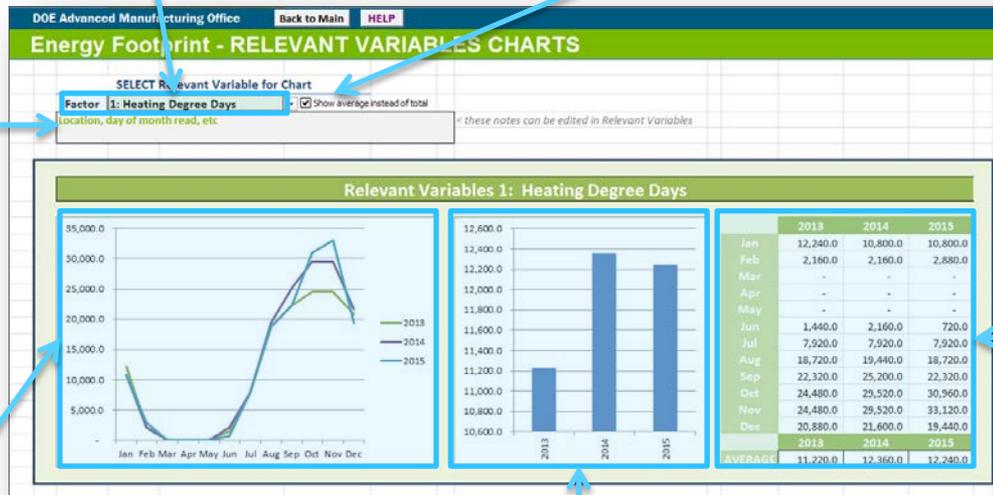
Checkbox toggles between displaying yearly average and total

Relevant Variable Notes

Notes pulled from Relevant Variables sheet

Monthly Data Chart

Displays monthly costs and usage for each tracked year



Related Data Tables

Table of charted data

Yearly Data Charts

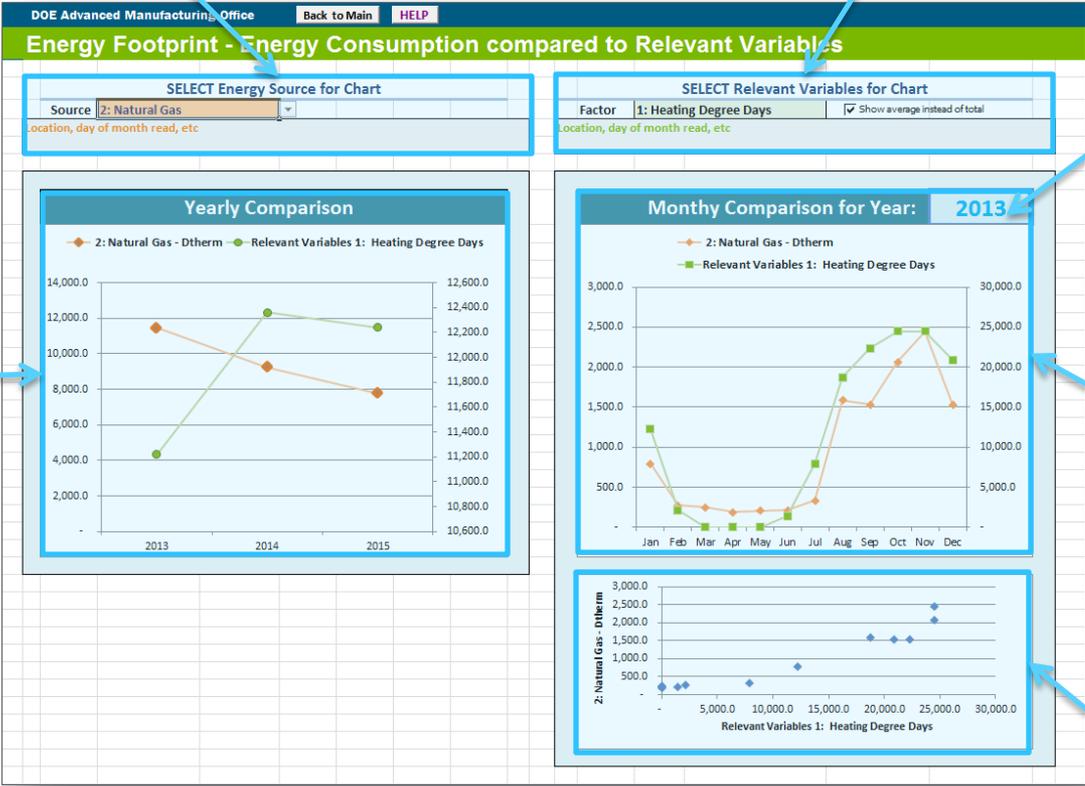
Displays yearly total or average for Relevant Variable

