

 MINNESOTA STATE UNIVERSITY MANKATO

Big ideas. Real-world thinking.

MSU-Mankato
and
Ameresco

GESP
Project

August 29, 2017



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Agenda

- ◆ Campus Utility Baseline
- ◆ GESP Review and Summary
- ◆ Sustainability Overview
- ◆ Energy Savings Achieved
- ◆ Overview of the Project
- ◆ Time Table
- ◆ Financial Status
- ◆ Next Steps





GESP Review and Summary



Campus Project - 18 Year Project Financing Term

- ◆ **LED Lighting Upgrades**
 - Interior and Exterior
 - Parking Lots and Roadways
- ◆ **Building Automation Controls Optimization**
- ◆ **Boiler #4 Upgrades - Controls and VFD for FD Fan**
- ◆ **Boiler Plant General System Enhancements**
- ◆ **Belimo Chilled Water Valves**
- ◆ **Trane Chiller VFD**

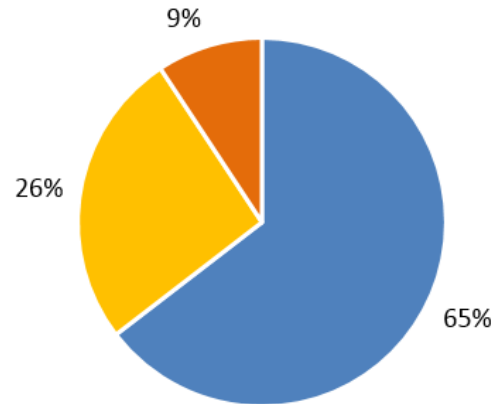
Project Summary	
Project Cost	\$ 8,092,143
Total Annual Energy Savings	\$ 404,728
O&M Savings	\$ 37,995
Estimated Rebates	\$ 592,041
Capital Contribution	\$ 0
Project Term	18 Years
Estimated Cooling Ton Savings	~ 242 Tons

Project Financed @ 2.43%

18 Year Self-Funding Project via Guaranteed Energy Savings with \$0 contribution from MSU

Campus Baseline Energy & Water Use – 2013

MSU Mankato Baseline (2013) Utility Costs

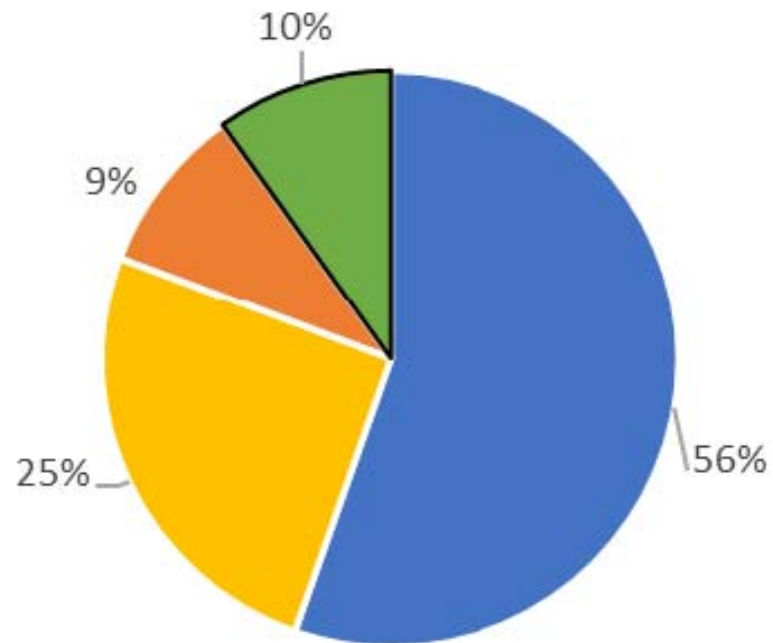


■ Electricity Cost ■ Natural Gas Cost ■ Water Cost

Month	Electricity			Natural Gas		Water				Campus
	kWh	kW	Cost	Therms	Cost	CCF	Sewer (\$)	Water (\$)	Total (\$)	Total
Jan-13	2,345,303	5,206	\$ 171,676	330,609	\$ 142,354	2,431	\$ 8,139	\$ 7,403	\$ 15,541	\$ 329,571
Feb-13	2,712,376	5,290	\$ 197,070	288,907	\$ 124,049	5,557	\$ 18,853	\$ 16,051	\$ 34,904	\$ 356,022
Mar-13	2,787,088	5,267	\$ 194,109	277,584	\$ 121,194	5,758	\$ 19,534	\$ 16,775	\$ 36,309	\$ 351,611
Apr-13	2,633,919	5,510	\$ 193,268	191,686	\$ 92,504	6,142	\$ 20,812	\$ 17,791	\$ 38,604	\$ 324,376
May-13	2,708,064	7,373	\$ 230,029	92,839	\$ 47,082	5,753	\$ 17,472	\$ 16,314	\$ 33,786	\$ 310,897
Jun-13	2,803,904	7,222	\$ 246,245	95,446	\$ 48,157	4,412	\$ 8,391	\$ 11,716	\$ 20,107	\$ 314,509
Jul-13	3,320,633	7,379	\$ 273,234	94,259	\$ 42,929	5,765	\$ 8,070	\$ 14,119	\$ 22,189	\$ 338,353
Aug-13	3,105,762	8,118	\$ 265,795	102,230	\$ 44,099	5,574	\$ 9,269	\$ 14,035	\$ 23,304	\$ 333,199
Sep-13	3,633,389	8,188	\$ 291,328	108,696	\$ 48,069	9,572	\$ 20,767	\$ 24,680	\$ 45,447	\$ 384,844
Oct-13	3,030,562	8,073	\$ 230,029	147,616	\$ 66,960	8,823	\$ 24,524	\$ 23,883	\$ 48,407	\$ 345,397
Nov-13	2,584,197	5,107	\$ 182,443	220,463	\$ 103,405	5,380	\$ 18,126	\$ 15,720	\$ 33,845	\$ 319,693
Dec-13	2,736,492	5,070	\$ 199,110	320,920	\$ 158,233	5,170	\$ 17,564	\$ 15,054	\$ 32,618	\$ 389,961
Totals	34,401,689	77,801	\$2,674,336	2,271,255	\$1,039,034	70,337	\$ 191,521	\$ 193,540	\$ 385,061	\$4,098,430

