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Sustainability and Recycling

Facilities Management

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DOW 642

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Introduction

Thank you to our University Senate for inviting me to make this presentation on Sustainability.

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Safety & Housekeeping

Welcome!

Fire exits

- In case of fire, please walk to the nearest exit through the doors behind you.
- Meet outside near Dillman Hall then if the weather is inclement, proceed to the Lobby of Dillman Hall
- Volunteers for taking Headcount

Unsafe act or condition

- If you see an unsafe act or condition, please notify Kerri Sleeman.

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The Purpose of Today's Presentation

- Update the University Senate on the Sustainability Initiatives regarding
  - Energy
  - Energy Research
  - Community Outreach
  - Sustainability Scorecard
  - Recycling (deep dive)

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Link to Strategic Goals

Vision

Michigan Tech will lead as a global technological university that inspires students, advances knowledge, and innovates to create a sustainable, just, and prosperous world.

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Link to Strategic Goals

We deliver action-based undergraduate and graduate education and discover new knowledge through research and innovation. We create solutions for society's challenges through interdisciplinary education, research, and engagement to advance sustainable economic prosperity, health and safety, ethical conduct, and responsible use of resources. We attract exceptional students, faculty, and staff who understand, develop, apply, manage, and communicate science, engineering, technology, and business to attain the goal of a sustainable, just, and prosperous world. Our success is measured by accomplishments and reputation of our graduates, national and international impact of our research and scholarly activities, and investment in our University.

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Energy Conservation Started in the 1970's

- The 1973 oil embargo set campus energy conservation in motion
- Temperature monitoring and adjustments
- Students, faculty and staff asked to conserve as much as possible
- Campus energy committees were formed
- Manual time clocks for air handlers were fine tuned
- The 1978 oil crisis added to the momentum
- Federal government imposed 65 deg standards for heating
- Lighting level standards were reduced for offices, classrooms & labs from 100 FC to 50 FC (foot candles)

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Energy **Conservation Stepped Up in 1980**

- $3.2 million (50% DOE) invested in energy reduction projects
- Energy management system to control building HVAC
- HVAC scheduling and monitoring
- Lighting standards applied – 7,000 tubes removed
- 40 watt lamps replaced with 34 watt lamps
- Space temps reduced to 65 deg F
- Economizers added to steam boilers
- Addt'l steam line insulation, 125 psig to 80 psig
- 40% fuel reduction, 20% electrical reduction

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Campus Changes Over Time

- New research type buildings
- Personal computers
- 8 to 5 schedule to almost 24/7
- 65 deg F was too low and uncomfortable
- 3% change in fuel for every 1 deg F change

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Energy

•20% Reduction of energy measured in BTU/sq ft over the past 35 years. This involved hundreds of projects beginning in 1980. Here are two examples:

•Reduced energy use for classroom, lab and office lighting by 36% saving approximately $31,000 annually. Accumulated savings since 2006 is $310,000.

•Waste heat recovered from exhaust gas in the Central Heating plant provides 95% of the thermal energy for the GLRC. 24,061,000,000 BTU's recovered, $150,000 in reduced fuel costs and 1,250 tons in reduced CO2 emissions

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Recent Sustainable Energy Changes

- HVAC control system upgrades
- Variable freq drives on fans and pumps
- Lighting to T-8's & prog start ballasts (36 w to 23 w)
- Metal halide replaced with high bay T-8's
- Incandescent & hard to reach lighting replaced with LED
- Lighting occupancy controls in classrooms & some restrooms
- Waste heat recovery from ice rink heats pools & DHW

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Recent Sustainable Energy Changes (continued)

- Waste heat from steam plant heats GLRC
- Additional roof insulation
- IT reduced number of computers in open labs
- Stepped up steam trap testing & repair
- KRC installed photo-voltaic solar panels
- Replaced exterior metal halide with long life HPS
- Retrofit of constant flush urinals to occupancy control

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Campus Energy Status

- Generator bank capable of powering the main campus in the event of a system wide outage.
- Reference Friday, July 21, 2016, 6 hours UPPCO outage, campus was up the entire event.
- **“Choice”** energy solution resulting in >20% reduction in energy rate over previous business rates

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Energy Research at KRC

- 20 Kw Solar Energy farm at KRC with faculty researchers
- Multiple research projects proving the viability of Solar in the UP
- EDA study of Industrial Parks in the UP on energy savings ideas
- Explore alternate geothermal heating and cooling applications using mine shaft water on campus
- Study the viability of wind in the Keweenaw

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Alternative Energy Enterprise

- Design of Solar System Options for Alberta FFC
- Biofuels Pyrolysis Research in Wood to Fuel
- Geothermal Heating/Freezing design for Hancock Ice Hockey Arena
- Renewable Energy Mission Module from Oshkosh for Disaster Relief
- Solar Panels on Campus
- Sustainable/Energy Efficient Demonstration House

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Green Campus Enterprise

- CNG campus shuttle feasibility
- Solar Thermal to aid campus heating plant
- Greenhouse Gas Emissions reports
- Assisting with Recycling Initiative

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Sustainability Partners

- Copper Country Recycling Initiative
- Society of Environmental Engineers
- Graduate Student Council
- Tim Palosaari - Composting Research

•Efficiency Through Engineering and Construction Enterprise

- Alternative Energy Enterprise
- Green Campus Enterprise
- Sustainable Food and Wellness Initiative
- Iranian Community at Michigan Tech

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Community Outreach

- Houghton Energy Efficiency Team - Georgetown University $5MM Prize
- Copper Country Recycling Initiative
- Cardboard Recycling in Houghton (CCRI)
- Green Lecture Series
- Solarize Houghton
- Geothermal display at KNHP
- Community Solar in L’Anse

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Sustainability Scorecard Initiative

- Association for the Advancement of Sustainability in Higher Education (AASHE)
- Sustainability Tracking and Assessment Reporting System (STARS)
- Will give us a numeric grade on our level of sustainability in four major categories
  - Academics
  - Engagement
  - Operations
  - Planning & Administration

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Recycling Facts

- Single stream recycling at Dow, MUB & Wads (circa 2011)
- Diversion rate = recycled/(trashed +recycled) = 12.5 to 16% depending upon year and campus area.
- State average =34%
- Annual Cost of trash = $ 160,000
- Annual tonnage of trash = 900 tons
- Annual cost of Recycling = $25,000
- Annual tonnage of recycled material =177 tons

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Recycling Initiatives

- Increase diversion rate from 12.5% to 25%
- Inventory of recycling containers
- Coordinating student groups in the recycling efforts
- USG RFP for Campus Improvement - requested $15K for additional recycle containers
- Coordination with custodial services
- Campus Awareness and more consistent signage
- Building/dormitory challenges
- Major event planning
- Sustainable Purchasing policies

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- Directions on how to give feedback
  - Email Address jmeldrum@mtu.edu
  - Jay Meldrum

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- Questions?
- Thank you

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