

## 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].

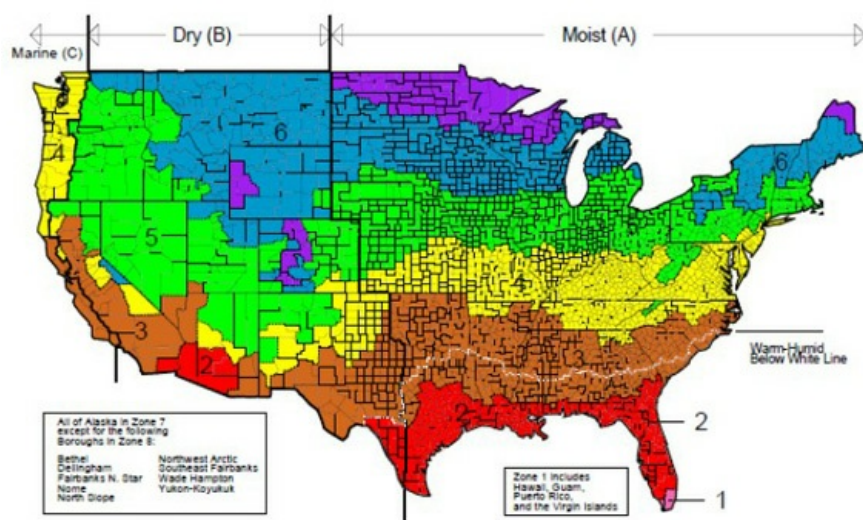


Figure 5.2-1: "United States Climate Zones"

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
	Fall (September-November)	Weekends/Holidays	Off-Peak	1-24	\$0.85
		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-February)	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
	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
			Off-Peak	1-24	\$0.82
			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
			Off-Peak	1-24	\$0.76
			Off-Peak	1-24	\$0.76
Gas (\$/therm)	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
			Off-Peak	1-24	\$0.75
			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
			Off-Peak	1-24	\$0.77
			Off-Peak	1-24	\$0.77
Steam (\$/Mlb)	Low Demand Season (April-October)	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
			Off-Peak	1-24	\$0.77
			Off-Peak	1-24	\$0.77
	High Demand Season (November-March)	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
			Off-Peak	1-24	\$0.77
			Off-Peak	1-24	\$0.77
Chilled Water (\$/ton-hr)	Low Demand Season (April-October)	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
			Off-Peak	1-24	\$0.77
			Off-Peak	1-24	\$0.77
	High Demand Season (November-March)	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
			Off-Peak	1-24	\$0.77
			Off-Peak	1-24	\$0.77

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
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
Gas (\$/therm)	Low Demand Season (April-October)	All	All	1-24	\$8.90
	High Demand Season (November-March)	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
Gas (\$/therm)	Low Demand Season (April-October)	All	All	1-24	\$9.36
			All	1-24	\$11.18
	High Demand Season (November-March)	All	All	1-24	\$134.26
			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	\$0.85
	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
Gas (\$/therm)	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
	Low Demand Season (April-October)	All	All	1-24	\$8.33
		All	All	1-24	\$11.15
	High Demand Season (November-March)	All	All	1-24	\$119.46
		All	All	1-24	\$159.81
	Low Demand Season (April-October)	All	All	1-24	\$1.03
		All	All	1-24	\$1.37
	High Demand Season (November-March)	All	All	1-24	\$1.03
		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-October)	Weekdays	Peak	NA	NA

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

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
	Fall (September-October)	Weekdays	Off-Peak	1-24	\$0.76
			Peak	13-22	\$1.07
			Mid-Peak	9-12	\$0.91
	Winter (November-March)	Weekdays	Off-Peak	23-8	\$0.72
			Off-Peak	1-24	\$0.72
			Peak	18-22	\$1.21
	Spring (April-May)	Weekdays	Mid-Peak	8-17, 23-24	\$0.99
			Off-Peak	1-7	\$0.80
			Off-Peak	1-24	\$0.80
Gas (\$/therm)	Low Demand Season (April-October)	All	Off-Peak	1-24	\$0.78
			Off-Peak	1-24	\$1.20
			Off-Peak	1-24	\$1.01
	High Demand Season (November-March)	All	Off-Peak	1-24	\$0.78
			Off-Peak	1-24	\$8.97
			Off-Peak	1-24	\$11.78
	Low Demand Season (April-October)	All	Off-Peak	1-24	\$128.57
			Off-Peak	1-24	\$168.85
			Off-Peak	1-24	\$1.10
	High Demand Season (November-March)	All	Off-Peak	1-24	\$1.45
			Off-Peak	1-24	\$1.10
			Off-Peak	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
	Fall (September-October)	Weekdays	Off-Peak	1-24	\$0.76
			Peak	NA	NA
			Mid-Peak	8-18	\$0.84
		Weekends/Holidays	Off-Peak	19-7	\$0.81
			Off-Peak	1-24	\$0.81
			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
	Spring (April-May)	Weekdays	Off-Peak	1-24	\$0.79
			Peak	NA	NA
			Mid-Peak	7-23	\$0.86
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
	Fall (September-September)	Weekdays	Off-Peak	1-24	\$0.62
			Peak	NA	NA
			Mid-Peak	8-21	\$0.90
		Weekends/Holidays	Off-Peak	22-7	\$0.58
			Off-Peak	1-24	\$0.58
			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
	Spring (April-May)	Weekdays	Off-Peak	1-24	\$0.86
			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
	Fall (September-September)	Weekends/Holidays	Off-Peak	1-24	\$0.65
		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
	Spring (May-May)	Weekdays	Off-Peak	1-24	\$0.81
			Peak	9-23	\$0.77
			Mid-Peak	NA	NA
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. <sup>1</sup>
- 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 through 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)"

<sup>2</sup>

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

<sup>1</sup>. ENERGY STAR Performance Ratings Methodology for Incorporating Source Energy use, U. S. Environmental Protection Agency.

<sup>2</sup>. Source energy conversions from "ENERGY STAR Performance Ratings Methodology for Incorporating Source Energy Use", December 2007, were used to generate this table.

#### 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-\(\\$/kBtu\)](http://www.comnet.org/mgp/content/53-calculating-zero-energy-performance-index-zepi#source-energy-conversion-factors-($/kBtu))