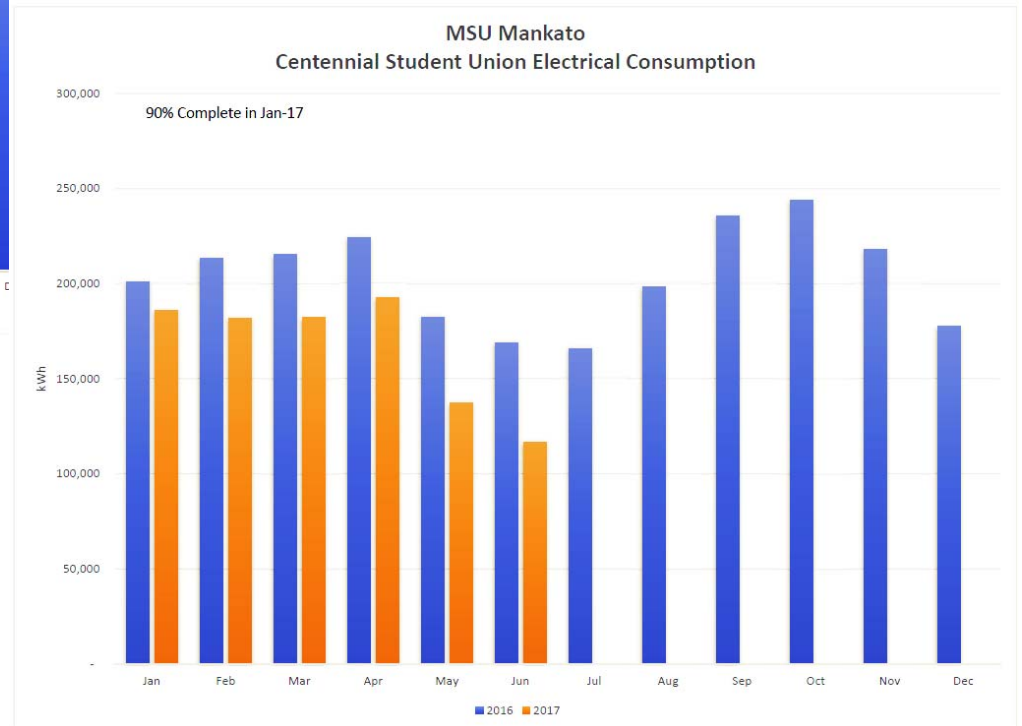
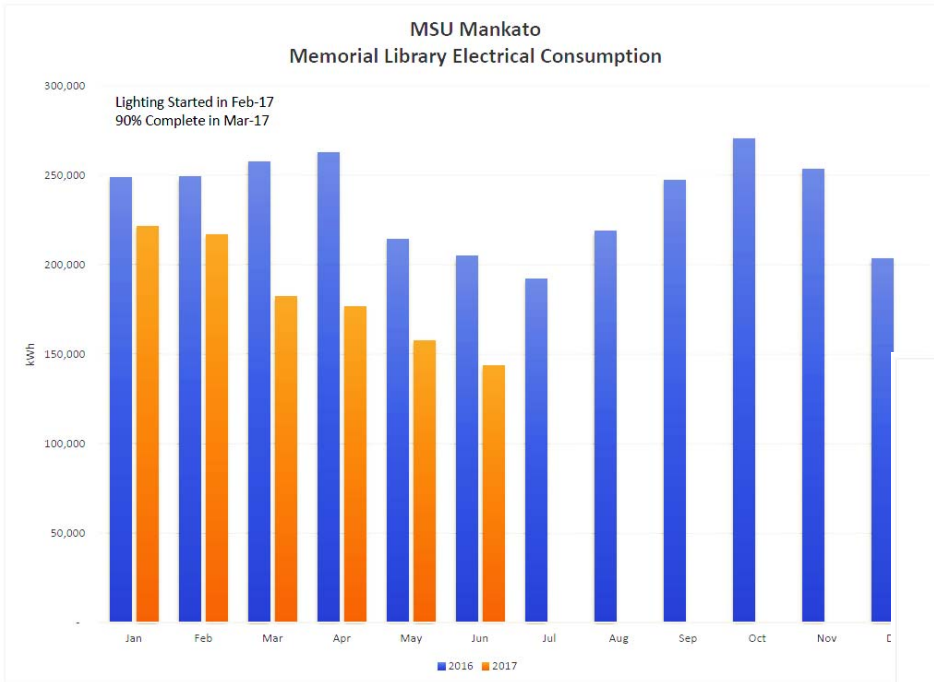
Campus Project - Project Utility Use

