

# **Oakland University**

## **Annual Energy Report**

**Fiscal Year 2009**

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[www.oakland.edu/energy](http://www.oakland.edu/energy)

<b>TABLE OF CONTENTS</b>	<b>Page</b>
List of tables and figures .....	2
Executive Summary .....	3
Introduction .....	4
Utility Cost per FYES and Square Footage .....	9
Historical Consumption and Cost .....	10
Natural Gas Purchasing Update.....	12
Wind Power Proposal Development.....	13
Biomass Boiler Feasibility Proposal Development .....	14
New Human Health Science Building.....	16

## **LIST OF TABLES AND FIGURES**

Table 1	Average unit cost per utility with comparisons to previous year.....	4
Table 2	Utility consumption & cost with comparisons to previous year.....	5
Table 3	PROJECTED FY 09 consumption and cost.....	6
Table 4	Heating and cooling degree days with comparisons to previous year .....	6
Table 5	PROJECTED FY 09 average unit cost per utility .....	6
Figure 1	Recent increases in the Detroit Edison electric rate .....	7
Figure 2	Eight year combined west campus utility expenditures with cost per square foot of facility space .....	8
Figure 3	Total utility cost for the main campus per FYES & building square foot....	9
Figure 4	Main campus monthly electrical cost and consumption .....	10
Figure 5	Main campus monthly natural gas cost and consumption.....	11
Figure 6	Main campus monthly water & sewer cost and consumption.....	11
Figure 7	Natural gas NYMEX futures contracts (+\$.25 basis points) as of market close October 30, 2009. Price shown is the Oakland University cost per million BTU. ....	12

## **EXECUTIVE SUMMARY**

Mild weather and relatively modest utility rate increases resulted in a small increase in total utility costs of approximately \$100,000, or 1.7% for FY 09 as compared to FY 08. Due to the milder air conditioning season and recent energy cost savings projects, electrical consumption was down 3.3% and electric cost was down 1.9%. Natural gas consumption was a 1% increase over the past year, and the gas cost was up 6.8%. Recent natural gas market prices have fallen significantly, and FY 09 will be the peak year in the unit cost of gas for the next few years, as additional gas purchases are made. For FY 10, we are expecting a 2 to 3 % decrease in total expenditures, mainly due to conservation projects and falling natural gas rates. Domestic water consumption decreased 9.3% resulting in a 6.9% decrease in cost.

The overall trend in for climate and temperatures is warm, even though this past FY 09 was back down to the historical average. Recent years have shown to be much warmer than the average, and this warming trend is expected to continue.

Following the feasibility studies for a wind power project and a biomass heating and power project, Facilities Management has solicited proposals for developers of third party, “design, build, own, and operate” financing. Both potential projects would use conventional equipment and are economically attractive. Combined, they could provide a renewable and sustainable energy infrastructure for the University’s future needs. Additional benefits from these systems would include energy independence, price security, local fuel procurement, carbon emissions reduction, and educational opportunities.

Lastly, the University’s first venture into a green building project will be the new Human Health Science building. The base goal will be to achieve a US Green Building Council rating of GOLD in their Leadership in Energy and Environmental Design (LEED), which is the industry standard green building rating system. The building will also be the University’s first facility to be heated and cooled by a geothermal heat pump system. Grants are being sought to supplement the building’s energy systems to achieve Michigan’s first platinum LEED rated building at any educational institution.

**INTRODUCTION**

Mild weather and relatively modest utility rate increases resulted in a small increase in total utility costs of approximately \$100,000, or 1.7% for FY 09 as compared to FY 08. Due to the milder air conditioning season and recent energy cost savings projects, electrical consumption was down 3.3% and electric cost was down 1.9%. Winter weather was also mild and natural gas consumption was a mere 1% increase over the past year, and cost was up 6.8%. Recent natural gas market prices have fallen significantly, and FY 09 will be the peak year in the unit cost of gas for the next few years, as additional gas purchases are made. Domestic water consumption decreased 9.3% resulting in a 6.9% decrease in cost.

The unit cost of each utility with fiscal year comparisons are shown below in Table 1.

