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# 5 Energy Costs and Currency Specification

## 5.1 Overview

This chapter provides default time-of-use tariffs that may be used for COMNET purposes that use cost as the metric. The COMNET valuation methodology provides default time-of-use rate schedules for electricity, gas, steam and chilled water. COMNET software shall incorporate these rates into the calculation procedure so that the default rate schedules are easily available to the user. The default rates simplify the process and provide a means to take credit for measures that have large savings during peak periods. Local utility rates may be used instead of the defaults when desired. The software shall have the capability to assign energy charges for different seasons, day types, and periods within the day. A procedure is provided at the end of this chapter to convert TOU energy costs to EPA source energy, for purposes that use EPA source energy as the metric. Appendix F describes the methodology used to create the TOU energy costs presented in this chapter.

## 5.2 Geographic Regions

Default TOU energy costs are provided for 16 regions. These are consistent with the DOE/ASHRAE climate zones. Figure 5.2-1 [1] below provides a map of the climate zones in the continental United States. Climate zone 1 is the tropical zone which includes Hawaii and the tip of Florida moving up to climate zone 8 which includes the northern arctic region of Alaska. Every county is in one unique climate zone.

There are 15 combinations of the 8 thermal zones and the 3 humidity zones. However, zone 3B is divided into two parts. Most of climate zone 3B is characterized by hot and dry summers; however, Los Angeles' climate is influenced by its coastal location. There are only five counties assumed to be in climate zone 3B (LA), Santa Barbara, Ventura, Los Angeles, Orange County, and San Diego. For each of the climate zones, the default TOU energy costs are shown in Table 5.2-1 [2] through Table 5.2-16 [3].

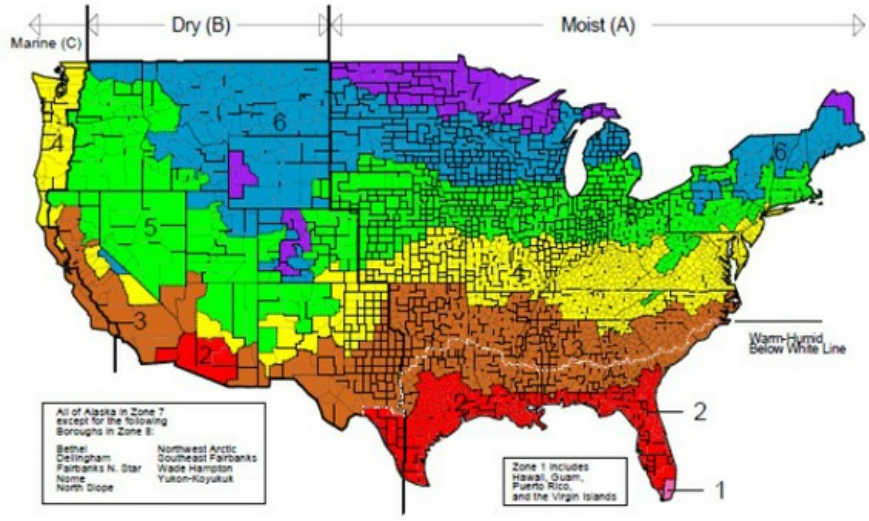


Figure 5.2-1: *"United States Climate Zones"*

Table 5.2-1: *"Energy Cost Specification by Season and TOU Period – Climate Zone 1A"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 12-21 | $2.85 |
| | | | Mid-Peak | 9-11, 22-24 | $0.91 |
| | | | Off-Peak | 1-8 | $0.85 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.85 |
| | Fall (September-November) | Weekdays | Peak | 12-21 | $1.13 |
| | | | Mid-Peak | 8-11, 22-24 | $0.81 |
| | | | Off-Peak | 1-7 | $0.77 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.77 |
| | Winter (December- | Weekdays | Peak | NA | NA |

| | | | | | |
|---|---|---|---|---|---|
| | February) | | Mid-Peak | 8-23 | $0.78 |
| | | | Off-Peak | 24-7 | $0.71 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.71 |
| | Spring (March-May) | Weekdays | Peak | 13-21 | $0.96 |
| | | | Mid-Peak | 9-12, 22-23 | $0.84 |
| | | | Off-Peak | 24-8 | $0.77 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.77 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $9.33 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.42 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $133.74 |
| | High Demand Season (November-March) | All | All | 1-24 | $163.80 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.15 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.41 |