MSU Mankato Projected Utility & Water Use



■ Electricity ■ Natural Gas ■ Water ■ Savings

Campus Project - Examples of Current Electrical Reductions



Campus Project - Status

Energy Conservation Measures	Status
LED Lighting Upgrades	99% complete
Control Upgrades (Library VFDs & Economizer Programming)	100% complete
Boiler #4 Control Upgrades	100% complete
Central Boiler Plant Improvements	100% complete
Belimo Energy Valves	100% complete
Chiller #2 VFD	100% complete
Project Commissioning	98% Complete
Rebates	70% complete
Project Punch Lists and Final Close-Out	85% complete

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Campus Sustainability Overview



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Sustainability Impact on MSU

Self Funding Project

Minnesota State University - Mankato = 43 Buildings @2.65 m Sq. ft.	Energy Costs (2013) \$4,098,430/ year / Baseline
Project Energy Savings=	<u>\$442,683 in</u> <u>Guaranteed Energy Savings &</u> <u>Material Savings</u>
18 year Financing Term	<u>Self Funded Performance</u> <u>Contract</u>
Total Emissions Reduced (Source of Metrics = SERC/Midwest reliability Org)	<u>~ 4,200 Metric Tons of CO2</u> <u>Equivalent</u>

Environmental Impact* for the Campus

Project Environmental Impact



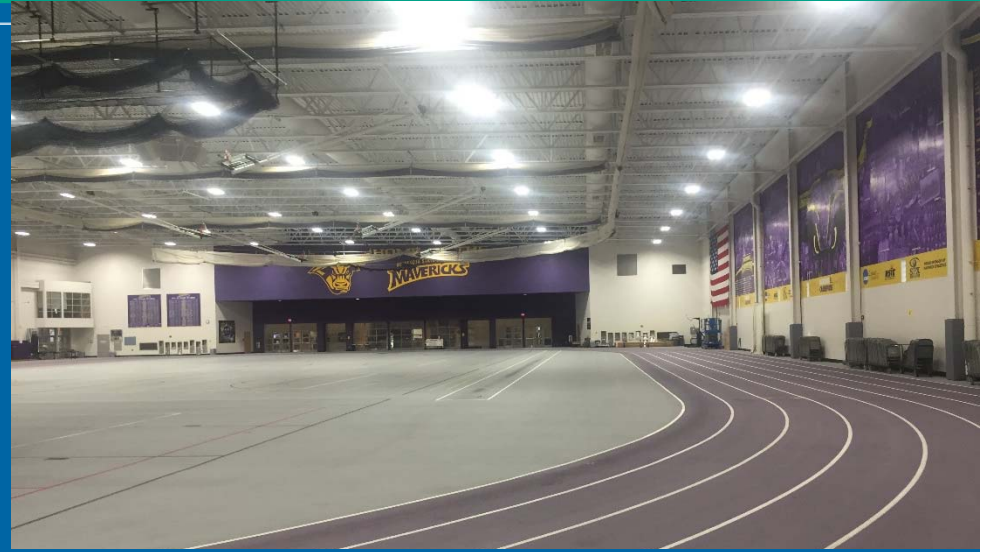
Greenhouse gas emissions reduction in CO₂ =
1st year = 4,214 Metric tons
20 year = 84,280 Metric tons

Major Progress towards the MSU Sustainability Plan

* The sum of the greenhouse gas emissions is equivalent to the above based on the US Environmental Protection Agency (EPA) Greenhouse Gas Equivalencies Calculator found at www.epa.gov/energy/greenhouse-gas-equivalencies-calculator.

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Campus Installation Examples



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ECM 1 - LED Lighting Upgrades



LED Upgrades in Memorial Library

Over 22,000 fixtures upgraded in 31 buildings to create a modern appearance within an older space

