How to Use Energy Benchmarks

What is an energy benchmark?

Energy benchmarks provide a means for comparing a facility's annual energy use to that of similar facilities. An energy benchmark consists of a ratio of annual energy use to a metric of comparison that is common to each facility. For example, a common energy benchmark for commercial building is energy use per square foot. Benchmarks are most reliable and useful when the metric used for comparison is a good indicator of anticipated annual energy use.

Does the benchmark fit?

To help determine if a benchmark is an accurate reflection of the facility in relation to its sub-sector peers, consider a number of factors:

- Types of operations performed
- Types of products made
- Utilization of floor space
- Utilization of employees

Additionally, consider if the benchmark reflects what is known about the facility:

- Is it wasteful or efficient?
- Is it new or old?
- Does it have knowledgeable staff?
- Has it recently implemented energy efficiency improvements?

Overall, the benchmark can help confirm and quantify how a facility's energy efficiency compares to peers, but the benchmark should not be used as the sole indicator.

Calculate your energy benchmark

Facilities within a sub-sector that has a reliable benchmark (as shown on Page 2) can estimate their relative efficiency as compared to their sub-sector peers by following these steps:

1. Determine your annual electric or thermal energy use (kWh or therms), facility area (sq. ft.), and employment data.

Annual facility energy can be determined by adding together consumption data shown on monthly utility bills. Facility area should include all conditioned floor space. Employment numbers should include all employees rather than employee shift totals.

2. Divide your annual energy use by facility area or employment data.

Example: A heat set printer that occupies a 10,000 sq. ft. facility and employs 150 people uses 1.2 million kWh and 72,000 therms annually. NOTE: Reliable benchmarks only exist for kWh/employee and therms/employee for this sub-sector.

$\text{kWh/employee} = \frac{1{,}200{,}000}{150} = 8{,}000$	$\text{therms/employee} = \frac{72{,}000}{150} = 480$

3. Compare your facility data with peer facilities.

The following benchmarks were developed for heat set printers. Therefore, the facility data above indicates that this example facility is in the top 50% of heat set printers and is more efficient than at least 50% of its peers.

	Most efficient 25% (Q1)	More efficient 25% (Q2)	Less efficient 25% (Q3)	Least efficient 25% (Q4)
kWh/employee	< 6,635	6,635 - 10,085	10,085 - 15,329	> 15,329
therms/employee	< 454	454 - 982	982 - 2,121	> 2,121

4. Evaluate what opportunities may exist for your facility.

Compare your facility benchmark with your sub-sector peers to determine what opportunities may still exist. A brief description of each quartile as well as likely types of conservation opportunities is shown in the table below.

Quartile Ranking	Facility Description	Opportunities
Most efficient 25% (Q1)	Above average efficiency and expected to be more efficient than at least 75% of their sub-sector peers.	Conservation opportunities that are likely to exist will tend to require more capital, staff time, and potentially shut-down times for implementation. Low-hanging fruit opportunities are likely to have been implemented.
More efficient 25% (Q2)	Slightly above average in terms of efficiency and expected to be more efficient than at least 50% of their sub-sector peers.	These facilities have few low-hanging fruit conservation opportunities remaining, but are more likey to have significant capital-intensive conservation projects remaining.
Less efficient 25% (Q3)	Slightly below average efficiency and expected to be more efficient than at least 25% of their sub-sector peers.	Substantial conservation opportunities are likely to exist and can range from low-hanging fruit opportunities to capital-intensive projects. A lack of knowledge about resources or opportunities may exist in these facilities.
Least efficient 25% (Q4)	Well below average efficiency and expected to be among the least efficient 25% of their sub-sector peers.	Conservation opportunities are very likely to exist and may be among the easiest to identify or implement. Facilities should start with low-hanging fruit opportunties and take advantage of opportunities to learn about energy conservation strategies.

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Sub-sector kWh/ft² benchmark quartile ranges.