Table 5.2-2: *"Energy Cost Specification by Season and TOU Period – Climate Zone 2A"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-September) | Weekdays | Peak | 14-21 | $2.51 |
| | | | Mid-Peak | 22-1, 11-13 | $0.85 |
| | | | Off-Peak | 2-10 | $0.81 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.81 |
| | Fall (October-November) | Weekdays | Peak | 13-23 | $0.99 |
| | | | Mid-Peak | 9-12 | $0.78 |
| | | | Off-Peak | 24-8 | $0.75 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.75 |
| | Winter (December-February) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 8-22 | $0.85 |
| | | | Off-Peak | 23-7 | $0.77 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.77 |
| | Spring (March-May) | Weekdays | Peak | 13-22 | $1.06 |
| | | | Mid-Peak | 10-12, 23-24 | $0.87 |
| | | | Off-Peak | 1-9 | $0.82 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.82 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $8.60 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.85 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $123.31 |
| | High Demand Season (November-March) | All | All | 1-24 | $169.94 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.06 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.46 |

Table 5.2-3: *"Energy Cost Specification by Season and TOU Period – Climate Zone 2B"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 9-21 | $2.47 |
| | | | Mid-Peak | NA | NA |

| | | | | | |
|---|---|---|---|---|---|
| | | | Off-Peak | 22-8 | $0.74 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.74 |
| | Fall (September-November) | Weekdays | Peak | 13-21 | $0.94 |
| | | | Mid-Peak | 11-12 | $0.86 |
| | | | Off-Peak | 22-10 | $0.79 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.79 |
| | Winter (December-February) | Weekdays | Peak | 7-9, 18-22 | $0.92 |
| | | | Mid-Peak | 10-13 | $0.88 |
| | | | Off-Peak | 23-6, 14-17 | $0.82 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.82 |
| | Spring (March-May) | Weekdays | Peak | 13-21 | $0.89 |
| | | | Mid-Peak | 10-12, 22-23 | $0.80 |
| | | | Off-Peak | 24-9 | $0.74 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.74 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $8.37 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.78 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $120.05 |
| | High Demand Season (November-March) | All | All | 1-24 | $168.88 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.03 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.45 |

Table 5.2-4: *"Energy Cost Specification by Season and TOU Period – Climate Zone 3A"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 12-19 | $3.48 |
| | | | Mid-Peak | 8-11, 20-23 | $0.89 |
| | | | Off-Peak | 24-7 | $0.82 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.82 |
| | Fall (September-October) | Weekdays | Peak | 12-20 | $0.91 |
| | | | Mid-Peak | 7-11, 21-22 | $0.79 |
| | | | Off-Peak | 23-6 | $0.76 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.76 |
| | Winter (November-February) | Weekdays | Peak | 6-11, 18-21 | $0.84 |
| | | | Mid-Peak | 12-17 | $0.79 |
| | | | Off-Peak | 22-5 | $0.75 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.75 |
| | Spring (March-May) | Weekdays | Peak | 12-21 | $0.97 |
| | | | Mid-Peak | 7-11 | $0.88 |
| | | | Off-Peak | 22-6 | $0.77 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.77 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $8.90 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.95 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $127.61 |
| | High Demand Season (November-March) | All | All | 1-24 | $171.38 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.10 |
| | High Demand Season | All | All | 1-24 | $1.47 |

| | | | | | |
|---|---|---|---|---|---|
| | High Demand Season (November-March) | All | All | 1-24 | $1.47 |

