



# Custom HVAC

**The Efficiency Maine Business Program provides incentives for the purchase and installation of premium efficiency HVAC systems in new construction projects, renovation projects, and for the replacement of functioning, but less efficient, existing equipment.** Custom projects submitted under the Business Program must include a detailed technical analysis showing base electrical energy use and proposed savings. The accompanying worksheets will provide your company's engineering staff or assisting contractor with step-by-step guidelines for analysis beyond what is listed in Table 4 of the Custom HVAC Incentive Application.

This instruction guide is intended to present information regarding the operations of the existing and proposed HVAC system components in a consistent manner. Please feel free to present the energy savings analysis in your own format, making sure that the current and proposed operations of the HVAC systems are correctly represented in the analysis. However, analyses presenting one-line calculations using average/full loads for the entire year are not recommended, and supplementary information will be requested in order to process the application. If you require assistance, please contact Efficiency Maine at 866-376-2463, or by email at [efficiencymainec&i@ers-inc.com](mailto:efficiencymainec&i@ers-inc.com). All forms and guidelines are downloadable at [efficiencymaine.com](http://efficiencymaine.com).

## Following you will find:

The first worksheet, page 2–3, is for presenting the information regarding the existing and proposed HVAC systems, their operational settings, and the building envelope characteristics. (See example on pages 6–7.)

The second worksheet, page 4, is for presenting the information regarding the HVAC system operation during the occupied hours. (See example on page 8.)

The third worksheet, page 5, is for presenting the information regarding the HVAC system operation during the unoccupied hours. (See example on page 9.)

Please note that these forms are intended for comparison of similar systems with different performances. If your project addresses a different type of energy efficiency measure (e.g. component replacement, totally different system, operating characteristics change) and these forms cannot be used, please contact us for assistance.

[Please review the attached example analysis for an electric heat pump replacement project.](#)

## HOW AND WHERE TO SEND YOUR APPLICATION AND PROOF OF PURCHASE

Please mail or fax all documentation and forms to: Efficiency Maine Business Program | 323 State Street, Suite 2 | Augusta ME 04330

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Efficiency Maine is a statewide effort to promote the more efficient use of electricity, help Maine residents and businesses reduce energy costs, and improve Maine's environment.

# HVAC Information Sheet

## Worksheet 1



Leading the Way to a Brighter Future

**FACILITY NAME:** \_\_\_\_\_

**FACILITY LOCATION:** \_\_\_\_\_

**FACILITY TYPE (HOTEL, OFFICE, SCHOOL, MANUFACTURING, ETC):** \_\_\_\_\_

**ELECTRIC RATE (\$/kWh)(EXAMPLE: \$0.15/kWh):** \_\_\_\_\_

BUILDING ENVELOPE DESCRIPTION	
Total Building Area (square feet):	
Estimated North, South, East, West Wall Areas (sq. ft):	
Average/Estimated Wall R-Value (hr-F-ft <sup>2</sup> /Btu):	
Average/Estimated Roof R-Value (hr-F-ft <sup>2</sup> /Btu):	
Estimated North, South, East, West, Horiz. Window Areas (sq. ft):	
Average/Estimated Window R-Value (hr-F-ft <sup>2</sup> /Btu):	
Number of People During Occupied Period:	
Lighting Load (Watts/square feet):	
Equipment Load (Watts/square feet):	
Ventilation Air Requirements (CFM):	
Building Occupied Hours Weekday:	
Building Occupied Hours Weekend:	
Cooling Occupied Temperature Setpoint (F):	
Cooling Unoccupied Temperature Setpoint (F):	
Heating Occupied Temperature Setpoint (F):	
Heating Unoccupied Temperature Setpoint (F):	
Programmable Thermostats (Yes or No):	

	UNIT 1	UNIT 2	UNIT 3
EXISTING EQUIPMENT DESCRIPTION			
Manufacturer:			
Model Number:			
Serial Number:			
Quantities:			
Unit Cooling Capacity (Tons):			
Rated Cooling Efficiency of Equipment (SEER or EER):			
Unit Heating Capacity (Btu/hr):			
Rated Heating Efficiency of Equipment, if applicable (COP):			
Type of System (Split, Packaged Rooftop, Heat Pump, Chiller, etc):			
Supply Fan HP:			
Return Fan HP (if applicable):			
Is the Unit Air Cooled or Water Cooled?:			
If Water Cooled, Size of Cooling Tower (Tons):			
Distribution System Type (Constant Volume, Variable Air Volume?):			
Economizer (if applicable) (Dry Bulb, Enthalpy):			
Other Information:			

