



(Responsible Individual)

(Company Name)

I, , from ,
verify that the information provided below is accurate, to the best of my knowledge.

CREDIT COMPLIANCE

(Please complete the color coded criteria(s) based on the option path selected)

Please select the appropriate compliance path option

Option 1 (Pg 2): Performance Rating Method, ASHRAE 90.1-2004 Appendix G or equivalent (up to 10 points possible)

Option 2 (Pg 14): ASHRAE Advanced Energy Design Guide for Small Office Buildings 2004 (4 points)

Option 3 (Pg 14): Advanced Buildings Benchmark™ Version 1.1, Basic Criteria & Prescriptive Measures (1 point)

OPTION 1: PERFORMANCE RATING METHOD

I confirm that the energy simulation software used for this project has all capabilities described in EITHER section 'G2 Simulation General Requirements' in Appendix G of ASHRAE 90.1-2004 OR the analogous section of the alternative qualifying energy code used.

I confirm that the baseline building and proposed building in this project's energy simulation runs use the assumptions and modeling methodology described in EITHER Appendix G of ASHRAE 90.1-2004 OR the analogous section of the alternative qualifying energy code used.

Complete the following sections to document compliance using Option 1:

- Section 1.1 - General Information
- Section 1.2 - Space Summary
- Section 1.3 - Advisory Messages
- Section 1.4 - Comparison of Proposed Design Versus Baseline Design Energy Model Inputs
- Section 1.5 - Energy Type Summary
- Section 1.6 - On-Site Renewable Energy (if applicable)
- Section 1.7 - Exceptional Calculation Measure Summary (if applicable)
- Section 1.8 - Performance Rating Method Compliance Report

Section 1.1 - General Information

Provide the following data for your project

Simulation Program:	<input type="text" value="Trane Trace 700"/>	Quantity of Stories:	<input type="text" value="1"/>
Principal Heating Source:	<input type="text" value="Electricity"/>	Weather File:	<input type="text" value="Duluth, MN - TMY3"/>
Energy Code Used:	<input type="text" value="ASHRAE 90.1-2004 Appendix G"/>	Climate Zone:	<input type="text" value="7"/>
New Construction Percent:	<input type="text" value="100 %"/>	Existing Renovation Percent:	<input type="text" value="0 %"/>

Enter the Target Finder score for your building from the Energy Star website (http://www.energystar.gov/index.cfm?fuseaction=target_finder.&CFID=154897). The score has no bearing on the number of EAc1 points earned. Use the following process to evaluate the Target Finder score:

1. Enter the facility information
2. Enter the facility characteristics. Select each primary and secondary space type that applies to the project. Then complete the required information for each space type.
4. Enter the total energy use per energy source for your project based on the totals reflected in the Proposed Design energy simulation output report.

Target Finder Score:



Section 1.2 - Space Summary

Provide the space summary for your project
(click "CLEAR" to clear the contents of any row All numeric entries must be entered as whole numbers without commas):

Building Use (Occupancy Type)	Conditioned Area (sf)	Unconditioned Area (sf)	Total Area (sf)	
Assembly Room	933	90	1,023	<input type="button" value="CLEAR"/>
Mens Toilet room	91	20	111	<input type="button" value="CLEAR"/>
Womens Toilet Room	91	20	111	<input type="button" value="CLEAR"/>
Mechanical/Storage Room	595	155	750	<input type="button" value="CLEAR"/>
				<input type="button" value="CLEAR"/>
				<input type="button" value="CLEAR"/>
				<input type="button" value="CLEAR"/>
				<input type="button" value="CLEAR"/>
				<input type="button" value="CLEAR"/>
				<input type="button" value="CLEAR"/>
				<input type="button" value="CLEAR"/>
				<input type="button" value="CLEAR"/>
Total:	1,710	285	1,995	

Section 1.3 - Advisory Messages

Complete the following information from the simulation output files (all entries should be entered as whole numbers, without commas)

