



Pharmaceutical Manufacturing Plant Energy Performance Indicator

Version 1 (12/18/2008)

Introduction

The ENERGY STAR pharmaceutical manufacturing plant energy performance indicator tool (EPI) enables comparison of the energy efficiency of a specific U.S.-based pharmaceutical manufacturing plant to that of the industry within the U.S.

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The EPI normalizes for differences between plants, such as size, location, hours of operation, and types of manufacturing operations.

The EPI produces a plant percentile rating between 1 and 100 and compares that rating to the most energy-efficient plants in the industry.

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Pharmaceutical manufacturing plants that rate a 75 or higher using this EPI are eligible to receive ENERGY STAR recognition from the U.S. Environmental Protection Agency. For more information on applying for the ENERGY STAR, see www.energystar.gov/industry

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Eligible Facilities & Space Types

Eligible Facilities:

The Pharmaceutical Manufacturing Plant Energy Performance Indicator is designed to be used by facilities that are primarily engaged in manufacturing, fabricating, or processing of: 1) drugs in pharmaceutical preparations intended for internal and external consumption in dose forms such as ampoules, tablets, capsules, vials, ointments, powders, solutions, and suspensions; or 2) in-vivo diagnostic substances; or 3) combinations of the two.

The EPI does not account for other operations such as R&D and office space *unless they are co-located with manufacturing operations and their function is to support manufacturing operations*. Metered energy data for non-manufacturing operations that are outside the scope of the tool should be removed from any data used as input for the EPI.

To be eligible for ENERGY STAR recognition, 50% of the square footage of the facility or site benchmarked in the EPI must be considered part of manufacturing operations. **The model may still be used as a management tool for facilities that do not meet the minimum requirement for ENERGY STAR recognition.**

Required Data

The following information is required in order to use the EPI.

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Energy Data: Annual energy purchases or transfers for the "current" year and a "reference" year (defined by user) for each energy source and fuel type. Annual is defined as a continuous 12-month period of data as defined by the user, such as a calendar year or fiscal year period.

Hours of Operation: Total operation hours per year at the plant, which are used to reflect plant utilization.

Total Plant Size: Total plant area in thousand square feet. See definitions section for more information.

Size of Operations: Actual or estimated breakdowns of plant operations (e.g. R&D, Bulk Chemical Production, Fill & Finish) as a percentage of total facility size.

Annual Heating & Cooling Degree Day and for the reference year for the actual location of the plant (if weather and temperature are

Data: measured and monitored at the plant) or for a tracked weather station nearest the plant. HDD and CDD data for the nearest tracked weather station may be obtained from the National Oceanic and Atmospheric Administration (NOAA) database at www.noaa.gov.

US ZIP Code: A 5-digit U.S. Postal Service ZIP code assigns the plant location and can be used to generate a default value for heating and cooling degree days. Default values are based on the 30-year average for that location and are provided in the tool to assist users who wish to test the EPI. However, to obtain a more accurate reading from this tool and for purposes of U.S. EPA recognition of plant performance, a user must enter HDD and CDD values derived from either actual weather measurements taken at the plant or tracked through NOAA weather station data.

All data values must be inserted in the white boxes on the EPI tool tab. Definitions are given below.

Definitions of Terms

Plant Characteristics Definitions of terms used in the energy consumption section

ZIP Code: A 5-digit U.S. Postal Service ZIP code assigns the plant location and can be used to generate default HDD & CDD values for weather normalization. Default HDD & CDD values based on 30-year averages are provided in the tool to assist users who wish to test the EPI. To obtain a more accurate reading from the tool and for purposes of U.S. EPA recognition of plant performance, a user must enter HDD and CDD values derived from either actual weather measurements taken at the plant or tracked through NOAA weather station data. See below for more information.

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Location: General location is based on the ZIP code entered by user. User should confirm location matches ZIP code.

Current Plant & Year: Most recent year of data, or other year selected by the user for evaluation.

Reference Plant & Year: User-defined reference plant and year for comparison purposes. Choice of reference year does **Year:** NOT impact current year rating. The reference plant can be the same plant with a different year and annual data. The reference plant can be a plant in a different location if actual HDD/CDD is entered.

Total Plant Size: The total square footage of buildings and process areas benchmarked in the EPI. All space that is used for manufacturing, R&D, or to support these operations should be included. Parking lots and open space should not be included in the total plant size. Small structures such as guard houses, small storage sheds, etc. can be excluded.

Bulk Chemical: Areas where both active and inactive ingredients are prepared in bulk form, including mixing, milling and drying of powders, and the mixing of liquids, gels and creams. All office space that shares HVAC with Bulk Chemical space will be considered as Bulk Chemical space.

Fill and Finish: All indoor areas used for Fill and/or Finish processes OR other manufacturing, production, warehousing with climate-controlled environments due to product requirements. Fill and Finish includes tabulating, encapsulation of powders or liquids, and the final bottling/packaging of this product; or the filling of liquids, gels or creams in their consumer packages. All office space that shares HVAC with Fill and Finish space will be considered Fill and Finish space.

Research & Development: Lab buildings including animal laboratories, storage space, laboratories, pilot plants and offices located in R&D facilities. Includes in-process labs and QA labs. All office space that shares HVAC with R&D / Laboratory space will be considered R&D / Laboratory space.