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# HVAC Information Sheet

## Worksheet 1 CONT.



Leading the Way to a Brighter Future

FACILITY NAME: \_\_\_\_\_

ELECTRIC RATE (EXAMPLE: \$0.15/kWh): \_\_\_\_\_

FACILITY TYPE (HOTEL, OFFICE, SCHOOL, MANUFACTURING, ETC): \_\_\_\_\_

ELECTRIC RATE (\$/kWh)(EXAMPLE: \$0.15/kWh): \_\_\_\_\_

	UNIT 1	UNIT 2	UNIT 3
<b>PROPOSED EQUIPMENT DESCRIPTION</b>			
<b>If any changes to building envelope are proposed, please specify:</b>			
Manufacturer:			
Model Number:			
Serial Number:			
Quantities:			
Unit Cooling Capacity (Tons):			
Rated Cooling Efficiency of Equipment (SEER or EER):			
Unit Heating Capacity (Btu/hr):			
Rated Heating Efficiency of Equipment, if applicable (COP):			
Type of System (Split, Packaged Rooftop, Heat Pump, Chiller, etc):			
Supply Fan HP:			
Return Fan HP (if applicable):			
Is the Unit Air Cooled or Water Cooled?:			
If Water Cooled, Size of Cooling Tower (Tons):			
Distribution System Type (Constant Volume, Variable Air Volume?):			
Economizer (if applicable) (Dry Bulb, Enthalpy):			
Other Information:			
<b>ENERGY SAVINGS SUMMARY</b>			
Annual kWh Savings:			
Annual \$ Savings:			
Material Cost:			
Labor Cost:			
Implementation Cost:			
Simple Paycheck (years):			

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# HVAC Information Sheet

## Worksheet 1



Leading the Way to a Brighter Future

**FACILITY NAME:** ABC Trucking Co.  
**FACILITY LOCATION:** Portland  
**FACILITY TYPE (HOTEL, OFFICE, SCHOOL, MANUFACTURING, ETC):** Office  
**ELECTRIC RATE (\$/kWh)(EXAMPLE: \$0.15/kWh):** \$0.15/kWh

BUILDING ENVELOPE DESCRIPTION	
Total Building Area (square feet):	10000
Estimated North, South, East, West Wall Areas (sq. ft):	North: 1,100, South: 1,100, East: 1,100, West: 1,100 (All in sq. ft)
Average/Estimated Wall R-Value (hr-F-ft <sup>2</sup> /Btu):	10
Average/Estimated Roof R-Value (hr-F-ft <sup>2</sup> /Btu):	15
Estimated North, South, East, West, Horiz. Window Areas (sq. ft):	North: 400, South: 400, East: 400, West: 400 (All in sq. ft)
Average/Estimated Window R-Value (hr-F-ft <sup>2</sup> /Btu):	2
Number of People During Occupied Period:	75
Lighting Load (Watts/square feet):	1.2
Equipment Load (Watts/square feet):	0.3
Ventilation Air Requirements (CFM):	3750
Building Occupied Hours Weekday:	7 AM to 7 PM, Monday to Friday
Building Occupied Hours Weekend:	10 AM to 4 PM on Saturday and Sunday
Cooling Occupied Temperature Setpoint (F):	72
Cooling Unoccupied Temperature Setpoint (F):	78
Heating Occupied Temperature Setpoint (F):	72
Heating Unoccupied Temperature Setpoint (F):	64
Programmable Thermostats (Yes or No):	Yes

EXISTING EQUIPMENT DESCRIPTION	UNIT 1	UNIT 2	UNIT 3
Manufacturer:	ABC		
Model Number:	GHF10		
Serial Number:	12345abc		
Quantities:	5		
Unit Cooling Capacity (Tons):	10		
Rated Cooling Efficiency of Equipment (SEER or EER):	7 EER		
Unit Heating Capacity (Btu/hr):			
Rated Heating Efficiency of Equipment, if applicable (COP):	2.5 COP		
Type of System (Split, Packaged Rooftop, Heat Pump, Chiller, etc):	Heat Pump		
Supply Fan HP:	N/A		
Return Fan HP (if applicable):	N/A		
Is the Unit Air Cooled or Water Cooled?:	Air Cooled		
If Water Cooled, Size of Cooling Tower (Tons):	N/A		
Distribution System Type (Constant Volume, Variable Air Volume?):	Constant Volume		
Economizer (if applicable) (Dry Bulb, Enthalpy):	N/A		
Other Information:	Have backup electric heat (COP of 1) starting at 35°		