	Proposed Building	Baseline Building (0 deg. rotation)	Difference
Number of hours heating loads not met:	0	0	0
Number of hours cooling loads not met:	0	0	0
Number of warning messages:	0	0	0
Number of error messages:	0	0	0
Number of defaults overridden:	18	16	2



Section 1.4 - Comparison of Proposed Design Versus Baseline Design Energy Model Inputs

Use Table 1.4 to document the Baseline and Proposed design energy model inputs for your project. Include descriptions for:

1. Exterior wall, underground wall, roof, floor, and slab assemblies including framing type, assembly R-values, assembly U-factors, and roof reflectivity when modeling cool roofs. (Refer to ASHRAE 90.1 Appendix A)
2. Fenestration types, assembly U-factors (including the impact of the frame on the assembly), SHGCs, and visual light transmittances, overall window-to-gross wall ratio, fixed shading devices, and automated movable shading devices.
3. Interior lighting power densities, exterior lighting power, process lighting power, and lighting controls modeled for credit.
4. Receptacle equipment, elevators or escalators, refrigeration equipment, and other process loads.
5. HVAC system information including types and efficiencies, fan control, fan supply air volume, fan power, economizer control, demand control ventilation, exhaust heat recovery, pump power and controls, and any other pertinent system information. (Include the ASHRAE 90.1-2004 Table G.3.1.1B Baseline System Number).
6. Domestic hot water system type, efficiency and storage tank volume.
7. General schedule information

Documentation should be sufficient to justify the energy and cost savings numbers reported in the Performance Rating Table.

(Click "CLEAR" to clear the contents of any row.)

Model Input Parameter	Proposed Design Input	Baseline Design Input	
Exterior Wall Construction	16" S.I.P. Panels: U=0.0136 6" S.I.P. Panel: U=0.0317	Steel-frame Construction, R-13 insulation + 7.5 ci, U-factor = 0.064	CLEAR
Roof Construction	14" S.I.P. Panels: U=0.0147	Insulation Entirely above deck R-15 insulation U-factor = .063, Roof Reflectivity = 0.30	CLEAR
Floor/Slab Construction	Heated Slab: R-80 insulation	Uninsulated, F-0.730	CLEAR
Window-to-gross wall ratio	15.7%	15.7%	CLEAR
Fenestration type	1. Dual-Pane Metal Frame windows with thermal break; operable 2. Dual-Pane Metal Frame windows with thermal break; operable	1. North, South, West Orientations 2. North, East, South, West Orientations	CLEAR
Fenestration U-factor	1. U=0.20 2. U=0.19	1. 0.57 2. 0.57	CLEAR
Fenestration SHGC - North	No windows facing North	1. 0.49 2 0.49	CLEAR
Fenestration SHGC - Non-North	1. SHGC = 0.44 2. SHGC = 0.38	1. 0.49 2 0.49	CLEAR
Fenestration Visual Light Transmittance	1. VT = 0.49 2. VT = 0.49	1. 0.44 2. 0.44	CLEAR
Shading Devices	slatted overhang	None	CLEAR
			CLEAR
Interior Lighting Power Density (W/sf)	Average LDP = 0.5 W/sqft	Whole Building: Average LDP = 1.2 W/sqft	CLEAR