**Table 1 Average unit cost per utility with comparisons to previous year**

	<b>FY08</b>	<b>FY09</b>		<b>% Change from</b>
	<b>Unit Cost</b>	<b>Unit Cost</b>	<b>Units</b>	<b>FY08</b>
Electricity	\$ 0.0749	\$ 0.0761	per kW hour	+1.7%
Natural Gas	\$ 9.442	\$ 9.981	per million BTU	+5.7%
Water & Sewer	\$ 4.630	\$ 4.807	per thousand gallons	+3.8%

The mild weather was a contributing factor for both the decrease in electric consumption as well as the small increase in natural as consumption. The overall trend in the weather is much warmer than average temperatures, even though FY 09 was more like the historical average. Recent years have shown to be much warmer than the historical average, and this trend is expected to continue to increase. Recent weather information is displayed below in Table 4.

The following Table 2 shows the FY 09 to FY 08 comparison of consumption and cost.

**Table 2 Utility consumption & cost with comparisons to previous year**

	<b>FY09 Usage</b>	<b>Units</b>	<b>% Change from FY08</b>	<b>FY09 Cost (Millions)</b>	<b>% Change from FY08</b>
<b>Electricity</b>	36,524,880	kW hours	-3.3%	\$ 2.78	-1.9%
<b>Natural Gas</b>	294,389	million BTU	+1.0%	\$ 2.94	+6.8%
<b>Water &amp; Sewer</b>	87,501	thousand gal	-9.3%	\$ 0.421	-6.9%
<b>TOTALS</b>				<b>\$ 6.13</b>	<b>+1.7%</b>

*Note 1: MMBTU = one million British thermal units (approximately = 1 MCF = thousand cubic ft)*

*Note 2: This data is for the large, main accounts only, the general funded small utility accounts are less than 1% of total expenditures.*

Additional conservation projects are underway. The Recreation and Athletic Center energy systems were recently re-commissioned and optimized, and the same is presently being done at Pawley Hall and the Central Heating Plant.

Projecting into FY 10, the unit cost of electricity is expected to rise slightly. Future increases should be expected as a 90% monopoly control was given back to electric utility companies. Detroit Edison is planning significant construction projects such as sulfur dioxide scrubbers, wind power projects, and a proposed new nuclear power plant. If a carbon tax, or cap and trade system, is implemented by the US congress, this will add increases to both the electrical and natural gas rates.

Presently 100% of FY 10, 40% of FY 11, and 10% of FY 12 natural gas has been contracted. Prices have tumbled along with all other commodities in our present recession, and future purchases will be made in the coming weeks.

**Table 3 PROJECTED FY 2010 utility consumption & cost**

	FY10			FY10	
	Projected Usage	Units	% Change from FY09	Projected Cost (Millions)	% Change from FY09
<b>Electricity</b>	36,721,776	kW hours	+0.5%	\$ 2.81	+1.1%
<b>Natural Gas</b>	297,909	million BTU	+1.2%	\$ 2.76	-6.2%
<b>Water &amp; Sewer</b>	86,863	thousand gal	-0.7%	\$ 0.402	-4.5%
<b>TOTALS</b>				\$ 5.96	-2.8%

Relatively mild weather for fiscal year placed FY 09 back close to historical average weather. Recent trends towards much warmer weather patterns are expected to continue. Table 4 below displays a weather measure called “degree days” to gauge how far each day is from a reference 65 deg F.

**Table 4 Heating and cooling degree days with comparisons to previous year**

	Average	FY07	FY08	FY09	% Change
<b>Heating Degree Days</b>	6,444	5,945	6,043	6,420	+6.4% cooler
<b>Cooling Degree Days</b>	736	909	894	774	-13.4 cooler

