

# Report on Sustainability, Energy Management, and Utilities

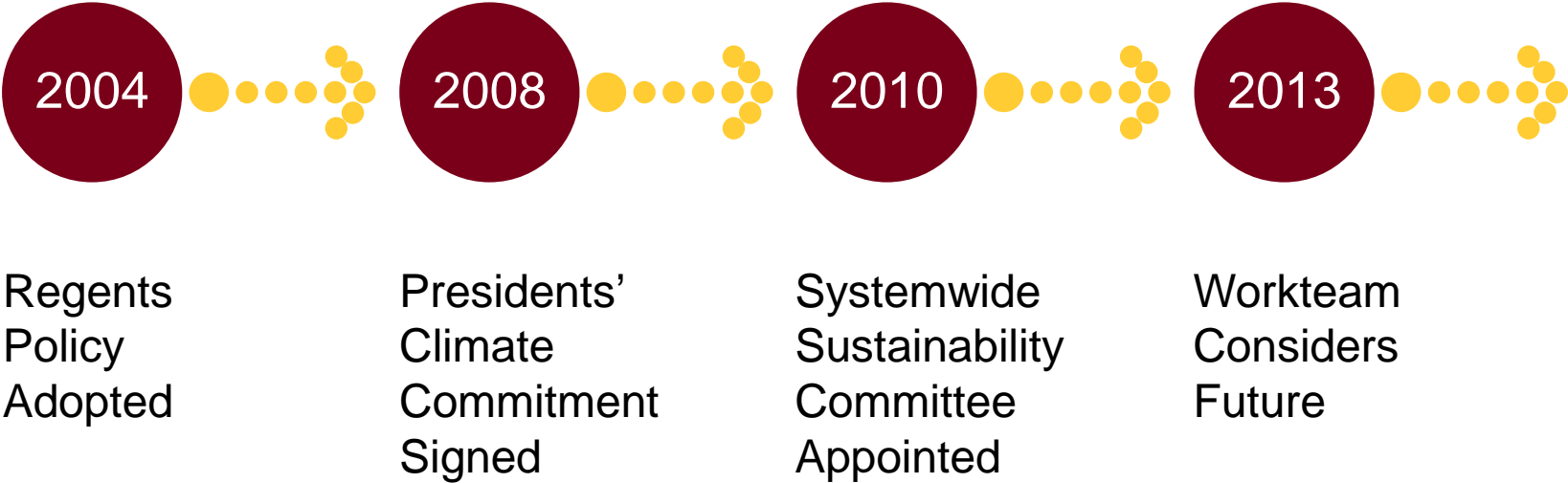
Board of Regents Facilities and Operations Committee  
February 13, 2014



UNIVERSITY OF MINNESOTA

**Driven to Discover**<sup>SM</sup>

# The University's Institutional Commitment to Sustainability



# Board Policy

- Adopted in July 2004
- Makes a commitment to incorporating sustainability into all aspects of the institution and by all members of the university community
- Sets out six guiding principles
  - Leadership, Modeling, Operational Improvements, Energy Efficiency, Research, and Education and Outreach
- Assigns implementation responsibilities to the administration and to each system campus, and asks for measures of success and annual reporting

# Presidents' Climate Commitment

- Signed on in 2008
- Institutional commitment to eliminate net greenhouse gas emissions from specified campus operations
- Encourages research and educational efforts regarding the earth's climate