- The ***RV Charts*** sheet will be hidden until **Tracked Relevant Variables** are added to the ***Relevant Variables*** sheet
- Change the selected **Relevant Variables** to change the charts
- The notes associated with the **Relevant Variables** will also be displayed
- Changing the selected **Relevant Variable** will also update the selected **Relevant Variable** on the ***EC-RV*** sheet
- The ***Show average instead of total*** checkbox will change the yearly total to yearly average to better represent **Relevant Variables** that are not cumulative

Selected Energy Source
Charts display selected energy source

Selected Relevant Variable
Charts display selected Relevant Variable

Selected Year
Current year used for comparison charts below. Change to update



Yearly Data Comparison
Compares energy source yearly energy consumption with Relevant Variable yearly total or average

Monthly Data Comparison
Compares energy source consumption with Relevant Variable by month

Direct Comparison
Energy consumption is directly plotted against the Relevant Variable

- The ***EC-RV Charts*** sheet will be hidden until both **Energy Consumption** and **Tracked Relevant Variables** have been added
- Change the selected **source** or **factor** to update the the charts
- Changing the selected **source** or **factor** will also update the selected **source** or **factor** on the related sheet
- Changing the *Year* will update both monthly comparison charts
- The *Show average instead of total* checkbox will change the yearly total to yearly average to better represent **Relevant Variables** that are not cumulative