ECM 1 – LED Lighting Upgrades



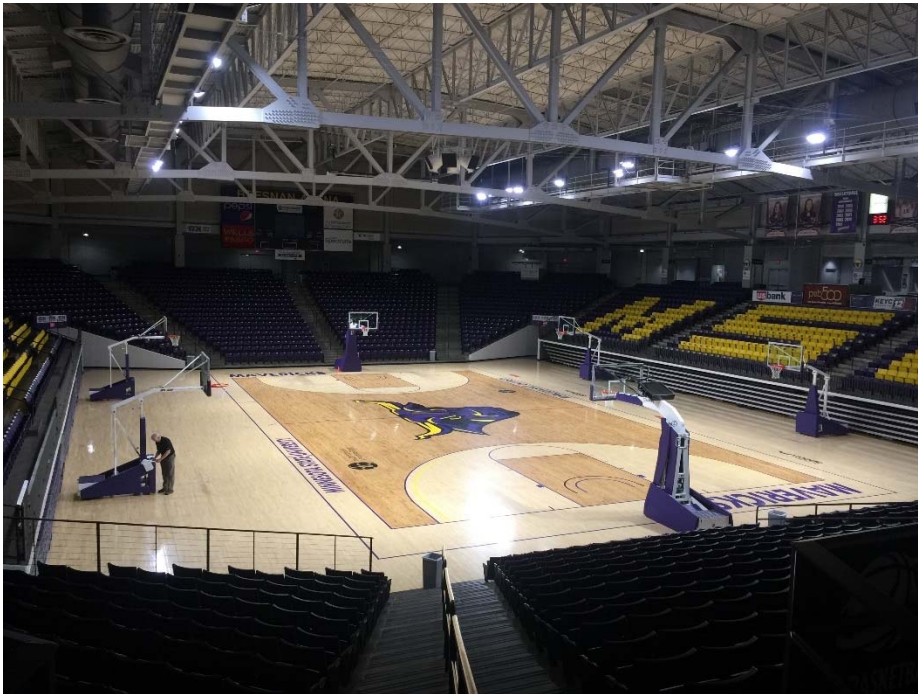
Schellberg Gym



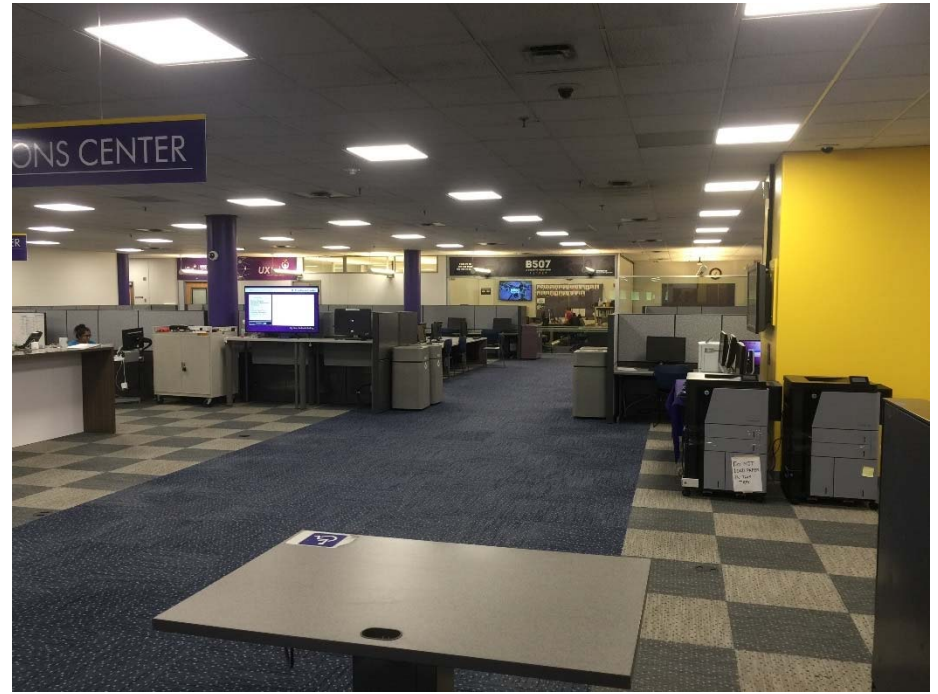
Otto Track

Improved lighting = safer conditions

ECM 1 - LED Lighting Upgrades



Taylor Center



Wissink Hall

The end result provided a more open and brighter space

ECM 1 – LED Lighting Upgrades (Lot 4)



Before



After

Improved night-time visibility and safety

ECM 1 – LED Lighting Upgrades (Mall looking North)



Before



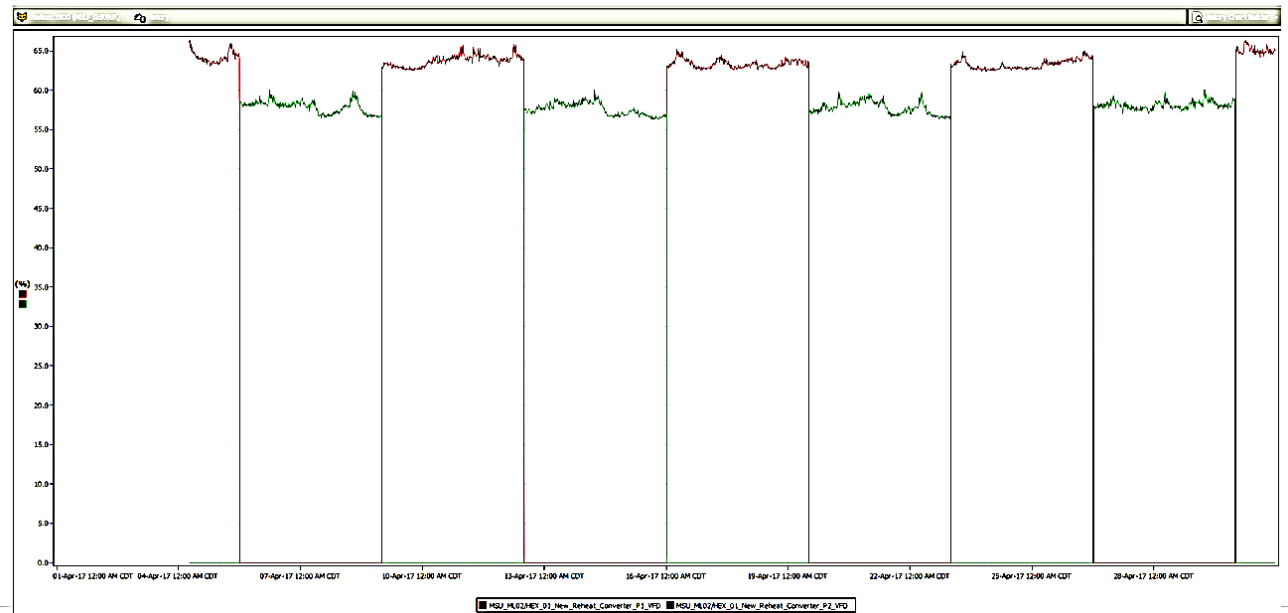
After

Improved night-time visibility and safety

ECM 4 – Library VFDs



Library Pump Speeds (April)