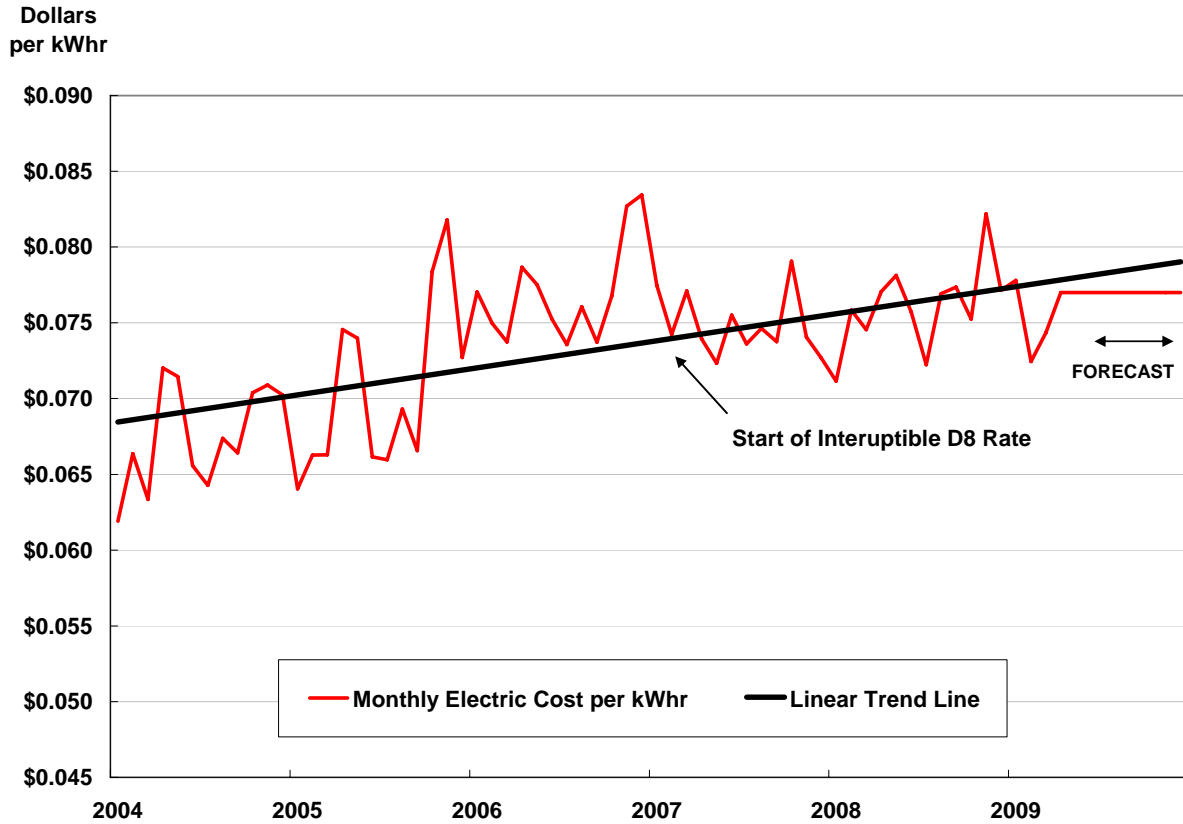
*Degree Days are calculated from the difference between the average daily temperature and reference temperature (65 deg F). This gives a measure of how much heating and cooling effort is required to maintain a typical building’s indoor air comfort level. (data source <sup>1</sup>)*

**Table 5 PROJECTED FY 2010 average unit cost per utility**

	FY09	FY10	Units	% Change from FY09
<b>Electricity</b>	\$ 0.0761	\$ 0.0765	per kW hour	+0.5%
<b>Natural Gas</b>	\$ 9.981	\$ 9.252	per million BTU	-7.7%
<b>Water &amp; Sewer</b>	\$ 4.807	\$ 4.627	per thousand gallons	-3.8%