# System / Campus Balance

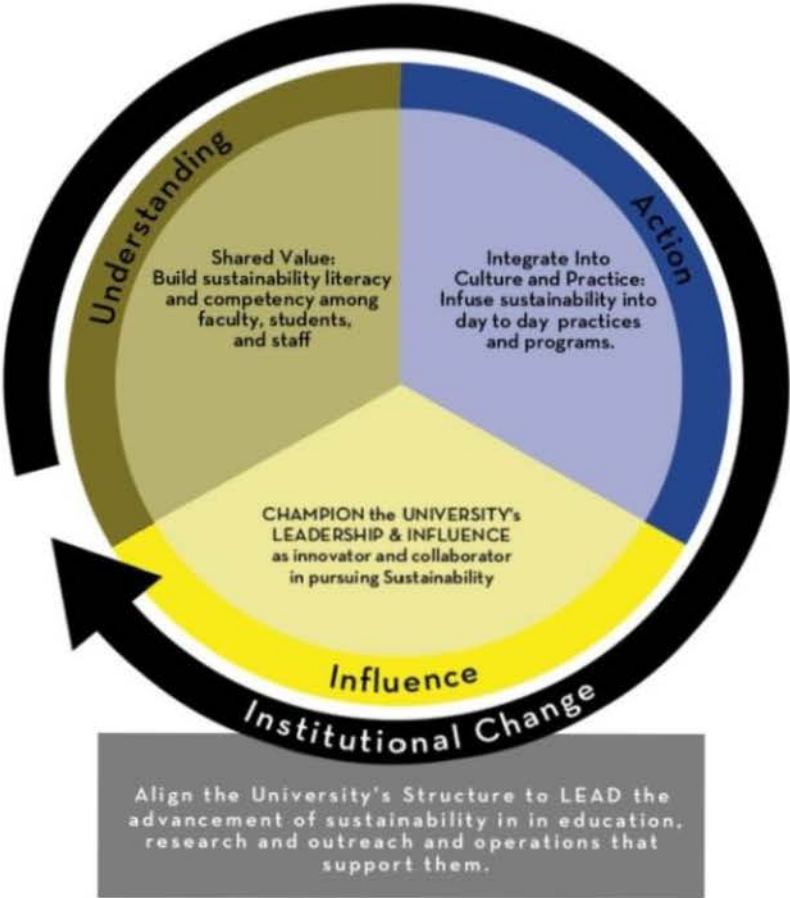
- Each campus is located in a different geographic area and each occupies a distinctive ecosystem
- Each campus also has a distinctive mission, with different expectations and support for faculty in terms of research, teaching, and outreach
- Our distinctiveness presents challenges to a system-wide approach, but it also provides a unique opportunity to model for others a variety of approaches and solutions to issues

# Moving Forward

- What are our goals?
- How do we advance this work?
- What are achievable timeframes?
- How do we organize our efforts?



# Vision for Sustainability



# Policy Questions

- How/can the system advance a centralized approach to creating and modeling sustainability while at the same time working within the framework of the missions of five distinct campuses?
- What benchmarks and reporting indicators/outcomes will demonstrate that we have made progress in the three areas critical to the University's mission?
- What benchmarks or key indicators will demonstrate that the University of Minnesota system occupies a place of national prominence and leadership in the area of sustainability?



# Key Sustainability Program Areas



Sundog, UMM Photographer: Barb Hesse



: Residence Hall, UMMC Photographer: Joe Brennan

Energy  
Buildings  
Waste  
Transportation  
Food  
Living Lab  
Research  
Education  
Engagement

more information available at <http://z.umn.edu/SustReports>

# University of Minnesota students: 2013 AASHE Student Leadership Award



# Waste Diversion and Minimization



Morris organics collection

**40%**  
of Waste Recycled  
or Composted



New recycling stations at UMD



# Sustainable Transportation



**1,000 new ZAP participants this year!**  
38,177 gallons of gas saved & 33,137,949 calories burned

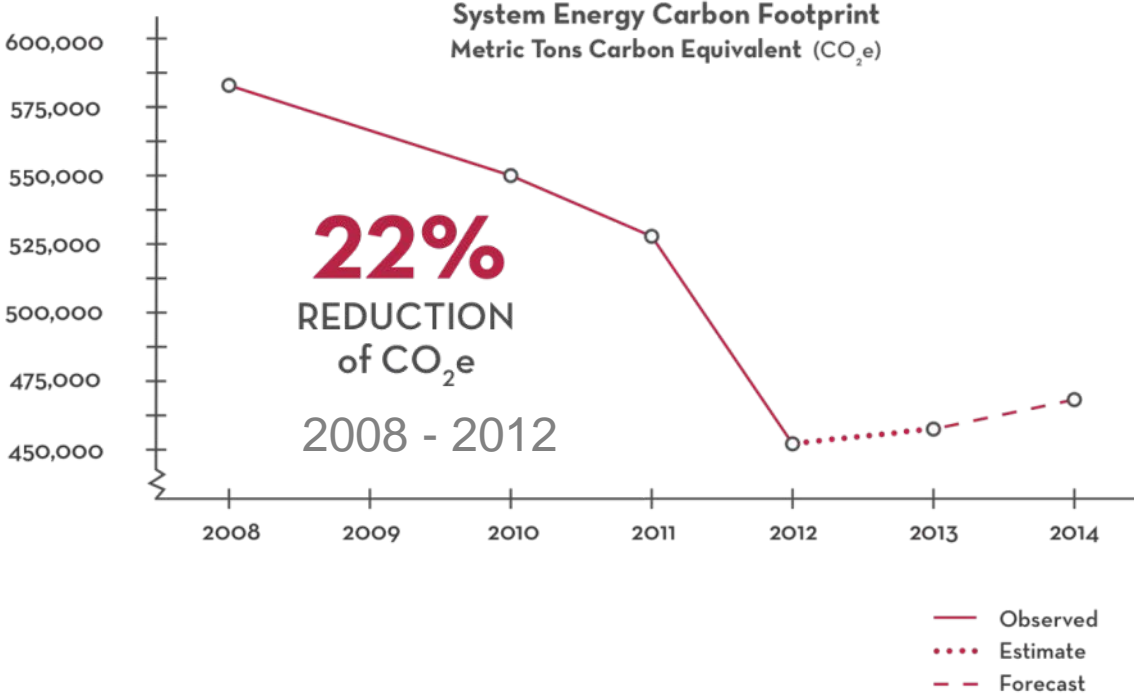
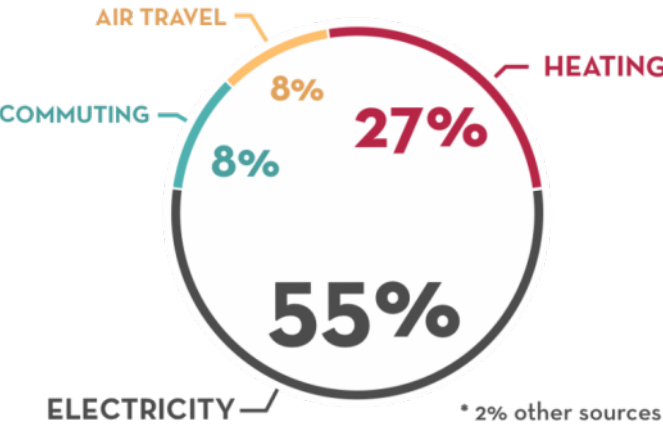
**3 Hybrid Buses**