Pump Speed Reduction = Energy Savings

ECM 6 - Boiler #4 Control Upgrades



Before



After

Removed unsupported, outdated controls with latest technology

ECM 7 - Boiler Plant Upgrades



New Deaerator Tank Controls



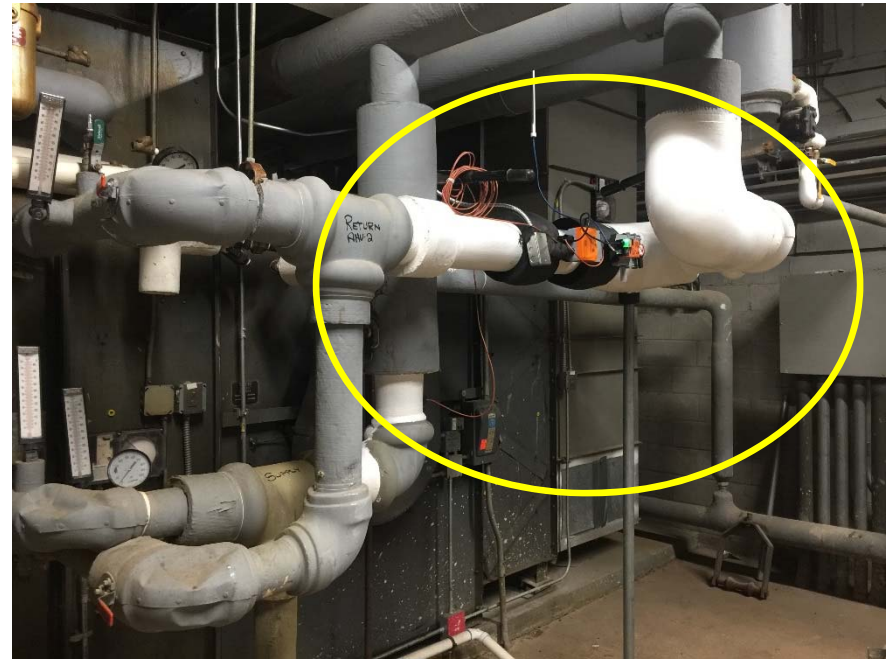
New Control Panel

Improved Feedwater and Deaerator Controls

ECM 8 – Belimo Energy Valve Installation



Before



After

Precise Control of Chilled Water to “Free-Up” Chiller Capacity

ECM 13 - Chiller #2 VFD



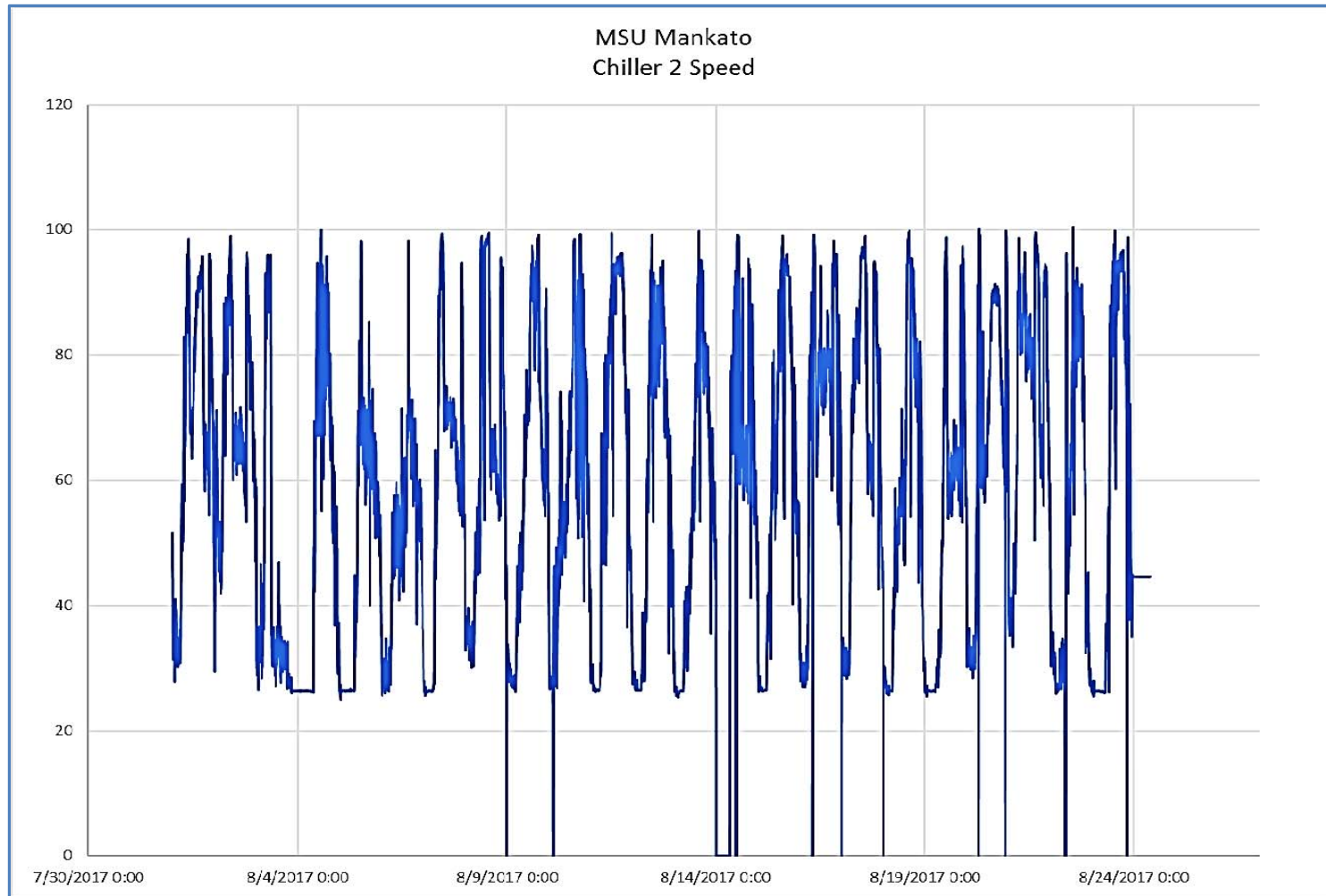
Before



After

Precise and clean installation

ECM 13 - Chiller #2 VFD



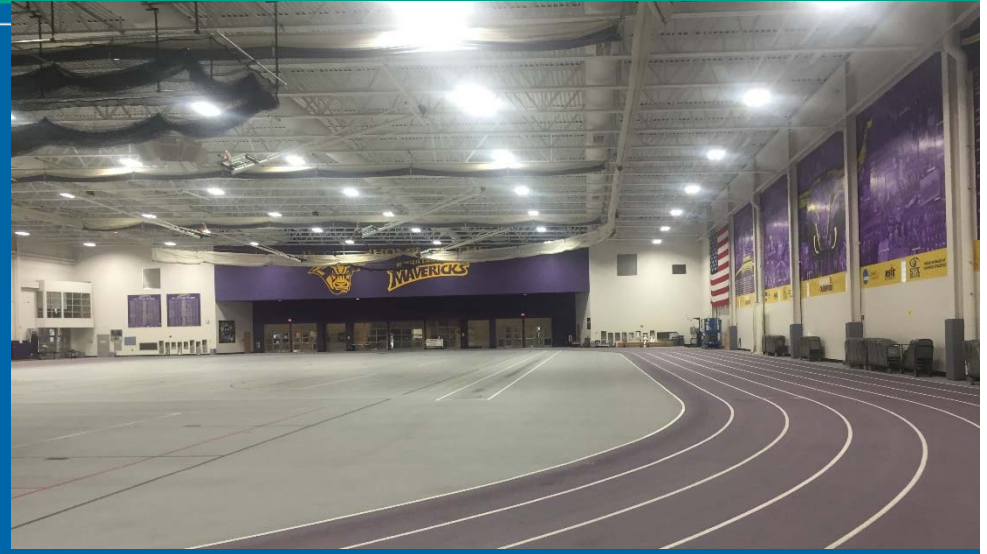
Chiller Modulation for Improved Performance

Positive Comments from MSU staff