Sector	Sub-sector	Q1	Q2	Q3	Q4
Chemical Manufacturing	Ethanol Production	< 1,070	1,070 - 1,422	1,422 - 1,889	> 1,889
Fabricated Metals	Machine Tool and Die/Metal Shops	< 14	14 - 22	22 - 34	> 34
	Plating, Polishing, Finishing	< 21	21 - 31	31 - 47	> 47
	Sheetmetal Products	< 8	8 - 16	16 - 32	> 32
Food Processing	Commercial Baking	< 18	18 - 33	33 - 59	> 59
	Dried Food	< 38	38 - 86	86 - 192	> 192
	Snack Chip Production	< 27	27 - 44	44 - 72	> 72
	Sunflower Seed & Wild Rice Processing	< 43	43 - 73	73 - 125	> 125
Pulp & Paper	Board Converting Non-Heat Set	< 24	24 - 37	37 - 58	> 58
Printing	Non-Heat Set Printers	< 8	8 - 15	15 - 27	> 27

Sub-sector kWh/employee benchmark quartile ranges.

Sector	Sub-sector	Q1	Q2	Q3	Q4
Chemical Manufacturing	Ethanol Production	< 612,896	612,896 - 803,404	803,404 - 1,053,129	> 1,053,129
	Resin Production	< 6,097	6,097 - 10,256	10,256 - 17,253	> 17,253
Fabricated Metals	Machine Tool and Die/Metal Shops	< 6,090	6,090 - 11,242	11,242 - 20,752	> 20,752
	Medium Duty Industrial Equipment	< 2,940	2,940 - 5,577	5,577 - 10,577	> 10,577
	Plating, Polishing, Finishing	< 16,390	16,390 - 25,656	25,656 - 40,160	> 40,160
	Sheetmetal Products	< 5,765	5,765 - 11,345	11,345 - 22,326	> 22,326
Food Processing	Commercial Baking	< 6,502	6,502 - 10,926	10,926 - 18,362	> 18,362
	Dried Food	< 27,431	27,431 - 46,649	46,649 - 79,331	> 79,331
	Meat Processing	< 23,037	23,037 - 33,052	33,052 - 47,422	> 47,422
	Pet Food Manufacturing	< 10,357	10,357 - 21,310	21,310 - 43,846	> 43,846
	Poultry Processing	< 22,934	22,934 - 42,222	42,222 - 77,732	> 77,732
	Snack Chip Production	< 6,010	6,010 - 11,768	11,768 - 23,043	> 23,043
Pulp & Paper	Board Converting Non-Heat Set	< 8,168	8,168 - 16,197	16,197 - 32,117	> 32,117
Primary Metals	Aluminum Operations	< 20,734	20,734 - 32,105	32,105 - 49,713	> 49,713
Printing	Heat Set Printers	< 6,635	6,635 - 10,085	10,085 - 15,329	> 15,329
	Non-Heat Set Printers	< 4,566	4,566 - 8,103	8,103 - 14,378	> 14,378

Sub-sector therms/ft² benchmark quartile ranges.

Sector	Sub-sector	Q1	Q2	Q3	Q4
Fabricated Metals	Machine Tool and Die/Metal Shops	< 0.15	0.15 - 0.27	0.27 - 0.47	> 0.47
	Plating, Polishing, Finishing	< 1.17	1.17 - 2.53	2.53 - 5.47	> 5.47
Food Processing	Dairy, Cheese, Butter, Whey	< 98.71	98.71 - 119.31	119.31 - 144.22	> 144.22
Primary Metals	Aluminum Operations	< 4.80	4.80 - 7.17	7.17 - 10.71	> 10.71
Printing	Non-Heat Set Printers	< 0.27	0.27 - 0.37	0.37 - 0.51	> 0.51

Sub-sector therms/employee benchmark quartile ranges.

Sector	Sub-sector	Q1	Q2	Q3	Q4
Chemical Manufacturing	Ethanol Production	< 241,686	241,686 - 302,801	302,801 - 379,369	> 379,369
Fabricated Metals	Medium Duty Industrial Equipment	< 174	174 - 337	337 - 653	> 653
Food Processing	Commercial Baking	< 494	494 - 666	666 - 899	> 899
	Dairy, Cheese, Butter, Whey	< 24,825	24,825 - 27,798	27,798 - 31,127	> 31,127
Pulp & Paper	Board Converting Non-Heat Set	< 337	337 - 554	554 - 912	> 912
	Multi-Wall Converting with Heat Set	< 1,160	1,160 - 1,769	1,769 - 2,700	> 2,700
Primary Metals	Aluminum Operations	< 2,615	2,615 - 3,445	3,445 - 4,537	> 4,537
Printing	Heat Set Printers	< 454	454 - 982	982 - 2,121	> 2,121