TABLE 1.4 - Comparison of Proposed Design Versus Baseline Design

Model Input Parameter	Proposed Design Input	Baseline Design Input	
Daylighting Controls	Yes	No	CLEAR
Other Lighting Control Credits	Occupancy sensors (No credit has been taken in the energy model)	None	CLEAR
Exterior Lighting Power (kW)	0.120 KW (Total installed exterior lighting wattage = 120 Watts) +	0.120 KW	CLEAR
Process Lighting (kW)	None	None	CLEAR
Receptacle Equipment Power Density (W/sf)	0.5 W/sqft	0.5 W/sqft	CLEAR
Service Water Heating	(2) 4.6 KW Instantaneous water heaters (Listed in the base utilities)	(2) 4.6 KW Instantaneous water heaters (Listed in the base utilities)	CLEAR
Primary HVAC System Type	Heating Boiler	Table G3.1.1B System # 4 -PSZ-HP	CLEAR
Other HVAC System Type	Heat Recovery Ventilator		CLEAR
Fan Supply Volume	600 CFM	2,895 CFM	CLEAR
Fan Power	1/6 HP Fan Motor Efficiency: 90% Mechanical Fan Efficiency = 75% +	2.5 HP Fan Motor Efficiency: 90% Mechanical Fan Efficiency = 75% +	CLEAR
Economizer Control	None	None	CLEAR
Demand Control Ventilation	Yes - CO2 control (Not included in the Energy Model)	No	CLEAR
Unitary Equipment Cooling Efficiency	Modeled as ASHRAE system, Air Cooled: <65,000: 10.1 EER	Air Cooled: >65,000<135,000: 10.1 EER for Packaged Units	CLEAR
Unitary Equipment Heating Efficiency	100% - Electric Heat	100% - Electric Heat	CLEAR
Boiler parameters	8.0 KW Instantaneous Electric Boiler		CLEAR
Hot water loop & pump parameters	In-floor radiant heating with Primary/Secondary pumping, two zones.		CLEAR
HRV Efficiencies	Air Volume: 600 CFM Sensible Transfer: Cooling Effectiveness: 62% +		CLEAR
			CLEAR
			CLEAR
			CLEAR
			CLEAR



Section 1.5 - Energy Type Summary

List the energy types used by your project (i.e. electricity, natural gas, purchased chilled water or steam, etc.) for either the Baseline or Proposed design. Also describe the utility rate used for each energy type (i.e. Feswick County Electric LG-S), as well as the units of energy used, and the units of demand used. (Click "CLEAR" to clear the contents of any row):

TABLE 1.5 - Energy Type Summary

Energy Type	Utility Rate Description	Units of Energy	Units of demand	
Electricity	City of Duluth	MBtu	MBH	<input type="button" value="CLEAR"/>
				<input type="button" value="CLEAR"/>
				<input type="button" value="CLEAR"/>
				<input type="button" value="CLEAR"/>

Energy Units:

1 kBtu = 1,000 Btu 1 MBtu = 1,000 kBtu
 1 kWh = 3,412 kBtu 1 MWh = 3,412 kBtu
 1 therm = 100 kBtu 1 ton hr = 12 kBtu

Demand Units

1 MBH = 1,000 Btu/h 1 MMBtuh = 1,000 MBH
 1 kW = 3.412 MBH 1 ton = 12 MBH



Section 1.6 - On-Site Renewable Energy

If the project does not include on-site renewable energy, skip to Section 1.7

The project includes On-Site Renewable Energy

How is the on-site renewable energy cost calculated?

This form will automatically calculate the Renewable Energy Cost based on the "virtual" energy rate from the proposed design energy model results. This form will subtract the Renewable Energy Cost from the proposed design energy model results to calculate the Proposed Building Performance Rating. (You do NOT need to fill out the "Renewable Energy Cost" field in Table 1.6 below)

Renewable Energy Cost for each on-site renewable source is analyzed separately from the energy model based on local utility rate structures. The Renewable Energy Cost for each renewable source is reported in Table 1.6 below, This form will subtract the reported Renewable Energy Cost from the proposed design energy model results to calculate the Proposed Building Performance Rating.

On-site renewable energy is modeled directly in the energy model. Renewable Energy Cost is already credited in the proposed design energy model results (i.e. the energy model already reflects zero cost for on-site renewable energy, and this form will NOT subtract the Renewable Energy Cost a second time).

Indicate the on-site renewable energy source(s) used, the backup energy type for each source (i.e. the fuel that is used when the renewable energy source is unavailable - ASHRAE 90.1-2004, Section G2.4), the rated capacity for the source, and the annual energy generated from each source.