Table 5.2-5: *"Energy Cost Specification by Season and TOU Period – Climate Zone 3B (LA)"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 13-19 | $3.59 |
| | | | Mid-Peak | 9-12, 20-23 | $0.94 |
| | | | Off-Peak | 24-8 | $0.59 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.59 |
| | Fall (September-November) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 9-22 | $1.40 |
| | | | Off-Peak | 23-8 | $0.71 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.71 |
| | Winter (December-March) | Weekdays | Peak | 11-15, 18-22 | $1.04 |
| | | | Mid-Peak | 8-10, 16-17 | $0.96 |
| | | | Off-Peak | 23-7 | $0.72 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.72 |
| | Spring (April-May) | Weekdays | Peak | 12-18 | $1.08 |
| | | | Mid-Peak | 8-11, 19-23 | $0.97 |
| | | | Off-Peak | 24-7 | $0.65 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.65 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $8.77 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.22 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $125.72 |
| | High Demand Season (November-March) | All | All | 1-24 | $160.95 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.08 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.38 |

Table 5.2-6: *"Energy Cost Specification by Season and TOU Period – Climate Zone 3B"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-September) | Weekdays | Peak | 14-20 | $3.60 |
| | | | Mid-Peak | 9-13, 21-22 | $0.83 |
| | | | Off-Peak | 23-8 | $0.71 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.71 |
| | Fall (October-November) | Weekdays | Peak | 17-21 | $1.00 |
| | | | Mid-Peak | 7-16 | $0.95 |
| | | | Off-Peak | 22-6 | $0.83 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.83 |
| | Winter (December-February) | Weekdays | Peak | 17-21 | $0.91 |
| | | | Mid-Peak | 7-16 | $0.79 |
| | | | Off-Peak | 22-6 | $0.75 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.75 |
| | Spring (March-May) | Weekdays | Peak | 12-21 | $0.87 |
| | | | Mid-Peak | 7-11 | $0.81 |
| | | | Off-Peak | 22-6 | $0.73 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.73 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $8.90 |
| | High Demand Season | All | All | 1-24 | $11.83 |

| | | | | | |
|---|---|---|---|---|---|
| | (November-March) | | | | |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $127.68 |
| | High Demand Season (November-March) | All | All | 1-24 | $169.57 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.10 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.46 |

Table 5.2-7: *"Energy Cost Specification by Season and TOU Period – Climate Zone 3C"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (July-September) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 8-11, 17-18 | $1.53 |
| | | | Off-Peak | 19-7, 12-16 | $1.11 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $1.11 |
| | Fall (October-November) | Weekdays | Peak | 9-20 | $0.95 |
| | | | Mid-Peak | 6-8, 21-23 | $0.79 |
| | | | Off-Peak | 24-5 | $0.74 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.74 |
| | Winter (December-April) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 8-22 | $1.29 |
| | | | Off-Peak | 23-7 | $0.77 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.77 |
| | Spring (May-June) | Weekdays | Peak | 9-18 | $1.01 |
| | | | Mid-Peak | 7-8, 19-23 | $0.75 |
| | | | Off-Peak | 24-6 | $0.66 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.66 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $9.36 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.18 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $134.26 |
| | High Demand Season (November-March) | All | All | 1-24 | $160.36 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.15 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.38 |

Table 5.2-8: *"Energy Cost Specification by Season and TOU Period – Climate Zone 4A"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 12-20 | $3.41 |
| | | | Mid-Peak | 8-11, 21-23 | $1.02 |
| | | | Off-Peak | 24-7 | $0.83 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.83 |
| | Fall (September-November) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 7-24 | $0.88 |
| | | | Off-Peak | 1-6 | $0.72 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.72 |
| | Winter (December-February) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 7-20 | $0.96 |
| | | | Off-Peak | 21-6 | $0.83 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.83 |

| | | | | | |
|---|---|---|---|---|---|
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.83 |
| | Spring (March-May) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 8-22 | $0.95 |
| | | | Off-Peak | 23-7 | $0.77 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.77 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $9.07 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.99 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $130.05 |
| | High Demand Season (November-March) | All | All | 1-24 | $171.95 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.12 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.48 |