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# HVAC Information Sheet

## Worksheet 1 CONT.



Leading the Way to a Brighter Future

**FACILITY NAME:** ABC Trucking Co.

**FACILITY LOCATION:** Portland

**FACILITY TYPE (HOTEL, OFFICE, SCHOOL, MANUFACTURING, ETC):** Office

**ELECTRIC RATE (\$/kWh)(EXAMPLE: \$0.15/kWh):** \$0.15/kWh

	UNIT 1	UNIT 2	UNIT 3
<b>PROPOSED EQUIPMENT DESCRIPTION</b>			
<b>If any changes to building envelope are proposed, please specify:</b>	None		
Manufacturer:	XYZ		
Model Number:	ESD10		
Serial Number:	4567xyz		
Quantities:	5		
Unit Cooling Capacity (Tons):	10		
Rated Cooling Efficiency of Equipment (SEER or EER):	12 EER		
Unit Heating Capacity (Btu/hr):			
Rated Heating Efficiency of Equipment, if applicable (COP):	3.3 COP		
Type of System (Split, Packaged Rooftop, Heat Pump, Chiller, etc):	Heat Pump		
Supply Fan HP:	N/A		
Return Fan HP (if applicable):	N/A		
Is the Unit Air Cooled or Water Cooled?:	Air Cooled		
If Water Cooled, Size of Cooling Tower (Tons):	N/A		
Distribution System Type (Constant Volume, Variable Air Volume?):	Constant Volume		
Economizer (if applicable) (Dry Bulb, Enthalpy):	N/A		
Other Information:	Have backup electric heat (COP of 1) starting at 25 F		
<b>ENERGY SAVINGS SUMMARY</b>			
Annual kWh Savings:	47,692		
Annual \$ Savings:	\$4,292.27		
Material Cost:	\$25,000		
Labor Cost:	\$5,000		
Implementation Cost:	\$30,000		
Simple Paycheck (years):	7.0		

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# HVAC Energy Savings Calculator Sheet Part I

## Worksheet 2



Leading the Way to a Brighter Future

OCCUPIED HOURS				EXISTING SYSTEM			PROPOSED SYSTEM			SAVINGS		
Temp. Bin, °F	Hours	Cooling/ Heating Mode	Temp. Setpoint °F	Cooling/ Heating Loads Btu/hr	Unit Efficiency (COP, EER)	Power Demand kW	Energy kWh	Unit Efficiency (COP, EER)	Power Demand kW	Energy kWh	Power Demand kW	Energy kWh
95	18	C	72	294,616	2.1	58.8	1,058	3.5	34.3	617	24.5	441
90	61	C	72	264,784	2.1	54.0	3,294	3.5	31.5	1,922	22.5	1,373
85	212	C	72	233,849	2.1	47.6	10,091	3.5	27.8	5,894	19.8	4,198
80	235	C	72	203,163	2.1	42.5	9,988	3.5	24.8	5,828	17.7	4,160
75	290	C	72	170,185	2.1	36.9	10,701	3.5	21.5	6,235	15.4	4,466
70	271	C	72	136,536	2.1	31.3	8,482	3.5	18.2	4,932	13.1	3,550
65	352	C	72	104,412	2.1	20.6	7,251	3.5	12.0	4,224	8.6	3,027
60	251	C	72	71,398	2.1	10.2	2,560	3.5	6.0	1,506	4.2	1,054
55	236	C	72	45,249	2.1	6.5	1,534	3.5	3.8	897	2.7	637
50	230	C	72	19,560	2.1	2.8	644	3.5	1.6	368	1.2	276
45	209	H	72	8,559	2.5	1.0	209	3.3	0.8	167	0.2	42
40	319	H	72	39,639	2.5	4.6	1,467	3.3	3.5	1,117	1.1	351
35	332	H	72	68,806	2.5	8.1	2,689	3.3	6.1	2,025	2.0	664
30	258	H	72	99,677	1	29.2	7,534	3.3	8.9	2,296	20.3	5,237
25	166	H	72	131,829	1	38.7	6,424	3.3	11.7	1,942	27.0	4,482
20	157	H	72	160,994	1	47.2	7,410	1	47.2	7,410	0	0
15	70	H	72	196,235	1	57.5	4,025	1	57.5	4,025	0	0
10	36	H	72	226,842	1	66.3	2,387	1	66.3	2,387	0	0
5	24	H	72	258,326	1	75.5	1,812	1	75.5	1,812	0	0
0	12	H	72	295,701	1	85.4	1,025	1	85.4	1,025	0	0
-5	10	H	72	328,090	1	99.6	996	1	99.6	996	0	0
-10	3	H	72	350,346	1	106.3	319	1	106.3	319	0	0
-15	1	H	72	431,518	1	101.6	102	1	101.6	102	0	0
<b>TOTALS</b>							<b>92,003</b>			<b>58,045</b>		<b>33,957</b>