**13 Electric Vehicles**  
**77 Gas-Electric Hybrid**



# Greenhouse Gas Emissions Carbon Footprint Sources and Trends

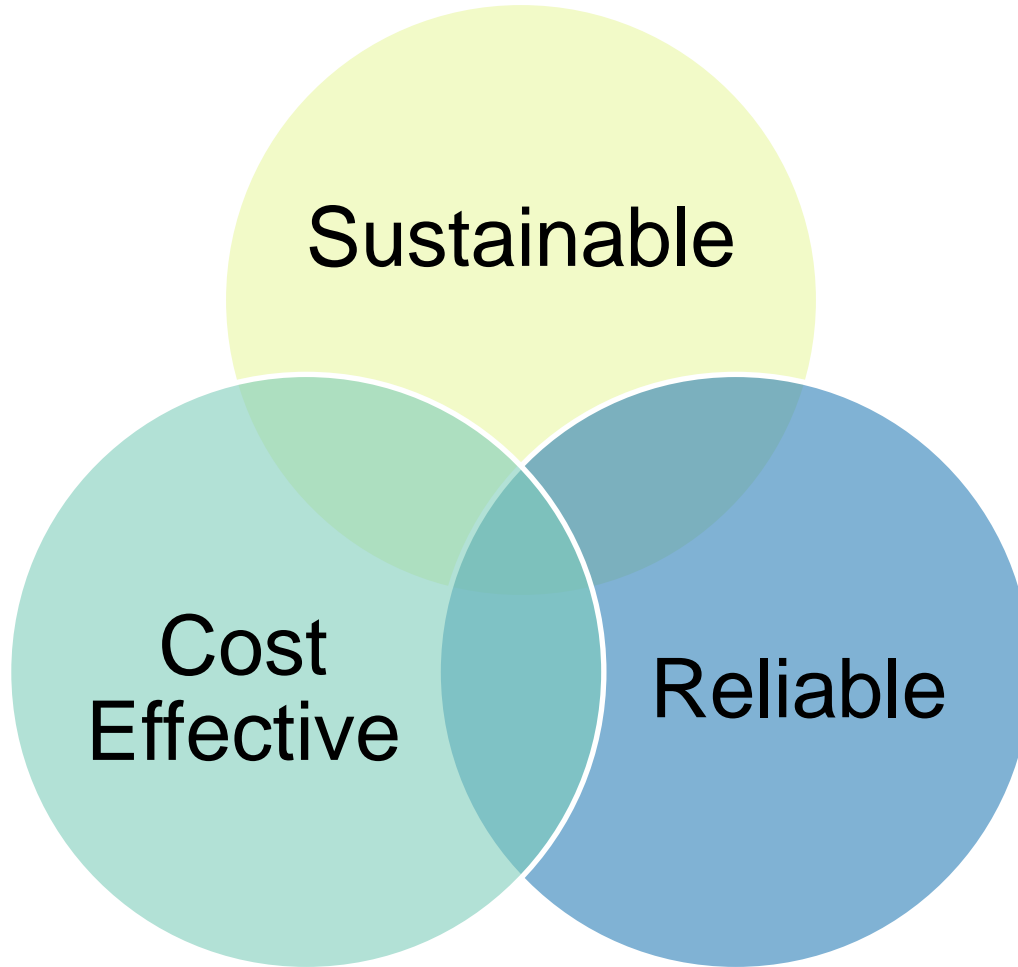


# Smart Labs



**We can cost effectively:**  
**Reduce lab energy consumption by ~50%**  
**Enhance safety and reduce risk**  
**Provide better facilities for the research enterprise**