Table 5.2-9: *"Energy Cost Specification by Season and TOU Period – Climate Zone 4B"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 11-20 | $3.04 |
| | | | Mid-Peak | 8-10, 21-22 | $0.86 |
| | | | Off-Peak | 23-7 | $0.85 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.85 |
| | Fall (September-October) | Weekdays | Peak | 12-20 | $0.91 |
| | | | Mid-Peak | 7-11, 21-22 | $0.80 |
| | | | Off-Peak | 23-6 | $0.76 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.76 |
| | Winter (November-February) | Weekdays | Peak | 18-22 | $0.84 |
| | | | Mid-Peak | 7-17 | $0.81 |
| | | | Off-Peak | 23-6 | $0.75 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.75 |
| | Spring (March-May) | Weekdays | Peak | 11-16, 19-21 | $0.96 |
| | | | Mid-Peak | 7-10, 17-18 | $0.91 |
| | | | Off-Peak | 22-6 | $0.77 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.77 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $8.33 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.15 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $119.46 |
| | High Demand Season (November-March) | All | All | 1-24 | $159.81 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.03 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.37 |

Table 5.2-10: *"Energy Cost Specification by Season and TOU Period – Climate Zone 4C"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 10-18 | $2.25 |
| | | | Mid-Peak | 7-9, 19-23 | $0.96 |
| | | | Off-Peak | 24-6 | $0.64 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.64 |
| | Fall (September | Weekdays | Peak | NA | NA |

| | | | | | |
|---|---|---|---|---|---|
| | Fall (September-October) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 8-23 | $0.91 |
| | | | Off-Peak | 24-7 | $0.76 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.76 |
| | Winter (November-March) | Weekdays | Peak | 8-12, 17-21 | $1.52 |
| | | | Mid-Peak | 13-16, 22-23 | $0.95 |
| | | | Off-Peak | 24-7 | $0.76 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.76 |
| | Spring (April-May) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 8-23 | $0.76 |
| | | | Off-Peak | 24-7 | $0.60 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.60 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $9.01 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.10 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $129.13 |
| | High Demand Season (November-March) | All | All | 1-24 | $159.20 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.11 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.37 |

Table 5.2-11: *"Energy Cost Specification by Season and TOU Period – Climate Zone 5A"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 13-21 | $3.08 |
| | | | Mid-Peak | 10-12, 22-24 | $1.05 |
| | | | Off-Peak | 1-9 | $0.76 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.76 |
| | Fall (September-October) | Weekdays | Peak | 13-22 | $1.07 |
| | | | Mid-Peak | 9-12 | $0.91 |
| | | | Off-Peak | 23-8 | $0.72 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.72 |
| | Winter (November-March) | Weekdays | Peak | 18-22 | $1.21 |
| | | | Mid-Peak | 8-17, 23-24 | $0.99 |
| | | | Off-Peak | 1-7 | $0.80 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.80 |
| | Spring (April-May) | Weekdays | Peak | 12-20 | $1.20 |
| | | | Mid-Peak | 9-11, 21-24 | $1.01 |
| | | | Off-Peak | 1-8 | $0.78 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.78 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $8.97 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.78 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $128.57 |
| | High Demand Season (November-March) | All | All | 1-24 | $168.85 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.10 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.45 |