Energy Uses sheet

LAYOUT

Number # of Groups

The number # selected controls the number of groups displayed below

Number # of Items

This controls the number of items included in this group

Duplicate Previous Year

Copies previous years data to current year

Energy Use Group Total Yearly Energy Consumption

Total for each groups yearly energy end-use

Group Name and Notes

Enter group name and descriptive details about the group

Group Item List

List of equipment and other energy uses that are included in this group

Yearly Energy Source Breakdown

Yearly energy consumption for each energy use group and overall by energy source

Energy Use

Energy consumption by energy use estimated or directly entered

Group Energy Source Breakdown

Energy use group total energy consumption by energy source

Current Selected Year

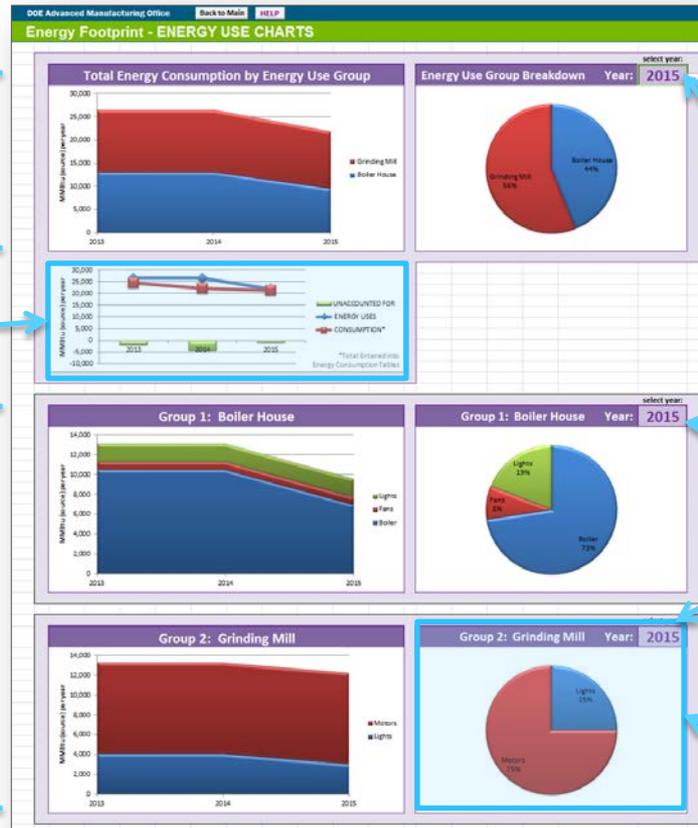
Previous Year

- The ***Energy Uses*** sheet uses navigation buttons to switch the current year displayed
- Only 2 years are displayed at a time, the current selected year and the year previous to that
- A previous years Energy End-Use data can be copied to the current selected year by clicking the *Duplication Previous Year* button and typing “*confirm*” into the confirm popup
- The ***Energy Uses*** sheet attempts to estimate the equipment energy consumption by using load factor, duty factor, and operating hours. If the actual energy consumption is known, it can be entered in the override field and other will be ignored
- A *Summary* of the equipment, group, and total energy consumption by year can be displayed by clicking the *View Summary* button

Total Yearly Energy Use
Comparing all groups

Total Yearly Energy Use and Energy Consumption Comparison

Group Specific Charts
Charts for each active energy use group



Selected Year
Pie charts display data for selected year. Change any selected year to update all

Pie Chart of Energy Use

- Changing any of the selected *Years* will update all select *Years* and associated pie charts
- The charts display groups and items based on the *number of groups/items* selected on the **Energy Uses** sheet. This means blank rows will still be charted if they are visible. To correct this, adjust the *number of groups/items* on the **Energy Uses** sheet to match the number of groups/items with data.
- The chart comparing **Energy Use** with **Energy Consumption** only displays energy consumption for energy use groups and overall by year. To compare energy consumption by energy use in more detail, review the summary tables in the **Energy Uses** sheet

DOE Advanced Manufacturing Office [Back to Main](#) [HELP](#)

Energy Footprint - EnPI Compatible Table

The following table provides the entered energy and related factors data in a format compatible with the DOE EnPI tool. NOTE: The EnPI Tool MUST FIRST be downloaded and installed.

download: <https://ecenter.ee.doe.gov/EM/tools/Pages/EnPI.aspx>

Once the EnPI has been installed, click the "EXPORT TABLE" button to export this table for use with the EnPI tool

[EXPORT TABLE](#)