TABLE 1.6 - Renewable Energy Source Summary

Renewable Source	Backup Energy Type	Annual Energy Generated		Rated Capacity	Renewable Energy Cost	
Photovoltaic	Electricity	24.5	(MBtu)	5.5 KW		<input type="button" value="CLEAR"/>
						<input type="button" value="CLEAR"/>



Section 1.7 - Exceptional Calculation Measure Summary

(If the energy analysis does not include exceptional calculation methods, skip to Section 1.8)

The energy analysis includes exceptional calculation method(s) (ASHRAE 90.1-2004, G2.5)

How is the exceptional calculation measure cost savings determined?

This form will automatically calculate the exceptional calculation measure cost savings based on the "virtual" energy rate from the proposed design energy model results. This form will subtract this cost savings from the proposed design energy model results to calculate the Proposed Building Performance Rating.

Exceptional calculation measure cost for each exceptional calculation measure is analyzed based on local utility rate structures. The cost savings for each exceptional calculation is reported below, This form will subtract the reported exceptional calculation cost savings from the proposed design energy model results to calculate the Proposed Building Performance Rating.

For each exceptional calculation method employed, document the predicted energy savings by energy type , the energy cost savings (if option 2 above is selected), and a narrative explaining the exceptional calculation method performed, and theoretical or empirical information supporting the accuracy of the method. Reference any applicable Credit Interpretation Rulings. [Note: if an end-use has an energy loss rather than an energy savings, enter it as a negative number]

Exceptional Calculation Measure Short Description:

Energy Type(s)	Annual Energy Savings by Energy Type	Annual Cost Savings	Exceptional Calculation Measure Narrative:
<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="text"/>	<input type="text"/>	<input type="text"/>	

Exceptional Calculation Measure Short Description:

Energy Type(s)	Annual Energy Savings by Energy Type	Annual Cost Savings	Exceptional Calculation Measure Narrative:
<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="text"/>	<input type="text"/>	<input type="text"/>	
<input type="text"/>	<input type="text"/>	<input type="text"/>	



Section 1.8 - Performance Rating Method Compliance Report (Option 1 Compliance Only)

In Table 1.8.1, list each energy end use for your project (including all end uses reflected in the baseline and proposed designs). Then check whether the end-use is a process load, select the energy type, and list the energy consumption and peak demand for each end-use for all four Baseline Design orientations. In Table 1.8.1(b) indicate the total baseline energy cost for each energy type for all four Baseline Design orientations. If either the baseline or proposed design uses more than one energy type for a single end use (i.e. electric resistance reheat, and central natural gas heating), enter each energy type as a separate end use (i.e. Heating - Electric, and Heating, NG).

Fill out the Proposed Design energy consumption and peak demand for each end use in Table 1.8.2. In Table 1.8.2 (b) indicate the total proposed energy cost for each energy type. [Note: Process loads for the proposed design must equal those listed in the Baseline design. Any process load energy savings for the project must be reported in Section 1.7.]

(Click "CLEAR" to clear the contents of any end use)

Table 1.8.1 - Baseline Performance - Performance Rating Method Compliance

End Use	Process?	Baseline Design Energy Type	Units of Annual Energy & Peak Demand	Baseline (0° rotation)	Baseline (90° rotation)	Baseline (180° rotation)	Baseline (270° rotation)	Baseline Design	
Interior Lighting	<input type="checkbox"/>	Electricity	Energy Use (MBtu)	6.5	6.5	6.5	6.5	6.5	CLEAR
			Demand (MBH)	6	6	6	6	6	
Exterior Lighting	<input type="checkbox"/>	Electricity	Energy Use (MBtu)	1.9	1.9	1.9	1.9	1.9	CLEAR
			Demand (MBH)	.3	.3	.3	.3	.3	
Process Energy	<input type="checkbox"/>	Electricity	Energy Use (MBtu)	59.8	59.8	59.8	59.8	59.8	CLEAR
			Demand (MBH)	9.3	9.3	9.3	9.3	9.3	
Space Cooling	<input type="checkbox"/>	Electricity	Energy Use (MBtu)	0	0	0	0	0	CLEAR
			Demand (MBH)	0	0	0	0	0	
Pumps	<input type="checkbox"/>	Electricity	Energy Use (MBtu)	0	0	0	0	0	CLEAR
			Demand (MBH)	0	0	0	0	0	
Heat Rejection	<input type="checkbox"/>	Electricity	Energy Use (MBtu)	0	0	0	0	0	CLEAR
			Demand (MBH)	0	0	0	0	0	
Fans - Interior	<input type="checkbox"/>	Electricity	Energy Use (MBtu)	60.9	61.2	61.6	61.3	61.3	CLEAR
			Demand (MBH)	11	11	11	11	11	
Space Heating - Electricity	<input type="checkbox"/>	Electricity	Energy Use (MBtu)	108.1	112.1	116.2	113.4	112.5	CLEAR
			Demand (MBH)	78	78	78	78	78	
Service Water Heating	<input type="checkbox"/>	Electricity	Energy Use (MBtu)	2	2	2	2	2	CLEAR
			Demand (MBH)	1.7	1.7	1.7	1.7	1.7	
Receptacle Equipment	<input type="checkbox"/>	Electricity	Energy Use (MBtu)	2.7	2.7	2.7	2.7	2.7	CLEAR
			Demand (MBH)	2	2	2	2	2	