- Alexey Lazar, Information System Developer, Memorial Library
 - “I really like the new lighting... I consider the new fixtures and lighting quality to be a great improvement over what we previously had”
- James Ball, Assoc. Director of Operations, Centennial Student Union
 - “I have been receiving compliments on the new lights and overall, people seem pleased with the outcome”
 - “I am pleased with the overall progress”
 - “Extremely professional and great to work with. Communication was never lacking...”
- David Jones, VP for Student Affairs
 - “Great work on this last night”

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Project Timetable



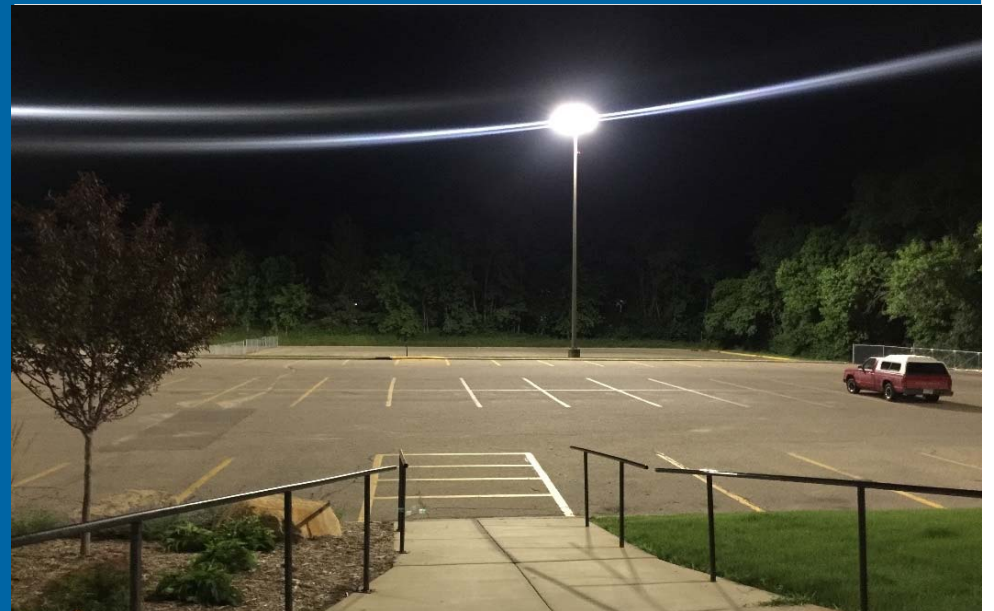
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Timeline