# Energy Management Principles



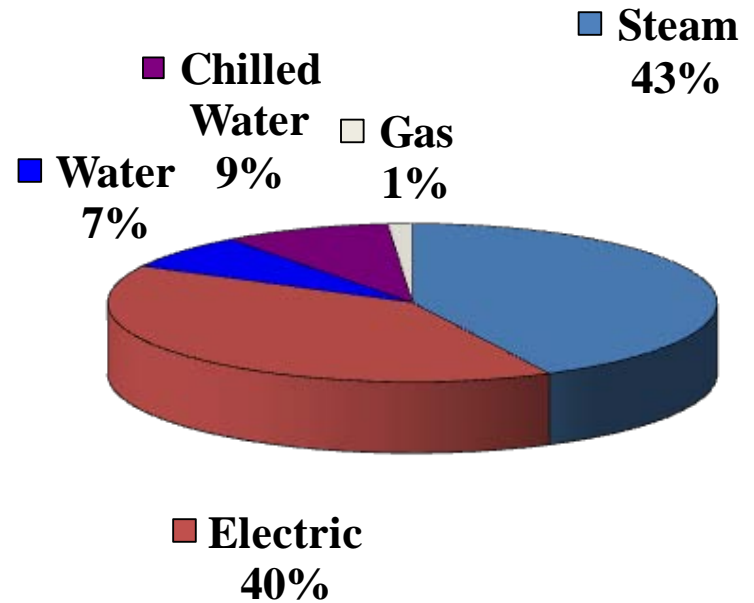
# Campus Utilities – What We Do

- Utility Production and Procurement
- Utility Distribution
- Engineering Expertise



# Twin Cities Utilities Cost Summary

- Projected FY 2015
  - Steam \$40,519,000
  - Electric \$38,029,000
  - Chilled Water \$8,475,000
  - Water \$6,828,000
  - Gas \$1,240,000
  - Total \$95,091,000



**Net Decrease from prior budget year: \$4.0 million**

**Rates include:**

- Purchased Fuel/Electricity
- Debt Service
- Capital Investment
- Operations/Repair
- Engineering & Tech Support

# EM Summary Statistics

02-13-14

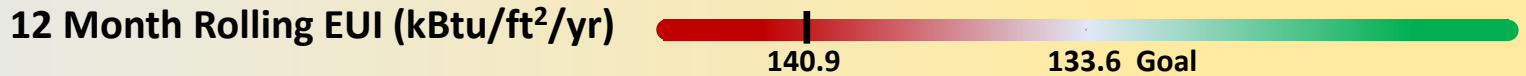
## Safety



## Reliability



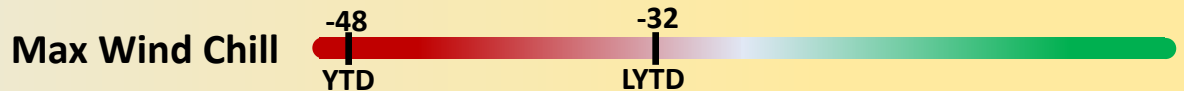
## Cost Effectiveness



## Sustainability



## Weather Trends



19-4-5

# Sustainable: Recommissioning Program

## Phase 1

- Return buildings to “Like New” designed performance specifications

## Phase 2

- Identify, design, and implement Energy Conservation Opportunities (ECOs)



## Goals

- Reduce Energy Consumption
- Reduce Carbon Footprint
- Improve Comfort and Functionality of the building