Date	Electricity (kWh site)	Electricity Cost	Natural Gas (Dtherms)	Natural Gas Cost	Other Energy (MMBtu)	Other Energy Cost	Heating Degree Days (HDD)	Production (count)
4/1/2013	81,480.00	\$ 13,541.30	795.60	\$ 7,489.25	-	\$ -	12,240.00	-
5/1/2013	80,640.00	\$ 15,088.00	271.87	\$ 2,391.90	-	\$ -	2,160.00	-
6/1/2013	149,600.00	\$ 25,365.00	252.19	\$ 2,084.72	-	\$ -	-	-
7/1/2013	135,975.00	\$ 22,205.30	192.60	\$ 1,365.60	-	\$ -	-	-
8/1/2013	137,072.00	\$ 22,526.40	206.65	\$ 1,454.51	-	\$ -	-	-
9/1/2013	101,178.00	\$ 18,001.17	216.44	\$ 1,574.20	-	\$ -	1,440.00	-
10/1/2013	95,372.00	\$ 18,395.80	336.02	\$ 2,716.86	-	\$ -	7,920.00	-
11/1/2013	78,106.00	\$ 13,787.62	1,588.63	\$ 14,805.60	-	\$ -	18,720.00	-
12/1/2013	123,930.00	\$ 22,373.40	1,532.35	\$ 15,002.70	-	\$ -	22,320.00	-
1/1/2014	89,991.00	\$ 15,670.20	2,065.25	\$ 19,376.49	-	\$ -	24,480.00	-
2/1/2014	107,565.00	\$ 18,955.68	2,448.60	\$ 21,091.29	-	\$ -	24,480.00	-
3/1/2014	99,200.00	\$ 17,884.68	1,535.07	\$ 17,018.61	-	\$ -	20,880.00	-
4/1/2014	67,776.00	\$ 12,292.81	613.51	\$ 6,176.65	-	\$ -	10,800.00	-
5/1/2014	113,500.00	\$ 21,077.28	375.54	\$ 3,650.33	-	\$ -	2,160.00	-
6/1/2014	131,047.00	\$ 24,305.75	188.01	\$ 1,405.15	-	\$ -	-	-
7/1/2014	151,925.00	\$ 28,685.28	171.74	\$ 1,224.10	-	\$ -	-	-
8/1/2014	133,400.00	\$ 24,219.36	183.33	\$ 1,370.16	-	\$ -	-	-
9/1/2014	92,640.00	\$ 18,381.30	180.79	\$ 1,290.28	-	\$ -	2,160.00	-
10/1/2014	84,348.00	\$ 14,477.05	410.24	\$ 3,303.78	-	\$ -	7,920.00	-
11/1/2014	90,889.00	\$ 17,243.23	809.88	\$ 10,788.72	-	\$ -	19,440.00	-
12/1/2014	100,400.00	\$ 17,742.78	1,284.12	\$ 18,571.24	-	\$ -	25,200.00	-
1/1/2015	121,824.00	\$ 21,551.04	2,312.66	\$ 22,473.31	-	\$ -	29,520.00	-
2/1/2015	93,394.00	\$ 16,666.56	1,577.22	\$ 20,868.12	-	\$ -	29,520.00	-
3/1/2015	88,896.00	\$ 17,028.00	1,121.90	\$ 16,513.40	-	\$ -	21,600.00	-
4/1/2015	105,282.00	\$ 18,799.57	953.54	\$ 9,718.14	-	\$ -	10,800.00	-
5/1/2015	98,838.00	\$ 17,111.78	268.32	\$ 2,280.94	-	\$ -	2,880.00	-
6/1/2015	123,900.00	\$ 23,615.84	204.43	\$ 1,955.15	-	\$ -	-	-
7/1/2015	144,960.00	\$ 28,495.46	191.52	\$ 1,538.21	-	\$ -	-	-
8/1/2015	128,352.00	\$ 24,430.42	173.76	\$ 1,296.09	-	\$ -	-	-
9/1/2015	104,215.00	\$ 19,004.75	173.28	\$ 1,314.72	-	\$ -	720.00	-
10/1/2015	83,226.00	\$ 14,554.98	342.51	\$ 3,549.50	-	\$ -	7,920.00	-
11/1/2015	106,890.00	\$ 17,746.82	760.62	\$ 12,560.28	-	\$ -	18,720.00	-
12/1/2015	119,200.00	\$ 21,895.12	942.69	\$ 15,972.96	-	\$ -	22,320.00	-
1/1/2016	95,445.00	\$ 15,587.60	1,277.78	\$ 22,091.98	-	\$ -	30,960.00	-
2/1/2016	93,670.00	\$ 16,663.00	1,559.38	\$ 26,033.46	-	\$ -	33,120.00	-
3/1/2016	102,588.00	\$ 18,281.47	908.11	\$ 15,243.17	-	\$ -	19,440.00	-

EXPORT DATA
Generate EnPI tool compatible workbook

Preview Table
This table approximately matches the data and format of the EnPI data input table

- EnPI stands for *Energy Performance Indicator*
- The **EnPI Table** sheet formats the entered data for use with the *EnPI tool* (v4)
- The *EnPI tool* establishes a normalized baseline of energy consumption and tracks annual progress of energy intensity improvements.
- To use this table with the *EnPI tool*, the table must first be exported to a separate workbook. This can be done automatically by clicking the **Export Table** button
- For more information and to download the EnPI tool, goto: <https://ecenter.ee.doe.gov/EM/tools/Pages/EnPI.aspx>

- The ***Raw Data*** table provides all of the entered **Energy Consumption** and **Relevant Variables** data in one large table
- This allows advanced users to easily analyze and work with this data outside of the ***Footprint Tool*** as needed
- All data, including hidden data, is included