

ENERGY AND WATER CONSERVATION REPORT FORMAT

PROJECTS BETWEEN \$2M AND \$10M CONSTRUCTION COST

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Executive Summary

Energy conservation measures (ECMs) were evaluated per the requirements of U-M Design Guideline 3.2. The total estimated cost savings and first cost of the recommended ECMs for this project are summarized below:

Estimated Annual Energy Cost Avoidance w/ECMs:	\$152,300
Total Estimated First Cost of ECMs:	\$1,210,000
Over-all Simple Payback (years):	7.9
KWH/Year Savings:	XXXXX
Therms/Year Savings:	XXXXX

A requirement of U-M Design Guideline 3.2 is for designs to use 20% less water compared to designs that exactly meet the building code. The estimated water savings for this project are summarized below:

Estimated Total Annual Water Savings:	41,000 gallons
Annual Water use w/o Water Conservation Measures:	200,000 gallons
Percent Savings Versus Code Requirement:	21%

Project:

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Table 1: Summary of ECM Evaluations

Table 1 summarizes every energy conservation measure evaluated by the design team for this particular project, along with various ECM financial metrics.

Table 1: Summary of ECMs Evaluated

ECM No.	Description	First Cost Estimate	Annual Costs Savings	Simple Payback	ROI	Persistence ¹ H/M/L	Accepted Yes/No	Comments
1a	Additional 0.75" Wall Insulation	\$180,000	\$14,000	12.9	7.8%	H	N	
1b	Additional 1" Wall Insulation	\$300,000	\$16,500	18.2	5.5%	H	N	
1c	Additional 1.5" Wall Insulation	\$350,000	\$18,400	19.0	5.3%	H	Y	
2a	Glass SHGC =0.38	\$186,000	\$7,500	24.8	4.0%	M	N	
2b	Glass SHGC =0.33	\$190,000	\$8,000	23.8	4.2%	M	Y	
2c	Argon Filled Triple Glazed Glass SHGC = 0.26	\$265,000	\$13,400	19.8	5.1%	L	N	Seal life guaranteed only 10 years. Slight gray tint.
3	Day Lighting Sensors, Atrium	\$42,000	\$12,000	3.5	28.6 %	M	Y	
4	Desiccant Wheel	\$200,000	\$40,000	5.0	20.0 %	M	Y	
5	Exterior Shades, South Façade	\$78,000	\$15,000	5.2	19.2 %	H	Y	
6	Increase Thermostat Deadband	\$0	\$7,000	N/A	N/A	L	Y	
7	Free Cooling Process Load	\$350,000	\$55,000	6.4	15.7 %	H	Y	
8	Shower Heat Recovery Device	\$24,000	\$3,000	8.0	12.5 %	L	N	Maintenance issues

Note 1: Persistence represents an opinion of the probability that the estimated energy savings will be fully realized.

Table 2: Water Conservation Measures and Predicted Results

Table 2 indicates the water saving measures and resulting percent water savings predicted for this project versus a project constructed to meet building code requirements (building code requirements are based on Energy Policy Act of 1992 fixture performance dictates). The requirement of U-M Design Guideline 3.2 is for designs to provide projects that use 20% less water than projects designed to exactly meet the building code.

Table 2: Water Conservation

Water Conservation Measure	Estimated Annual Savings (Gallons)
Dual Flush Water Closets	7,000
Waterless or 1/8 Gallon Per Flush Urinals	5,000
HVAC Condensate Used For Cooling Tower Make-Up	8,000
2 GPM Shower Heads	12,000
Gray Water Recovery	9,000

Estimated Total Annual Water Savings: 41,000

Annual Water use w/o Water Conservation Measures: 200,000

Estimated Percentage Savings: 21%

Tables 3 and 4:

U-M Design Guideline 3.2 requires that all projects implement certain "mandatory" energy conservation measures, and it requires that other energy conservation measures be "evaluated" for every project. Tables 3 and 4 indicate which of the mandatory and evaluated measures were found applicable to the project.

Table 3: Review of Mandatory Energy Conservation Measures

Mandatory ECM No.	Description	Implemented Yes/No	Comments	ECM Cross Ref.
a	Window Blinds/Shades	Y		ECM 9
b	Occupancy Schedules	Y		
c	Part Load Efficiency	Y		
d	HVAC System Zoning	Y		ECM 8
e	DDC VAV Control	Y		
f	Standalone HVAC Systems	N	No process areas.	
g	Laboratory ECMs	N	Not a lab building.	
h	Building Envelope Thermal Scanning	Y		ECM 4
i	Limit Incandescent Lighting	Y		
j	Lighting and Power Justification	N		

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Table 4: Review of Mandatory Energy Evaluations

Mandatory Evaluation No.	Description	Implemented Yes/No	Comments	ECM Cross Ref.
a	Additional Below-Grade Insulation			
b	Additional Wall Insulation			
c	Additional Roof Insulation			
d	Improved Glazing (1)			
e	Eliminate Server Rooms			
f	High Efficiency Chiller (1)			
g	Free Cooling			
h	Heat Recovery			
i	Increased Envelope Inspections			
j	Occupancy/Daylight Sensing			
k	High Efficiency Boiler (1)			
l	High Efficiency HVAC Equipment (1)			
m	Variable Volume Kitchen Hoods			

Note 1: Performance/efficiency better than required by code.

Table 5: Energy Cost Assumptions:

Table 5 reports the energy cost assumptions utilized for energy cost calculations.

Table 5: Energy Costs Assumptions

Energy Type	Cost	Comments
Electricity	\$0.079 /kwh	DTE Direct Purchase Rate
Natural Gas	\$0.842/therm	MichiCon Direct Purchase Rate
District Steam	\$1.90/therm	U-M Utility Rate
District Chilled Water	\$1.07/therm	U-M Utility Rate