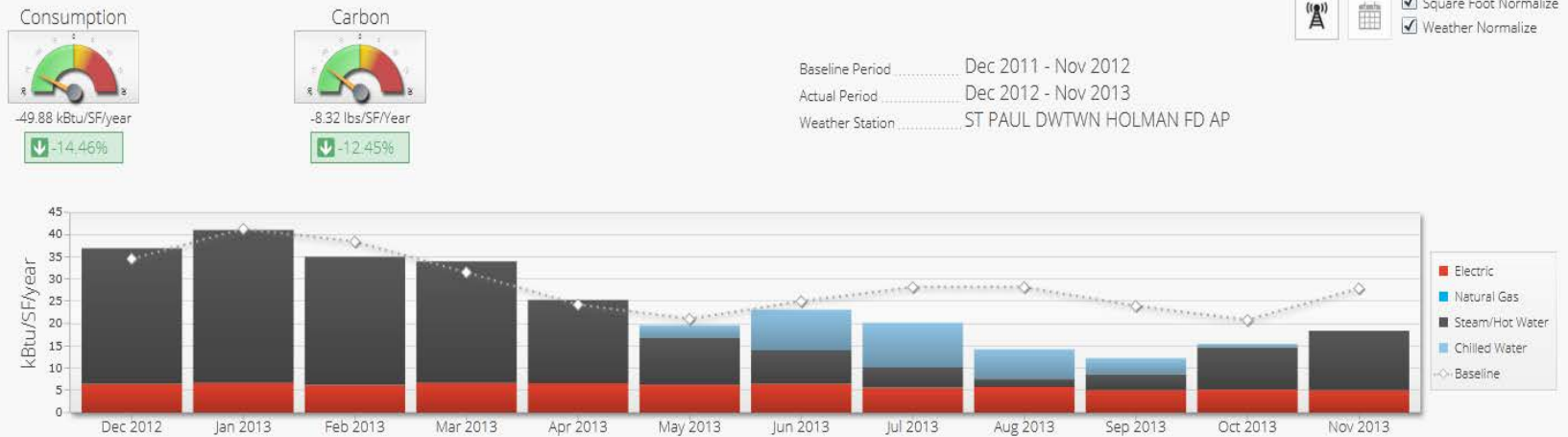
# Sustainable: Recommissioning Program



## Biological Sciences Building

- Ongoing recommissioning efforts in 2013 have resulted in a **14%** Reduction over the 2012 Baseline.
- **\$160K** Cost savings to date with projections exceeding **\$400K** annually.

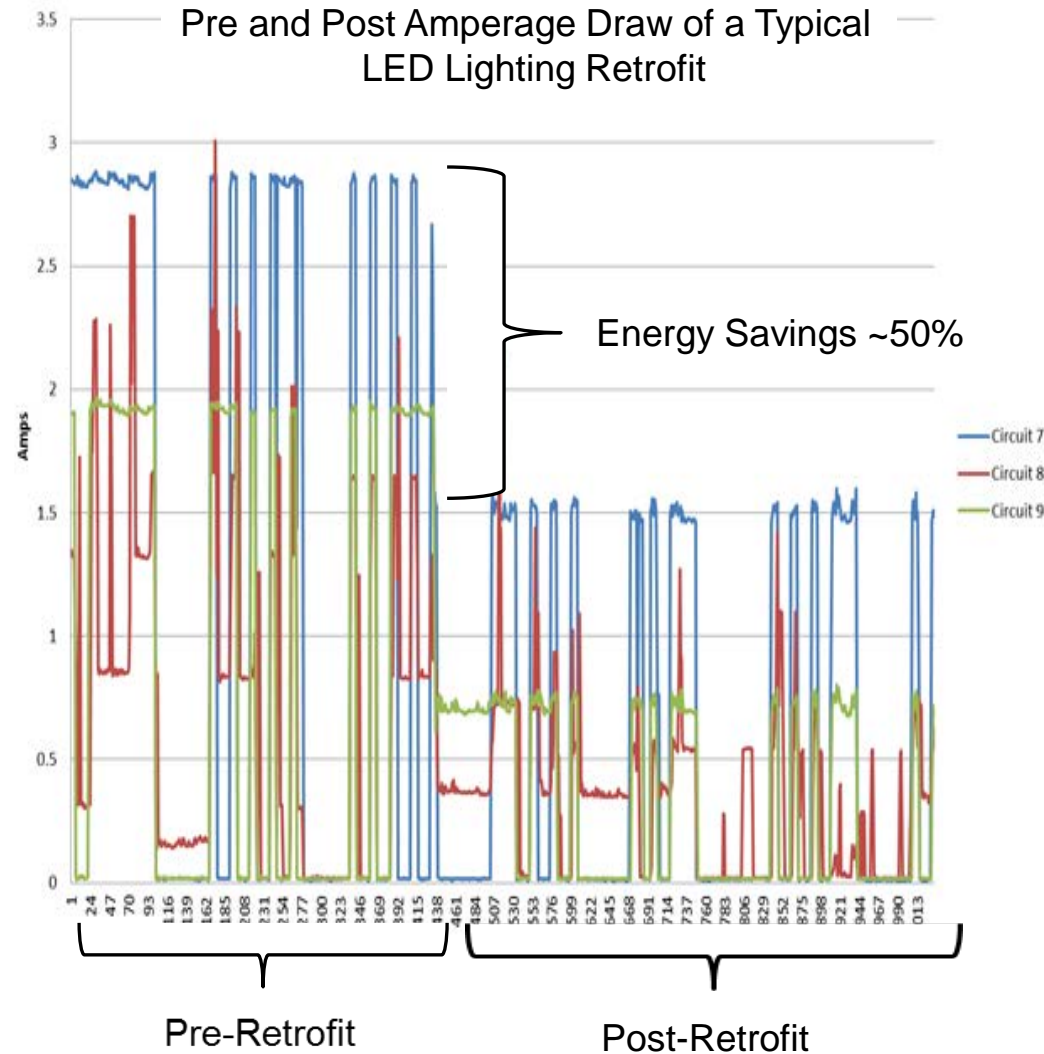
Baseline is used to compare a site to itself using a defined baseline period. The baseline is weather normalized so that changes in weather do not affect the comparison. More Info...