Table 1.8.1 - Baseline Performance - Performance Rating Method Compliance

End Use	Process?	Baseline Design Energy Type	Units of Annual Energy & Peak Demand	Baseline (0° rotation)	Baseline (90° rotation)	Baseline (180° rotation)	Baseline (270° rotation)	Baseline Design	
	<input type="checkbox"/>		Energy Use						CLEAR
			Demand						
	<input type="checkbox"/>		Energy Use						CLEAR
			Demand						
	<input type="checkbox"/>		Energy Use						CLEAR
			Demand						
	<input type="checkbox"/>		Energy Use						CLEAR
			Demand						
	<input type="checkbox"/>		Energy Use						CLEAR
			Demand						
Baseline Energy Totals:			Total Annual Energy Use (kBtu/year)	241,910	246,210	250,710	247,610	246,610	
			Annual Process Energy (kBtu/year)					0	

Note: Process Cost accounts for 0% of Baseline Performance. Process cost must equal at least 25% of Baseline Performance, or the narrative at the end of this form must document why this building's process costs are less than 25%

Table 1.8.1(b) - Baseline Energy Costs

Energy Type	Baseline Cost (0° rotation)	Baseline Cost (90° rotation)	Baseline Cost (180° rotation)	Baseline Cost (270° rotation)	Baseline Building Performance
Electricity	\$5,444	\$5,540	\$5,642	\$5,571	\$5,549
Total Baseline Costs:	\$5,444	\$5,540	\$5,642	\$5,571	\$5,549

Table 1.8.2 - Performance Rating Table - Performance Rating Method Compliance

End Use	Process?	Proposed Design Energy Type	Proposed Design Units	Proposed Building Results	Baseline Building Units	Baseline Building Results	Percent Savings
Interior Lighting		Electricity	Energy Use (MBtu)	2.8	Energy Use (MBtu)	6.5	56.9 %
			Demand (MBH)	2	Demand (MBH)	6	66.7 %