Table 5.2-12: *"Energy Cost Specification by Season and TOU Period – Climate Zone 5B"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 11-20 | $2.69 |
| | | | Mid-Peak | 8-10, 21-22 | $0.81 |
| | | | Off-Peak | 23-7 | $0.76 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.76 |
| | Fall (September-October) | Weekdays | Peak | 13-20 | $0.71 |
| | | | Mid-Peak | 6-12, 21-22 | $0.61 |
| | | | Off-Peak | 23-5 | $0.54 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.54 |
| | Winter (November-March) | Weekdays | Peak | 9-17 | $1.10 |
| | | | Mid-Peak | 7-8, 18-23 | $1.07 |
| | | | Off-Peak | 24-6 | $0.93 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.93 |
| | Spring (April-May) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 7-22 | $0.96 |
| | | | Off-Peak | 23-6 | $0.80 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.80 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $8.28 |
| | High Demand Season (November-March) | All | All | 1-24 | $10.71 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $118.69 |
| | High Demand Season (November-March) | All | All | 1-24 | $153.51 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.02 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.32 |

Table 5.2-13: *"Energy Cost Specification by Season and TOU Period – Climate Zone 6A"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 12-20 | $3.32 |
| | | | Mid-Peak | 9-11, 21-24 | $0.97 |
| | | | Off-Peak | 1-8 | $0.78 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.78 |
| | Fall (September-October) | Weekdays | Peak | 12-21 | $1.11 |
| | | | Mid-Peak | 8-11, 22-23 | $0.84 |
| | | | Off-Peak | 24-7 | $0.80 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.80 |
| | Winter (November-March) | Weekdays | Peak | 9-13, 18-22 | $1.16 |
| | | | Mid-Peak | 14-17 | $1.00 |
| | | | Off-Peak | 23-8 | $0.83 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.83 |
| | Spring (April-May) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 8-23 | $0.89 |
| | | | Off-Peak | 24-7 | $0.71 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.71 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $8.86 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.53 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $127.02 |

| | | | | | |
|---|---|---|---|---|---|
| | High Demand Season (November-March) | All | All | 1-24 | $165.38 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.09 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.42 |

Table 5.2-14: *"Energy Cost Specification by Season and TOU Period – Climate Zone 6B"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 12-21 | $2.27 |
| | | | Mid-Peak | 8-11, 22-23 | $0.79 |
| | | | Off-Peak | 24-7 | $0.76 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.76 |
| | Fall (September-October) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 8-18 | $0.84 |
| | | | Off-Peak | 19-7 | $0.81 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.81 |
| | Winter (November-March) | Weekdays | Peak | 8-11, 18-21 | $1.44 |
| | | | Mid-Peak | 12-17 | $0.87 |
| | | | Off-Peak | 22-7 | $0.79 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.79 |
| | Spring (April-May) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 7-23 | $0.86 |
| | | | Off-Peak | 24-6 | $0.80 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.80 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $8.32 |
| | High Demand Season (November-March) | All | All | 1-24 | $10.63 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $119.26 |
| | High Demand Season (November-March) | All | All | 1-24 | $152.40 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.02 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.31 |

Table 5.2-15: *"Energy Cost Specification by Season and TOU Period – Climate Zone 7"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 10-21 | $2.48 |
| | | | Mid-Peak | 7-9, 22-23 | $0.77 |
| | | | Off-Peak | 24-6 | $0.62 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.62 |
| | Fall (September-September) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 8-21 | $0.90 |
| | | | Off-Peak | 22-7 | $0.58 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.58 |
| | Winter (October-March) | Weekdays | Peak | 8-13, 17-22 | $1.28 |
| | | | Mid-Peak | 14-16 | $1.00 |
| | | | Off-Peak | 23-7 | $0.86 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.86 |
| | Spring (April-May) | Weekdays | Peak | NA | NA |
| | | | Mid-Peak | 7-21 | $1.13 |

| | | | | | |
|---|---|---|---|---|---|
| | | | Off-Peak | 22-6 | $0.82 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.82 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $8.95 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.41 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $128.26 |
| | High Demand Season (November-March) | All | All | 1-24 | $163.63 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.10 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.40 |