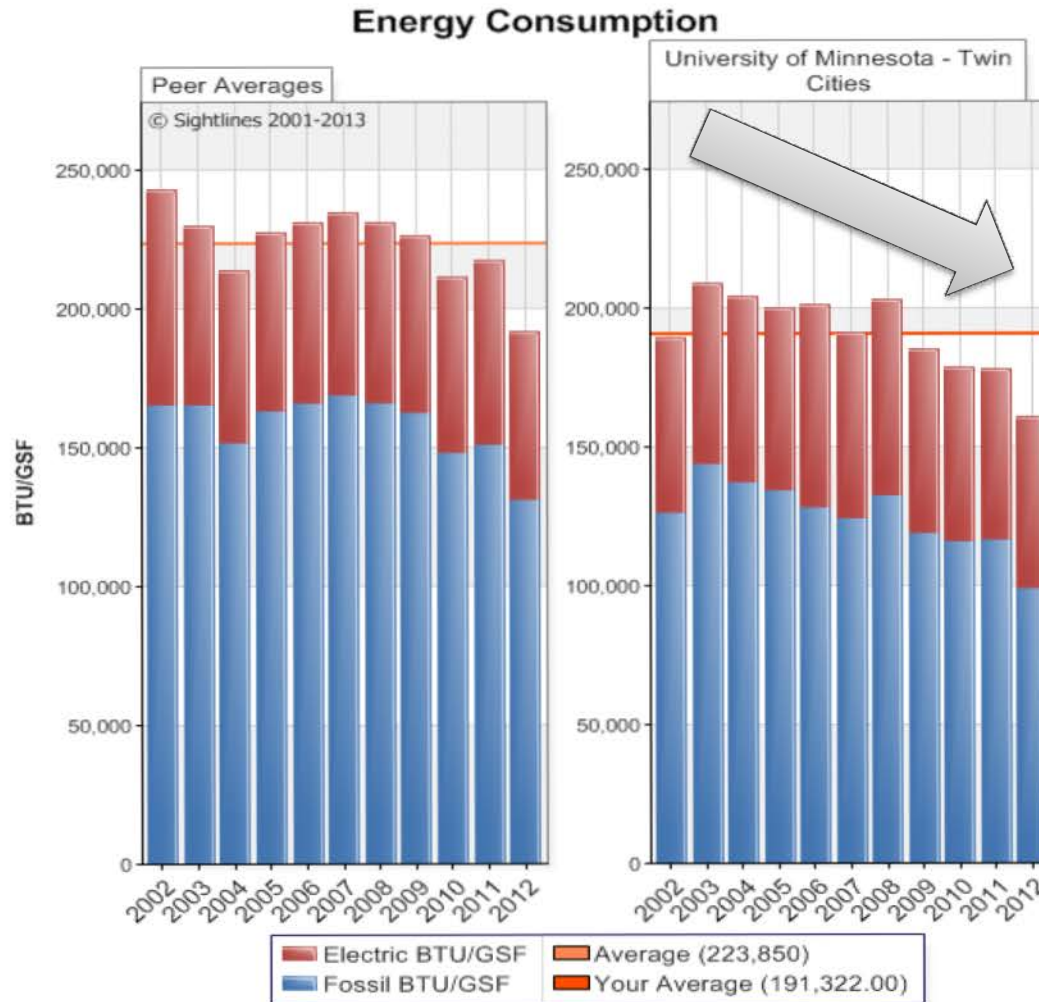
# Sustainable: High Efficiency Lighting

## Lighting Retrofits throughout campus realizing significant energy savings:

- Health Sciences Stairwell Project
  - 1,326 Fixtures Installed
  - 624,124 KWh energy reduction
  - **\$50K Annual Savings**
- East Bank Stairwell Project
  - 1,400 Fixtures installed
  - 577,200 KWh energy reduction
  - **\$46K Annual Savings**
- Moos Tower Project
  - 4,000 Fixtures in progress
  - Projected 1 GWh energy reduction
  - **Projected \$90K Annual savings**
- St Paul Growth Chambers Project
  - 54 Chambers to be retro-fitted
  - Projected 1 GWh energy reduction
  - **Projected \$90K Annual savings**