	Activity	Date
1	ECM completion	July 2017
2	Commissioning of installed equipment	July / August 2017
3	Punch list of lighting equipment	July / August 2017
4	Completion of rebate requests	September 2017
5	Final Project completion – punch lists	September 2017
6	Finalize Campus –staff Training	Complete
7	Project Financial Closeout	September 2017

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Project Financials



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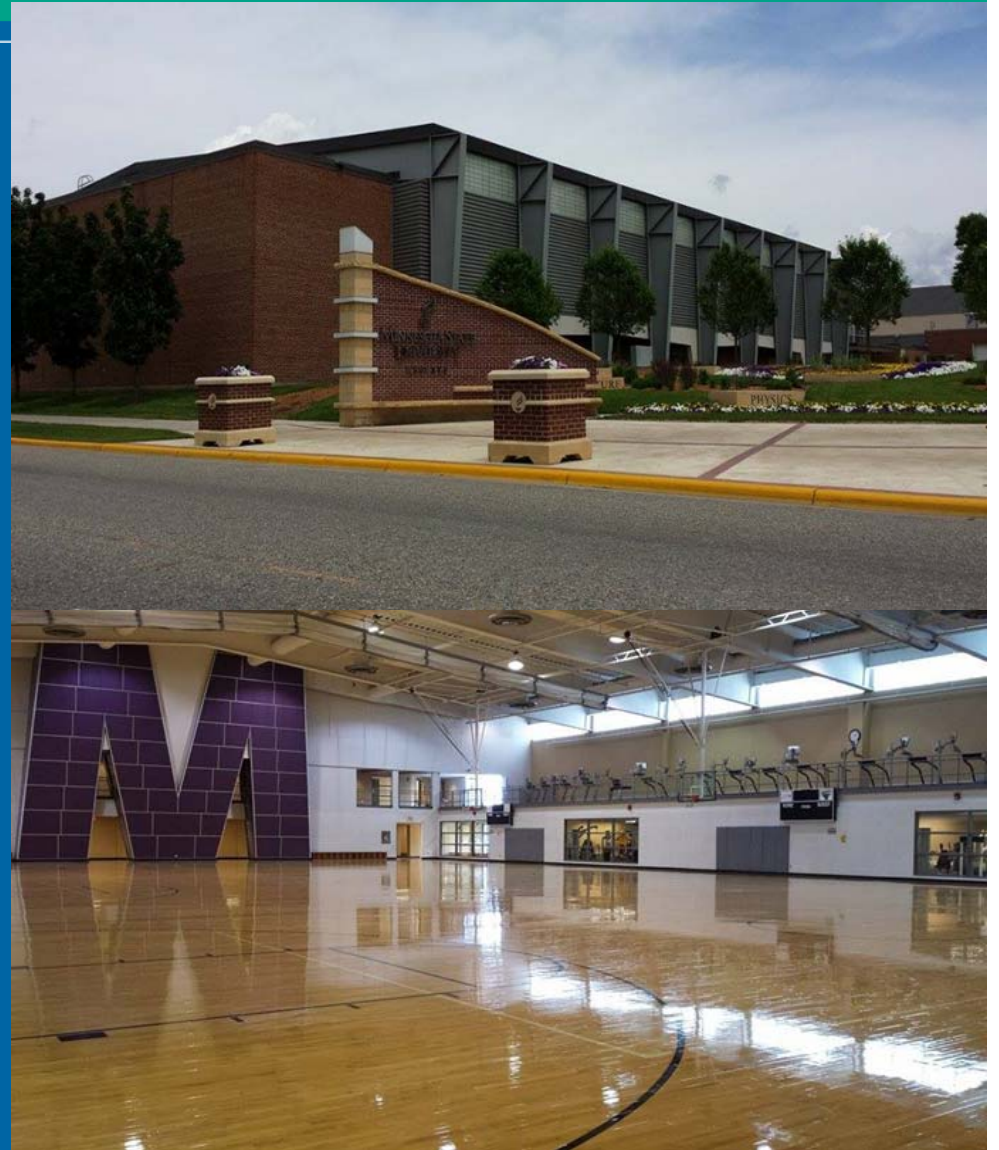
MSU GESP Project Budget - Status

Project	\$'s
Contract Amount	\$8,092,143.00
Original Subcontracting Budget	\$5,607,706.51
Selected Subcontractor Pricing to Date	\$4,806,968.52
Difference	\$800,738.28
Remaining Project contingency	~\$170,000.00
Project \$'s available for added ECM's or ???	\$970,738.28

Project was financed at 2.43% for a 18 year term

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New Opportunities



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Project \$'s available for additional Project /Campus use

- The GESP contract has been **satisfied as a self funding project**
 - The energy and O&M savings guarantee = \$442,683
- Project \$'s (\$8,097,143) already funded and **available at 2.43%**
- Additional equipment / services can be added to the project
 - **Energy related** = additional \$ savings
 - ECM's not included in the current project – due to self-funding constraints
 - **Non-Energy related** = new equipment
 - Use of these project \$'s can be used for non-funded State / HEAPR funding requests
 - Other campus projects?
- GESP approved use = simple change to the scope of the contract
 - Required anyways – due to project cost changes

Energy Conservation Measures Reviewed

Campus Wide Improvements

- Lighting Improvements (T8 Improvements)
- Lighting Improvements (LED Tube Improvements)
- Lighting Improvements (LED Fixtures Improvements)
- Water Conservation Retrofits
- Building Envelope - Air Infiltration Reduction
- Destratification Fans
- Networked - Building Automation Controls Optimization
- Transformers