Table 5.2-16: *"Energy Cost Specification by Season and TOU Period – Climate Zone 8"*

| Fuel | Seasons | Day Types | Time Periods | Hours in TOU Period (1-24) | Present Value of Energy Cost |
|---|---|---|---|---|---|
| Electricity ($/kWh) | Summer (June-August) | Weekdays | Peak | 9-23 | $0.78 |
| | | | Mid-Peak | NA | NA |
| | | | Off-Peak | 24-8 | $0.65 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.65 |
| | Fall (September-September) | Weekdays | Peak | 8-23 | $0.79 |
| | | | Mid-Peak | NA | NA |
| | | | Off-Peak | 24-7 | $0.68 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.68 |
| | Winter (October-April) | Weekdays | Peak | 8-23 | $1.61 |
| | | | Mid-Peak | NA | NA |
| | | | Off-Peak | 24-7 | $0.81 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.81 |
| | Spring (May-May) | Weekdays | Peak | 9-23 | $0.77 |
| | | | Mid-Peak | NA | NA |
| | | | Off-Peak | 24-8 | $0.64 |
| | | Weekends/Holidays | Off-Peak | 1-24 | $0.64 |
| Gas ($/therm) | Low Demand Season (April-October) | All | All | 1-24 | $9.20 |
| | High Demand Season (November-March) | All | All | 1-24 | $11.56 |
| Steam ($/Mlb) | Low Demand Season (April-October) | All | All | 1-24 | $131.93 |
| | High Demand Season (November-March) | All | All | 1-24 | $165.76 |
| Chilled Water ($/ton-hr) | Low Demand Season (April-October) | All | All | 1-24 | $1.13 |
| | High Demand Season (November-March) | All | All | 1-24 | $1.42 |

# 5.3 Calculating Zero Energy Performance Index (zEPI)

The zero energy performance index (zEPI) is the ratio of energy performance of the rated building to the average energy consumption of a similar building at the turn of the millennium that is operated in a similar climate, for similar hours of and similar operating conditions. zEPI is used by some rating programs and COMNET purposes. The COMNET modeling rules and procedures produce an estimate of the energy performance of the proposed design. The energy performance of the baseline building can be determined in a variety of ways. For comparison, the rated building energy performance and baseline building energy performance need to be compared in consistent units; the units are specified for each purpose. This section provides a method for converting EPA source energy to energy costs, consistent with the COMNET default tariffs.

The process, using the COMNET tariffs, is similar except that the zEPI energy efficiency ratio is calculated as the ratio of energy cost instead of source energy. The following procedure enables the energy performance of the baseline building to be converted to COMNET energy costs:

A. Estimate the energy cost of the rated building through simulations and using the default tariffs provided in this chapter.
B. Estimate the electricity, gas, steam and/or other fuels of the baseline building or comparator building for a similar climate and for similar operating conditions.
C. Use the EPA source energy multipliers to convert the baseline building estimates to EPA source energy. The source-site ratio for electricity is 3.34; natural gas is 1.047; fuel oil and propane are 1.01; steam is 1.45; hot water is 1.35; chilled water is 1.05; wood, coal, coke and other fuels are 1.00. The EPA source energy multipliers are static and do not vary with season, day, or hour. [1]
D. Convert the EPA source energy to COMNET TOU costs using the conversion factors in Table 5.3-1 [4].
E. Calculate the zEPI as the ratio of the proposed design energy costs divided by the baseline building energy costs, as determined in the previous step.

A benefit of using the COMNET tariffs for zEPI is that building features such as daylighting or thermal storage that reduce energy demand in periods when the utility grid is stressed and when more expensive generating sources are on-line are given more credit. The procedure in this section enables proper credit for thermal storage, daylighting, photovoltaic production and other measures that reduce energy consumption during peak periods.