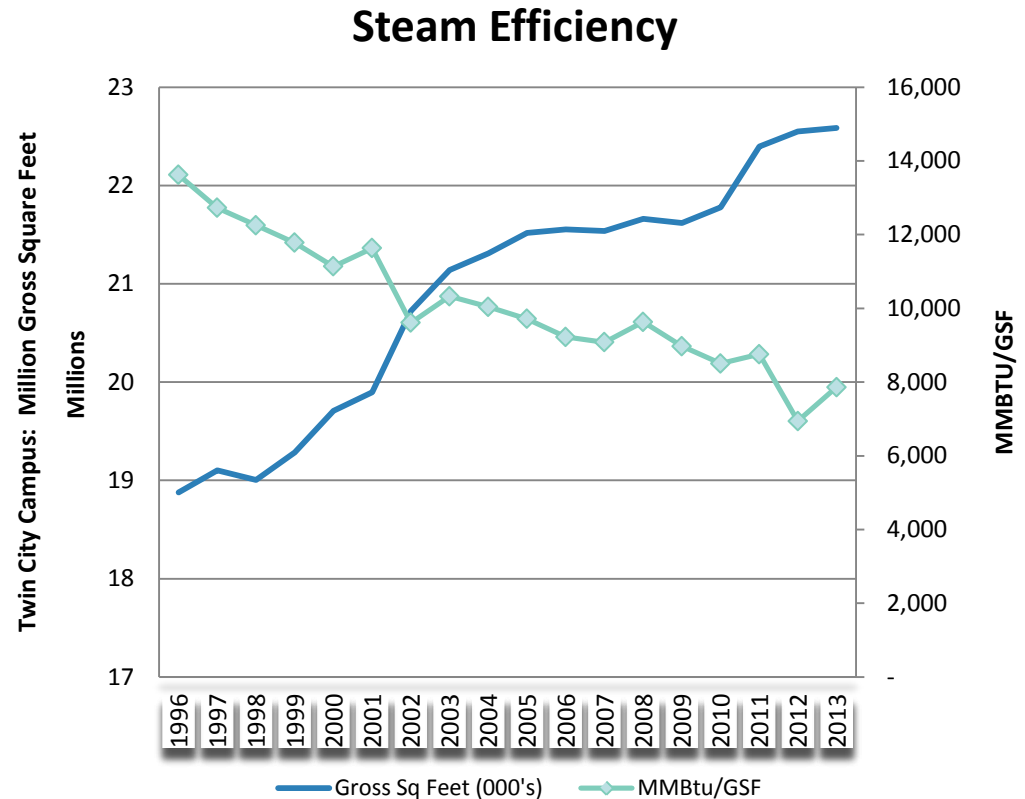


# Cost Effective: Twin Cities Energy Consumption vs Peers



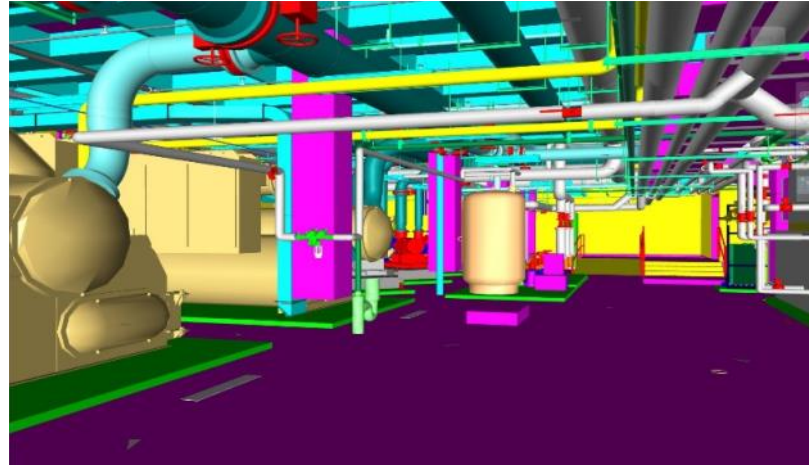
# Cost Effective: Twin Cities Steam Efficiency Over Time

- Since 1996:
  - Campus increased by 3.7M SqFt
  - Steam Efficiency increased by 42%
  - Cumulative savings due to efficiency gains = \$113M (annualized for 2013 = \$10.5M)



