MSU Energy Model Guidelines

The MSU Sustainability Policy states, "*All new construction and/or major repair and renovation of existing facilities must be designed to meet energy-efficient goals which exceed the most current year of the American Society of Heating, Refrigeration and Air-Conditioning Engineer's (ASHRAE) Standard 90.1 by 30%, when determined life-cycle cost effective. Should a professional determine that it is not cost effective to exceed ASHRAE 90.1 by 30%, the professional shall submit to the Sustainability Committee energy simulation modeling showing the initial cost associated with exceeding ASHRAE 90.1 by 30% as compared to the benefits of increased efficiency over a 10 year payback period.*"

During the planning and design of a project, a team of professionals will go through a sequential design process before issuing a final set of construction documents for bid. This design process includes schematic design, design development and construction document phases. Meaningful results from an energy model are typically available during the design development phase with the most accurate model results available when the construction documents are 100% complete. As the energy model is the most critical tool available to demonstrate compliance and exceedance of the ASHRAE 90.1 energy standard, energy models should be submitted to the Office of Planning, Design and Construction Administration at the design development and the construction document phases of each qualifying project. If energy model results do not achieve the 30% performance improvement as described by the policy, then the project design will require approval by the MSU Sustainability Committee.

It is the job of the professional design team to deliver a design that complies with the MSU Sustainability Policy. The following guidelines can be utilized to ensure that the design team provides sufficient information to demonstrate compliance with the policy.

<u>Guidelines for the Design Team:</u>

1) The professional shall provide the owner with the initial energy model and summary of results during design development. The final energy model shall be submitted during the construction document design phase. Along with the final energy model, the professional shall provide the owner a letter recommending the acceptance of the proposed design.

2) The letter of recommendation shall state which version of the ASHRAE 90.1 standard was utilized. The letter should also state the energy and cost reductions (if applicable) between the baseline and proposed designs. Exhibit A is provided as a template for energy model results tabulation.

3) The professional should briefly describe the building and provide a summary of energy efficient features that allowed the building to exceed the ASHRAE 90.1 standard. R-Values, U-Values, fenestration characteristics, mechanical features, controls enhancement, electrical enhancement, and other key design considerations related to the envelope and building systems should be included. Exhibit B is provided as a template for demonstrating the key energy model inputs and assumptions.

4) If the proposed design does not meet the 30% requirement referenced in the MSU Sustainability Policy, the professional should state why the proposed design is the most "cost effective" design.

This statement should be supported with examples of energy enhancing features that were considered but deemed "not cost effective" to integrate into the design. The professional shall use the template provided as Exhibit C for reporting significant energy efficiency measures that were considered but that were not deemed cost effective. The MSU Sustainability Committee will review the professional's determination of cost effectiveness in its consideration of the project.

5) If the design does meet the 30% requirement referenced in the MSU Sustainability Policy, the letter should state that the proposed design meets this aspect of the policy.

Exhibit A – Sample Table of Energy Results

Item	Proposed Building	Baseline Building
Annual Energy Consumption	1,6668 MMBtu/yr	2,901 MMBtu/yr
Annual Energy Cost	$26,930	$46,624
Annual $/sqft	$1.12/sqft	$1.94/sqft
Energy Savings/Cost Savings	42.5% / 42.2%	

Exhibit B – Sample Table of Energy Model Inputs (NOT EXHAUSTIVE)

Item	Proposed Value	Baseline Value
Climate Zone	3A	3A
Mechanical System – Conditioned Spaces	Packaged rooftop air conditioner for the Locker Room Zone. High Efficiency Split Systems for the other zones	Packaged rooftop air conditioner
Mechanical System – Heated and Ventilated Spaces	Electric Unit Heaters with Exhaust Fans providing ventilation	Electric Unit Heaters with Exhaust Fans providing ventilation
Mechanical SEER Rating	17.0	13.0
AFUE	95%	80%
Roof R-Value	R-30	R-20
Wall R-Value	R-19	R-7.6
Window U Value and SC	0.35/0.26	0.65/0.25
Lighting Watts/SF Locker Class Room	0.54	1.24
Lighting Watts/SF Therapy Tub/Treatment	0.52	1.66
Lighting Watts/SF Team Room	0.81	1.24
Lighting Watts/SF Fire Riser	1.53	0.63
Lighting Watts/SF Elec/Comm	0.88	0.63
Electrical Demand	$0.10359/kw	$0.10359/kw
Electrical Consumption	$0.104/kwh	$0.104/kwh
Gas Cost	$1.724/therm	$1.724/therm
Building Glass Percentage	0-40%	0-40%

Exhibit C – Sample Table Energy Conservation Measures deemed "not cost effective"

Energy Conservation Measure	Cost ($)	Annual Energy Savings ($)	Simple Payback Period
Increase HVAC Unit Efficiency Rating	$2,880	$205	14 yr
Increase Roof Insluation to R29.28 from R23.58	$9,000	Negligible	50+ yr