Exterior Lighting	Electricity	Energy Use (MBtu)	1.9	Energy Use (MBtu)	1.9	0	%
		Demand (MBH)	.3	Demand (MBH)	.3	0	%
Process Energy	Electricity	Energy Use (MBtu)	59.8	Energy Use (MBtu)	59.8	0	%
		Demand (MBH)	9.3	Demand (MBH)	9.3	0	%
Space Cooling	Electricity	Energy Use (MBtu)	0	Energy Use (MBtu)	0	0	%
		Demand (MBH)	.1	Demand (MBH)	0	0	%
Pumps	Electricity	Energy Use (MBtu)	2.2	Energy Use (MBtu)	0	0	%
		Demand (MBH)	0	Demand (MBH)	0	0	%
Heat Rejection	Electricity	Energy Use (MBtu)	0	Energy Use (MBtu)	0	0	%
		Demand (MBH)	0	Demand (MBH)	0	0	%
Fans - Interior	Electricity	Energy Use (MBtu)	3.3	Energy Use (MBtu)	61.3	94.6	%
		Demand (MBH)	1	Demand (MBH)	11	90.9	%
Space Heating - Electricity	Electricity	Energy Use (MBtu)	62.9	Energy Use (MBtu)	112.5	44.1	%
		Demand (MBH)	60	Demand (MBH)	78	23.1	%
Service Water Heating	Electricity	Energy Use (MBtu)	2	Energy Use (MBtu)	2	0	%
		Demand (MBH)	1.7	Demand (MBH)	1.7	0	%
Receptacle Equipment	Electricity	Energy Use (MBtu)	2.7	Energy Use (MBtu)	2.7	0	%
		Demand (MBH)	2	Demand (MBH)	2	0	%
		Energy Use		Energy Use		0	%
		Demand		Demand		0	%
		Energy Use		Energy Use		0	%
		Demand		Demand		0	%
		Energy Use		Energy Use		0	%
		Demand		Demand		0	%
		Energy Use		Energy Use		0	%
		Demand		Demand		0	%
		Energy Use		Energy Use		0	%
		Demand		Demand		0	%
Energy Totals:		Total Annual Energy Use (kBtu/year)	137,610		246,610	44.2	%
		Annual Process Energy (kBtu/year)	0		0	0	%



Table 1.8.2(b) - Energy Cost and Consumption by Energy Type - Performance Rating Method Compliance										
Energy Type	Proposed Design			Baseline Design			Percent Savings			
	Energy Use		Cost	Energy Use		Cost	Energy Use		Cost	
Electricity	132	MBtu	\$3,098	242	MBtu	\$5,549	45.5	%	44.2	%
	0		0	0			0	%	0	%
	0			0			0	%	0	%
	0			0			0	%	0	%
Subtotal (Model Outputs):	137,610	(kBtu/year)	\$3,098	246,610	(kBtu/year)	\$5,549	44.2	%	44.2	%
On-Site Renewable Energy	Energy Generated		Renewable Energy Cost							
Photovoltaic	24	(MBtu)	\$563	(subtracted from model results to reflect Proposed Building Performance)						
			0	(subtracted from model results to reflect Proposed Building Performance)						
Exceptional Calculations	Energy Savings		Cost Savings							
Total:	Proposed Design			Baseline Design			Percent Savings			
	Energy Use		Cost	Energy Use		Cost	Energy		Cost	
	113,110	(kBtu/year)	\$2,535	246,610	(kBtu/year)	\$5,549	54.1	%	54.3	%

Select Source of Data: full simulation

Base 1 (TRACE LEED)

Base 2 (TRACE)

Actual 1 (TRACE LEED)

Actual 2 (TRACE)

Actual 3 (PHPP)

	Base (1/2)	Actual (1/2/3)
Total Purchased Energy (Mbtu/yr)	247/598	114/8/-10
Total Purchased Energy by Fuel:		
Electricity (Mbtu/yr)	247/598	114/8/-10
Natural Gas (Mbtu/yr)	0/0	0/0/0
Other (Mbtu/yr)	0/0	0/0/0
On-site Renewable Energy:		
Photovoltaics (Mbtu/yr)	0/0	24/24/31
Wind (Mbtu/yr)	0/0	0/0/0
Other (Mbtu/yr)	0/0	0/0/0
Building Consumption Breakdown:		
Heating (Mbtu/yr)	113/369	63/23/7
Cooling (Mbtu/yr)	0/50	0/0/0
Building Energy Loads:		
Cooling Capacity (ton)	NA	NA
Lighting Load connected (kw)	0/2.0	NA
Lighting Load after controls (kw)	0.2/NA	0.09/0.05/0.04
Plug load (kw)	0.09/0.6	0.09/0.05/0.03
Peak electricity demand (kw)	32/158	22/7.3/NA

Percentage Total Energy Savings Comparing 1 & 1: 54%

Percentage Total Energy Savings Comparing 2 & 2: 99%

Percentage Total Energy Savings Comparing 1 & 3: 104%

Energy Data Attachments:

Electrical Utility Bill

TRACE 700 Calculation for LEED

TRACE 700 Calculation for design planning

Passive House Planning Package(PHPP) sheets

Photovoltaic System Data

LEED EA1 template

Energy Cost Budget / PRM Summary

Date: August 11, 2010

Note: The percentage displayed for the "Proposed/ Base %" column of the base case is actually the percentage of the total energy consumption.