Other: All space that does not share HVAC with Bulk Chemical, Fill and Finish, Sterile Fill and Finish, or R&D / Laboratory spaces. May include storage and warehouse areas associated with manufacturing and administrative offices.

50% Requirement for ENERGY STAR: To be eligible for ENERGY STAR recognition, 50% of plant area must be part of manufacturing (Fill & Finish, Bulk Chemical, and manufacturing R&D space). If other non-manufacturing space types represent more than 50% of the total square footage of a site, then sub-metering must be used to isolate the energy use of the manufacturing operations.

Hours of Operation: This variable is used to reflect the utilization of the plant.
For production areas, provide average annual hours of active manufacturing/production.
For R&D / Laboratory and office areas, provide average annual occupied hours.

Examples:
24 hr/day; 7 day/wk production operation for a year (52 weeks + 1 day): Enter 8760 hr/yr
2 shift/day, 5 day/wk production operation: Enter 2 shifts x 8 hr/shift x 5 day/wk x 52 wk/yr = 4160 hr/yr

Office or R&D area occupied 10 hr/day, 5 day/wk: Enter 10hr/day x 5 day/wk x 52 wk/yr = 2600 hr/yr

Heating and Cooling Degree Days: Enter heating degree day (HDD) and cooling degree day (CDD) values for the same 12-month period used for energy use and production figures for the current and reference year for the actual location of the plant (if measured and monitored at the plant) or for the nearest tracked weather station. HDD and CDD values for the nearest tracked weather station may be secured from the National Oceanic and Atmospheric Administration (NOAA) database at www.noaa.gov.

NOTE: The user is responsible for ensuring the HDD and CDD values are calculated as follows. If the user calculates HDD/CDD values from actual site weather data, use the average temperature for the day (based on average of the minimum and maximum temperatures for the day). Calculate the HDD and CDD values on a base of 65 degrees. If the average temperature for the day is 65, there will be no value for either HDD or CDD for that day. If the average temperature is below 65, the day will have an HDD value. Calculate the HDD value by subtracting the average temperature from 65 (HDD = 65 - average temperature). If the temperature is above 65, the day will have a CDD value. Calculate the CDD value by subtracting 65 from the average temperature (CDD = average temperature - 65). The user must sum all HDD values and all CDD values for the 12-month period for use in the model. If the user must secure weather station data for a station nearest the plant, use a NOAA database (www.noaa.gov) to obtain the HDD/CDD values. User calculates the annual HDD and CDD values by summing them.

Energy Consumption

Definitions of terms used in the energy consumption section

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Electricity: Data for electricity should include only total electricity purchased or transferred into the plant from another facility. Units should be supplied in terms of site energy, i.e. in kWh or MMBtu on the basis of 3,412 Btu per kWh.

Compressed Air: If compressed air is transferred in from another facility or external utility, then plant consumption should be converted back to kWh using actual conversion efficiencies of the external facility / plant.

Non-Electric Energy Use: All other forms of energy purchased or transferred (natural gas, oil, coal, etc.) should be included.

Steam: If steam is transferred in from another facility or external utility, then that consumption should be converted back to Btu using plant actual boiler conversion efficiencies (i.e. the Btu value of the fuel used to make the steam). This value should be included in the appropriate energy type entered into the "Other" field.

Chilled Water: If chilled water is transferred in from another facility or external utility, then plant consumption should be converted back to the actual energy used to create the chilled water and included in the appropriate energy type or entered into the "Other" field.

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Annual Cost: Total annual energy cost for each fuel type in current year dollars. **Input of cost data is optional and does not impact the EPI rating.**

Results

Definitions of terms used in the results section

Energy Performance Rating: The Energy Performance Indicator rating is a percentile ranking for the specific facility normalized for size, climate, and space type composition.

Total Source Energy (MMBtu): The sum of direct fossil fuel consumption and electricity, with electricity converted from kWh to Btu using the national average power plant conversion (10,236 Btu/kWh). For more information on Source energy definitions see www.energystar.gov.

Total Site Energy (MMBtu): The sum of direct fossil fuel consumption and electricity, with electricity converted from kWh to Btu using the engineering conversion rate (3,412 Btu/kWh).

Total Source Energy / Sq. Ft. (MMBtu/Sq. Ft.): The source energy use per total square feet for the current, reference, average and efficient plant. The first two ratios are directly based on input data, and the latter two are the projected normalized values for an efficient and average plant (see below) relative to the current plant performance.

Efficient plant: Defined at the values associated with a plant operating at the 75th percentile.

Average Plant: Defined at the values associated with a plant operating at the 50th percentile.

About The EPI

The ENERGY STAR Pharmaceutical Manufacturing Plant EPI was developed by the US EPA in collaboration with companies participating in the ENERGY STAR Focus on Energy Efficiency in the Pharmaceutical Industry and with technical support from Duke University and ICF International. The EPI is based upon data provided by companies participating in the ENERGY STAR Focus. Technical documentation on the design of the EPI is available at www.energystar.gov/EPIs. This EPI will periodically be updated and revised by the US EPA as part of the ENERGY STAR Pharmaceutical Industry Focus. For more information on the Pharmaceutical Focus, visit www.energystar.gov/industry or contact energystarstrategy@energystar.gov.