Central Plant Improvements

- Boiler Stack Heat Recovery
- Boiler #3 - Burner Controls and FW Economizer
- Boiler #4 - Controls and VFD for FD Fan
- Boiler Plant General System Enhancements
- Replacement of Chiller - 1280 Ton Chiller (Chiller Room)
- Install VFD on Chiller – 1280 Ton Chiller
- Replacement of Chiller - 2000 Ton Chiller (Modular System)
- Chiller Generator Addition (2MW)
- Chiller Generator Addition (3MW)
- Belimo Delta P Chilled Water Valves (Priority 1)
- Belimo Delta P Chilled Water Valves (Priority 2)
- Steam Traps

Other Facility Improvement Measures

- Trafton Fume Hoods
- Ford Hall Fume Hoods
- Kitchen Hoods
- Window Film
- Ozone Laundry
- Irrigation
- Dishwasher
- Pool Cover

Energy Conservation Measures Not Selected for the Project

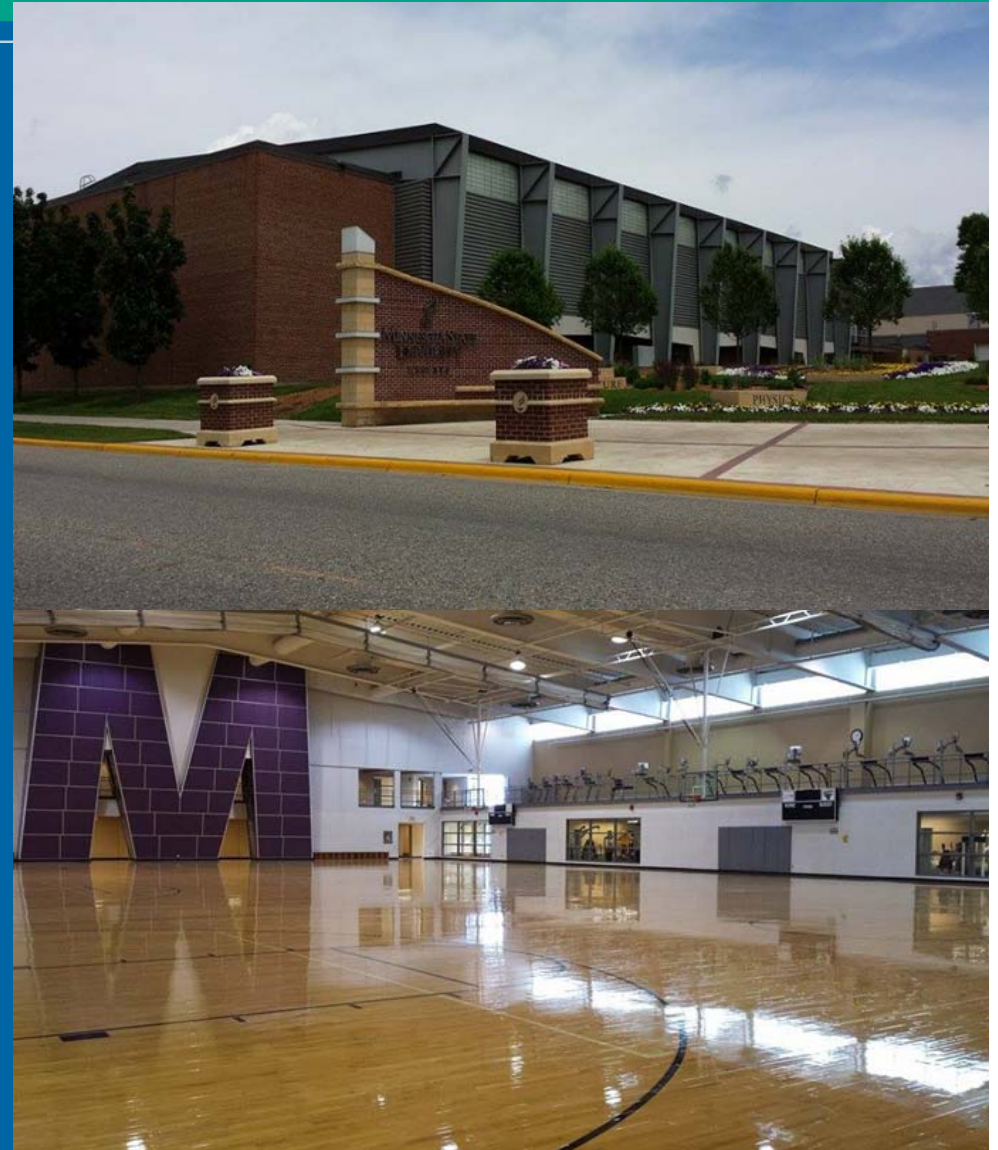
- Armstrong Hall LED Lighting Upgrades ~\$450k
- Electrical Transformer Replacement ~ \$300k
- Priority 2 Belimo Energy Valves ~\$82k
- Boiler #3 Burner Controls & Stack Economizer ~\$900k
- Residence Hall LED Lighting Upgrades
 - Crawford Hall ~\$325k
 - Julia A. Sears ~\$320k
 - McElroy Hall ~\$200k
 - Preska Hall ~\$270k

Other Non-Energy Items for consideration

- New Emergency/Back-Up Generator
- Non-funded HEAPR requests?
- Other equipment or building upgrades?
- Other?

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Questions?



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