* Denotes the base alternative for the ECB study.

		Actual 1 (LEED)			Base 1 (LEED)		
		Energy 10 ⁶ Btu/yr	Proposed / Base %	Peak kBtuh	Energy 10 ⁶ Btu/yr	Proposed / Base %	Peak kBtuh
Lighting - Conditioned	Electricity	2.8	2	2	6.5	230	6
Space Heating	Electricity	62.9	46	60	112.5	179	78
Space Cooling	Electricity	0.0	0	1	0.0	0	0
Pumps	Electricity	2.2	2	0	0.0	0	0
Heat Rejection	Electricity	0.0	0	0	0.0	0	0
Fans - Conditioned	Electricity	3.3	2	1	61.2	1,851	11
Receptacles - Conditioned	Electricity	2.7	2	2	2.7	100	2
Stand-alone Base Utilities	Electricity	63.7	46	9	63.7	100	9
Total Building Consumption		137.7			246.6		

		* Alt-1 UMD Bagley Nature Clas	Alt-2
Total	Number of hours heating load not met	0	0
	Number of hours cooling load not met	0	0

		* Alt-1 UMD Bagley Nature Clas		Alt-2	
		Energy 10 ⁶ Btu/yr	Cost/yr \$/yr	Energy 10 ⁶ Btu/yr	Cost/yr \$/yr
Electricity		137.7	3,098	246.6	5,549
Total		138	3,098	247	5,549



Energy Cost Budget / PRM Summary

	Date: April 30, 2009
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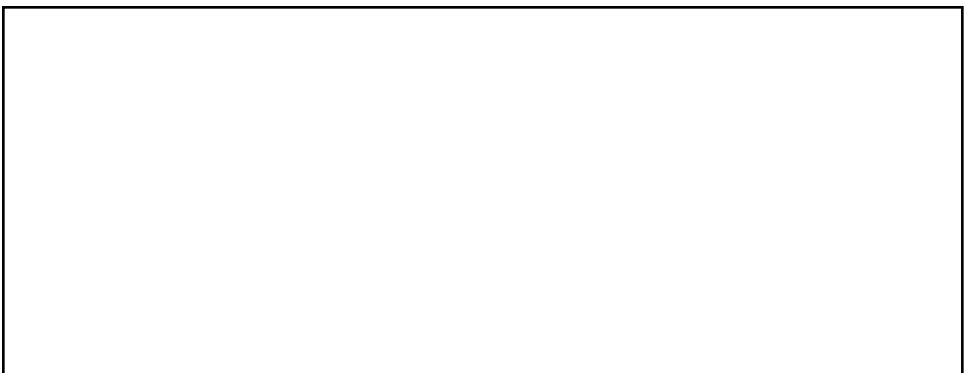
Note: The percentage displayed for the "Proposed/ Base %" column of the base case is actually the percentage of the total energy consumption.

* Denotes the base alternative for the ECB study.

		Actual 2			Base 2		
		Energy 10 ⁶ Btu/yr	Proposed / Base %	Peak kBtuh	Energy 10 ⁶ Btu/yr	Proposed / Base %	Peak kBtuh
Lighting - Conditioned	Electricity	1.4	4	2	60.8	4,246	7
Space Heating	Electricity	23.0	72	20	369.4	1,606	461
Space Cooling	Electricity	0.0	0	0	50.0	0	51
Pumps	Electricity	2.8	9	0	0.0	0	0
Heat Rejection	Electricity	0.0	0	0	3.9	0	4
Fans - Conditioned	Electricity	1.0	3	0	110.0	10,560	13
Receptacles - Conditioned	Electricity	1.6	5	2	1.6	100	2
Stand-alone Base Utilities	Electricity	2.0	6	1	2.0	100	1
Total Building Consumption		31.9			597.6		