# Cost Effective: Utilities Services – Chilled Water

- Commissioned new ultra efficient ME and Cancer Cardio facilities
- Improving overall plant performance from 0.8 to 0.55kW/Ton avoiding \$483K/Year in purchased electric expense





# Reliable: Multi-Fuel Facilities

- Natural gas, fuel oil, propane and/or solid fuels (e.g. coal, biomass)
- Enables continuous boiler operations in event of disruption of one fuel type
- Natural gas supply curtailed multiple times this winter due to cold weather/Xcel pipeline explosion
- Gas curtailments require:
  - Additional coal & oil purchases
  - Longer plant operator work shifts and/or overtime
  - Numerous fuel deliveries
- Net cost increase from curtailments >\$1.7 M

January						
M	T	W	Th	F	Sat	Sun
		1	2	3	4	5
6	7	8	9	10	11	12
13	14	15	16	17	18	19
20	21	22	23	24	25	26
27	28	29	30	31		
February						
					1	2
3	4	5	6	7	8	9
10	11	12	13	14	15	16



One or more U of M facilities curtailed part or all of the day

# Reliable: Maintaining Infrastructure

- Ongoing renewal of 49 steam heating shafts; one per summer season



Before Renovation



After Renovation

# Reliable: Maintaining Infrastructure

- Conditions based renewal of University owned sanitary and storm water sewer manholes



Before Renovation



After Renovation

# Reliable: System Campus Support

- **Crookston** - Electric Distribution Master Plan Study
  - Establish long-term improvements necessary for greater system reliability
  - System has infrastructure 50+ years old and delivery capacity to serve campus service demands has no redundancy



# Reliable: System Campus Support

- **Morris**

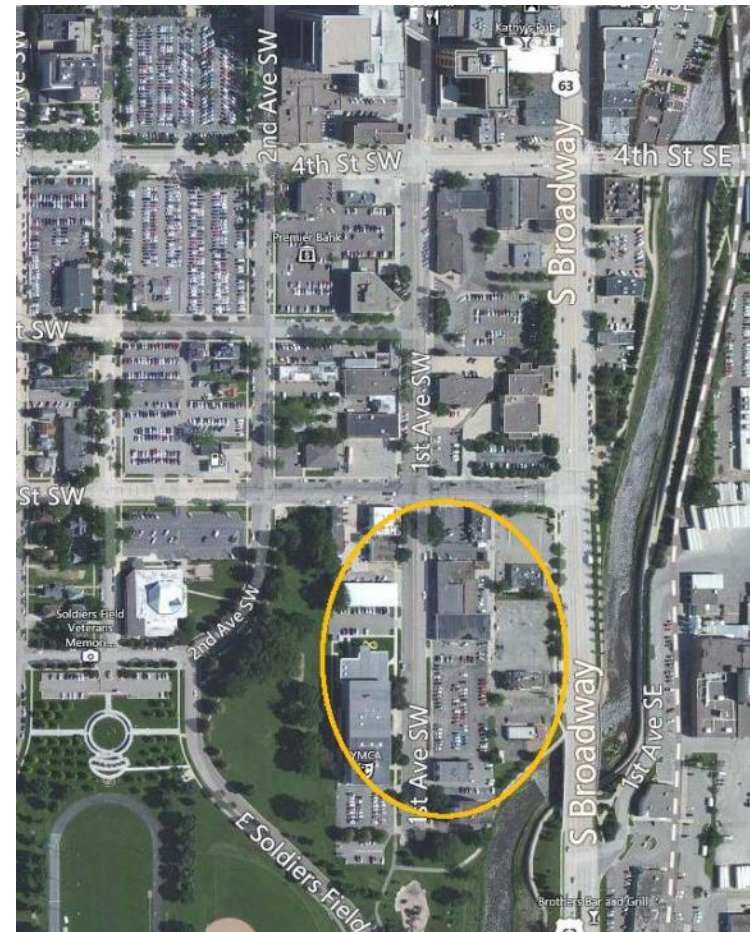
- Engineering & technical study support to determine Biomass unit emission controls retrofit requirements

- **Duluth**

- Engineering & technical direction to remedy steam distribution system problems

# Reliable: System Campus Support

- **Rochester** - Support Master Planning for new campus
  - Utilities services development for a multiple facility campus
  - Potential district heating and cooling supplied by near area established system operators



# Reliable: New Steam Plant Operator Selected

- Veolia Energy Solutions, LLC will replace Foster Wheeler Twin Cities Inc. Spring 2014
- Veolia will operate and maintain all Twin Cities steam production.



# Recognition



2012 Energy Efficiency  
Customer of the Year





UMC Research



Ianni Hall, UMD

## In Closing

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