Please specify the source of the weather data used in the analysis along with any other assumptions.  
Please submit separate sheets for each unit (if case).

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# HVAC Energy Savings Calculator Sheet Part II

## Worksheet 3



Leading the Way to a Brighter Future

UNOCCUPIED HOURS				EXISTING SYSTEM			PROPOSED SYSTEM			SAVINGS		
Temp. Bin, °F	Hours	Cooling/ Heating Mode	Temp. Setpoint °F	Cooling/ Heating Loads Btu/hr	Unit Efficiency (COP, EER)	Power Demand kW	Energy kWh	Unit Efficiency (COP, EER)	Power Demand kW	Energy kWh	Power Demand kW	Energy kWh
95	4	C	78	141,789	2.1	26.0	104	3.5	15.2	61	10.8	43
90	15	C	78	125,375	2.1	21.4	321	3.5	12.5	188	8.9	134
85	69	C	78	104,980	2.1	18.5	1,277	3.5	10.8	745	7.7	531
80	95	C	78	84,950	2.1	15.3	1,454	3.5	8.9	846	6.4	608
75	203	C	78	61,085	2.1	11.5	2,335	3.5	6.7	1,360	4.8	974
70	317	C	78	34,756	2.1	7.5	2,378	3.5	4.4	1,395	3.1	983
65	510	C	78	15,487	2.1	2.8	1,428	3.5	1.6	816	1.2	612
60	455	H	64	560	2.5	0.1	46	3.3	0.0	0	0.1	46
55	347	H	64	1,500	2.5	0.2	69	3.3	0.1	35	0.1	35
50	350	H	64	2,300	2.5	0.3	105	3.3	0.2	70	0.1	35
45	290	H	64	4,421	2.5	0.6	174	3.3	0.4	116	0.2	58
40	483	H	64	21,387	2.5	2.5	1,208	3.3	1.9	918	0.6	290
35	485	H	64	37,649	2.5	4.4	2,134	3.3	3.3	1,601	1.1	534
30	398	H	64	53,653	1	15.7	6,249	3.3	4.8	1,910	10.9	4,338
25	303	H	64	72,648	1	21.3	6,454	3.3	6.4	1,939	14.9	4,515
20	274	H	64	88,281	1	25.9	7,097	1	25.9	7,097	0	0
15	151	H	64	103,398	1	30.3	4,575	1	30.3	4,575	0	0
10	83	H	64	121,761	1	35.7	2,963	1	35.7	2,963	0	0
5	69	H	64	145,665	1	42.7	2,946	1	42.7	2,946	0	0
0	44	H	64	162,965	1	47.9	2,108	1	47.9	2,108	0	0
-5	43	H	64	180,422	1	52.4	2,253	1	52.4	2,253	0	0
-10	11	H	64	198,947	1	57.7	635	1	57.7	635	0	0
-15	8	H	64	218,801	1	65.7	526	1	65.7	526	0	0
<b>TOTALS</b>	<b>5,007</b>						<b>48,835</b>			<b>35,101</b>		<b>13,735</b>

Please specify the source of the weather data used in the analysis along with any other assumptions. Please submit separate sheets for each unit (if case).

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