Note that if the energy performance of the baseline building is determined though simulations, the COMNET default tariffs may be directly applied and this procedure is not applicable. Note also that some rating programs may require that the ratio of the rated building and the baseline building be compared using source energy. In this case, this procedure is also not applicable.

Table 5.3-1: *"Source Energy Conversion Factors ($/kBtu)"*
[2]

| Climate Zone | Vacant | Office | Laboratory | Refrigerated Warehouse | Food Sales | Public Order and Safety | Outpatient Health Care | Refrigerated Warehouse | Religious Worship | Public Assembly |
|---|---|---|---|---|---|---|---|---|---|---|
| 1A | $0.0944 | $0.0929 | $0.0928 | $0.0956 | $0.0892 | $0.0932 | $0.0937 | $0.0939 | $0.0911 | $0.0921 |
| 2A | $0.0915 | $0.0908 | $0.0900 | $0.0929 | $0.0880 | $0.0902 | $0.0898 | $0.0904 | $0.0909 | $0.0874 |
| 2B | $0.0936 | $0.1020 | $0.1022 | $0.0935 | $0.0895 | $0.1025 | $0.1024 | $0.0922 | $0.1015 | $0.1016 |
| 3A | $0.0974 | $0.0942 | $0.0950 | $0.0983 | $0.0893 | $0.0960 | $0.0961 | $0.0954 | $0.0954 | $0.0957 |
| 3B (LA) | $0.0967 | $0.0981 | $0.0980 | $0.0980 | $0.0916 | $0.0981 | $0.0981 | $0.0978 | $0.1003 | $0.1003 |
| 3B | $0.0959 | $0.1010 | $0.1005 | $0.0955 | $0.0945 | $0.1008 | $0.1011 | $0.0949 | $0.0967 | $0.0953 |
| 3C | $0.0919 | $0.0922 | $0.0926 | $0.0916 | $0.0878 | $0.0922 | $0.0921 | $0.0901 | $0.0947 | $0.0948 |
| 4A | $0.0973 | $0.0984 | $0.0984 | $0.1010 | $0.0947 | $0.0980 | $0.0973 | $0.0984 | $0.1040 | $0.1008 |
| 4B | $0.0928 | $0.0932 | $0.0938 | $0.0958 | $0.0906 | $0.0930 | $0.0930 | $0.0959 | $0.0986 | $0.0956 |
| 4C | $0.0924 | $0.0955 | $0.0950 | $0.0928 | $0.0876 | $0.0948 | $0.0949 | $0.0910 | $0.0962 | $0.0945 |
| 5A | $0.1007 | $0.1029 | $0.1031 | $0.0951 | $0.0964 | $0.1056 | $0.1021 | $0.0942 | $0.1010 | $0.0987 |
| 5B | $0.0943 | $0.0984 | $0.0993 | $0.0875 | $0.0915 | $0.0984 | $0.0984 | $0.0866 | $0.0948 | $0.0948 |
| 6A | $0.0998 | $0.1014 | $0.1016 | $0.1030 | $0.0961 | $0.1012 | $0.1024 | $0.1019 | $0.1018 | $0.1022 |
| 6B | $0.0901 | $0.0915 | $0.0923 | $0.0937 | $0.0879 | $0.0914 | $0.0915 | $0.0917 | $0.0929 | $0.0928 |
| 7 | $0.0994 | $0.1013 | $0.1015 | $0.1027 | $0.0957 | $0.1011 | $0.1024 | $0.1020 | $0.1032 | $0.1041 |
| 8 | $0.0949 | $0.0933 | $0.0959 | $0.0977 | $0.0883 | $0.0938 | $0.0943 | $0.0918 | $0.0998 | $0.0984 |
| Climate Zone | Education | Food Service | Inpatient Health Care | Nursing | Lodging | Strip Shopping Mall | Enclosed Mall | Retail Other than Mall | Service | Other |