		* Alt-1 UMD Bagley Nature Clas	Alt-2
Total	Number of hours heating load not met	0	0
	Number of hours cooling load not met	0	227

		* Alt-1 UMD Bagley Nature Clas		Alt-2	
		Energy 10 ⁶ Btu/yr	Cost/yr \$/yr	Energy 10 ⁶ Btu/yr	Cost/yr \$/yr
Electricity		31.9	1,656	597.6	14,587
Total		32	1,656	598	14,587



Passive House Verification



Street: _____
 Postcode/City: _____
 Architect: _____
 Street: _____
 Postcode/City: _____
 Mechanical System: _____
 Street: _____
 Postcode/City: _____
 Year of Construction: **2010**
 Number of Dwelling Units: **0**
 Gross Enclosed Volume V_e: **25231** ft³
 Number of Occupants: **15.0**

Interior Temperature: **68.0** °F
 Internal Heat Gains: **0.9** BTU/hr.ft²

Calculation Electricity / Internal Heat Gains

Building Type:

Internal Heat Gains

Utilization Pattern:

Type of Values Used:

Planned Number of Occupants:

15 Verification

Specific Demands with Reference to the Treated Floor Area			
Treated Floor Area:	1551 ft ²		
Applied:	Monthly Method	PH Certificate:	Fulfilled?
Specific Space Heat Demand:	4.64 kBTU/(ft ² ·yr)	4.75 kBTU/(ft ² ·yr)	Yes
Pressurization Test Result:	0.5 ACH ₅₀	0.6 ACH ₅₀	Yes
Specific Primary Energy Demand (DHW, Heating, Cooling, Auxiliary and Household Electricity):	36.5 kBTU/(ft ² ·yr)	38.0 kBTU/(ft ² ·yr)	Yes
Specific Primary Energy Demand (DHW, Heating and Auxiliary Electricity):	19 kBTU/(ft ² ·yr)		
Specific Primary Energy Demand Energy Conservation by Solar Electricity:	40 kBTU/(ft ² ·yr)		
Heating Load:	0 BTU/(ft ² ·hr)		
Frequency of Overheating:	0 %	over 77.0 °F	
Specific Useful Cooling Energy Demand:	0 kBTU/(ft ² ·yr)	4.75 kBTU/(ft ² ·yr)	
Cooling Load:	0 BTU/(ft ² ·hr)		

Verification:

Monthly Method

Specific Space Heat Demand, Annual Method	5.6
Specific Space Heat Demand, Monthly Method	4.6

We confirm that the values given herein have been determined following the PHPP methodology and based on the characteristic values of the building. The calculations with PHPP are attached to this application.

Issued on:

Oct. 1, 2010

signed:



AC Energy
&
Cost Savings



Station Identification	
City:	Duluth
State:	Minnesota
Latitude:	46.83° N
Longitude:	92.18° W
Elevation:	432 m
PV System Specifications	
DC Rating:	5.5 kW
DC to AC Derate Factor:	0.854
AC Rating:	4.7 kW
Array Type:	Fixed Tilt
Array Tilt:	60.0°
Array Azimuth:	180.0°
Energy Specifications	
Cost of Electricity:	7.9 ¢/kWh

Results			
Month	Solar Radiation (kWh/m ² /day)	AC Energy (kWh)	Energy Value (\$)
1	3.50	563	44.48
2	4.44	634	50.09
3	5.43	826	65.25
4	4.70	657	51.90
5	4.85	663	52.38
6	4.85	625	49.38
7	4.75	620	48.98
8	4.83	643	50.80
9	4.30	575	45.43
10	3.87	554	43.77
11	2.72	388	30.65
12	2.79	436	34.44
Year	4.25	7185	567.62

[Output Hourly Performance Data](#)

[Output Results as Text](#)

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Run [PVWATTS v.2](#) (US only)

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