| 1A | $0.0952 | $0.0930 | $0.0923 | $0.0909 | $0.0916 | $0.0939 | $0.0940 | $0.0940 | $0.0957 | $0.0942 |
| 2A | $0.0874 | $0.0913 | $0.0897 | $0.0888 | $0.0900 | $0.0914 | $0.0911 | $0.0917 | $0.0926 | $0.0912 |
| 2B | $0.1021 | $0.0926 | $0.0917 | $0.0911 | $0.0901 | $0.0975 | $0.0961 | $0.0973 | $0.0972 | $0.0934 |
| 3A | $0.0957 | $0.0930 | $0.0926 | $0.0914 | $0.0917 | $0.0952 | $0.0945 | $0.0960 | $0.0967 | $0.0956 |
| 3B (LA) | $0.1004 | $0.0954 | $0.0938 | $0.0939 | $0.0936 | $0.0986 | $0.0987 | $0.0986 | $0.0975 | $0.0966 |
| 3B | $0.0966 | $0.0978 | $0.0963 | $0.0948 | $0.0987 | $0.1012 | $0.1011 | $0.1019 | $0.1018 | $0.0956 |
| 3C | $0.0948 | $0.0919 | $0.0914 | $0.0917 | $0.0903 | $0.0908 | $0.0905 | $0.0910 | $0.0948 | $0.0922 |
| 4A | $0.1005 | $0.1009 | $0.0972 | $0.0966 | $0.0937 | $0.1029 | $0.1021 | $0.1046 | $0.1040 | $0.0984 |
| 4B | $0.0991 | $0.0956 | $0.0917 | $0.0916 | $0.0905 | $0.0989 | $0.0981 | $0.0990 | $0.0996 | $0.0922 |
| 4C | $0.0954 | $0.0918 | $0.0914 | $0.0911 | $0.0894 | $0.0937 | $0.0923 | $0.0937 | $0.0949 | $0.0935 |
| 5A | $0.1001 | $0.1014 | $0.1036 | $0.1042 | $0.0936 | $0.1040 | $0.1037 | $0.1047 | $0.1053 | $0.1001 |
| 5B | $0.0947 | $0.0925 | $0.0985 | $0.0985 | $0.0882 | $0.0973 | $0.0978 | $0.0981 | $0.0984 | $0.0948 |
| 6A | $0.1030 | $0.0981 | $0.0979 | $0.0976 | $0.0995 | $0.1023 | $0.1024 | $0.1022 | $0.1020 | $0.0997 |
| 6B | $0.0928 | $0.0893 | $0.0891 | $0.0892 | $0.0900 | $0.0917 | $0.0921 | $0.0922 | $0.0924 | $0.0903 |
| 7 | $0.1046 | $0.0977 | $0.0975 | $0.0972 | $0.0982 | $0.1012 | $0.1012 | $0.1012 | $0.1011 | $0.0993 |
| 8 | $0.0996 | $0.0911 | $0.0920 | $0.0917 | $0.0892 | $0.0919 | $0.0915 | $0.0918 | $0.0919 | $0.0943 |

1. ENERGY STAR Performance Ratings Methodology for Incorporating Source Energy use, U. S. Environmental Protection Agency.
2. Source energy conversions from “ENERGY STAR Performance Ratings Methodology for Incorporating Source Energy Use”, December 2007, were used to generate this table.



**Source URL:** http://www.comnet.org/mgp/content/5-energy-costs-and-currency-specification

**Links:**
[1] http://www.comnet.org/mgp/content/52-geographic-regions#united-states-climate-zones
[2] http://www.comnet.org/mgp/content/52-geographic-regions#energy-cost-specification-by-season-and-TOU-period---climate-zone-1A
[3] http://www.comnet.org/mgp/content/52-geographic-regions#energy-cost-specification-by-season-and-TOU-period---climate-zone-8
[4] http://www.comnet.org/mgp/content/53-calculating-zero-energy-performance-index-zepi#source-energy-conversion-factors-($/kBtu)