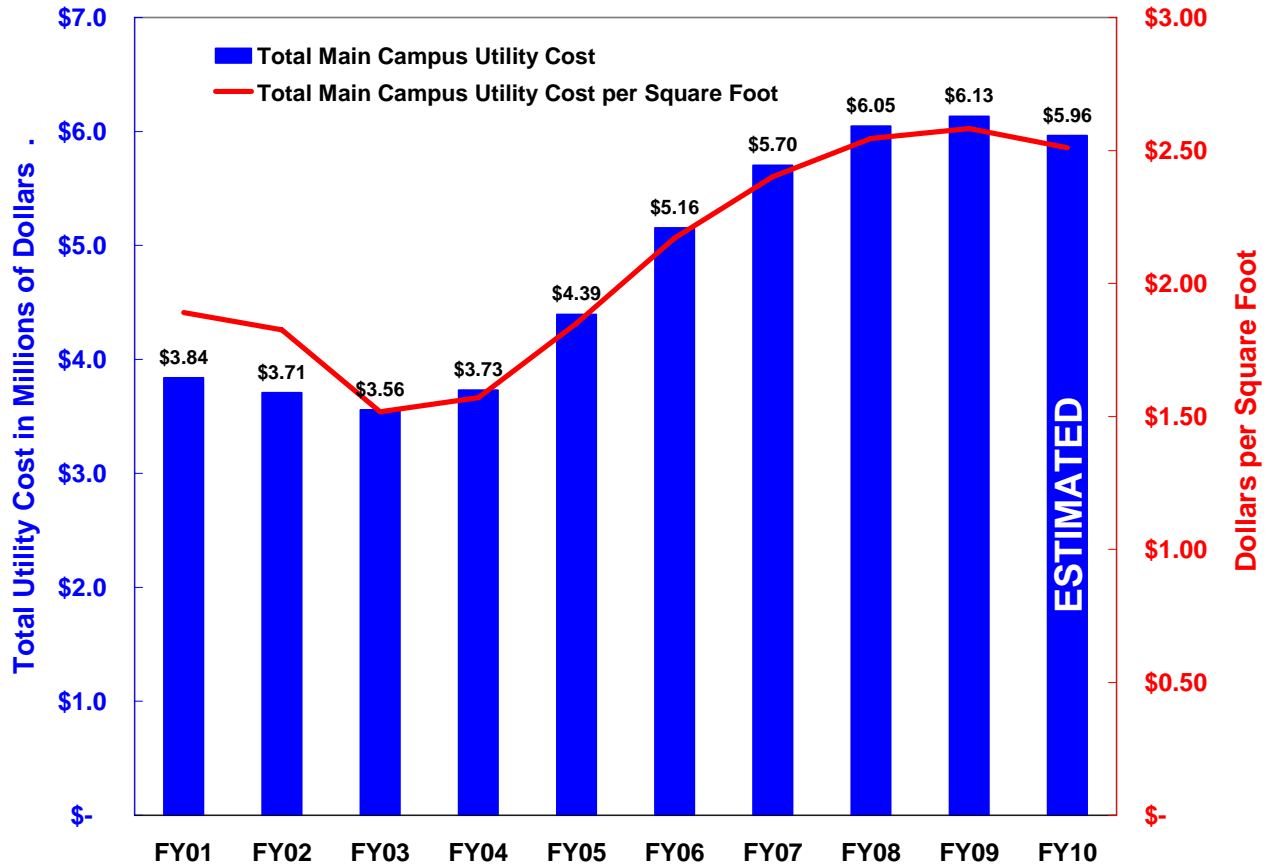
<sup>1</sup> National Oceanic and Atmospheric Administration, National Center for Environmental Prediction, [http://ftp.ncep.noaa.gov/pub/cpc/htdocs/products/analysis\\_monitoring/cdus/degree\\_days/archives/](http://ftp.ncep.noaa.gov/pub/cpc/htdocs/products/analysis_monitoring/cdus/degree_days/archives/)

Detroit Edison electric rates have continued to rise steadily in recent years at approximately 3 to 4% per year. The recent introduction of a partial D8 interruptible rate has taken the University off of this trend line, but further increases are expected.



**Figure 1** Recent increases in the Detroit Edison electric rate

Figure 2 illustrates the previous cost savings from the electrical Retail Open Access purchasing program in FY 03 & FY 04, followed by several years of increasing utility unit costs (mostly significantly in natural gas). FY 09 should be the peak in this steady climb in utility costs, with FY 10 expecting a 2 to 3 % decrease in expenditures, mainly due to conservation projects and falling natural gas costs.



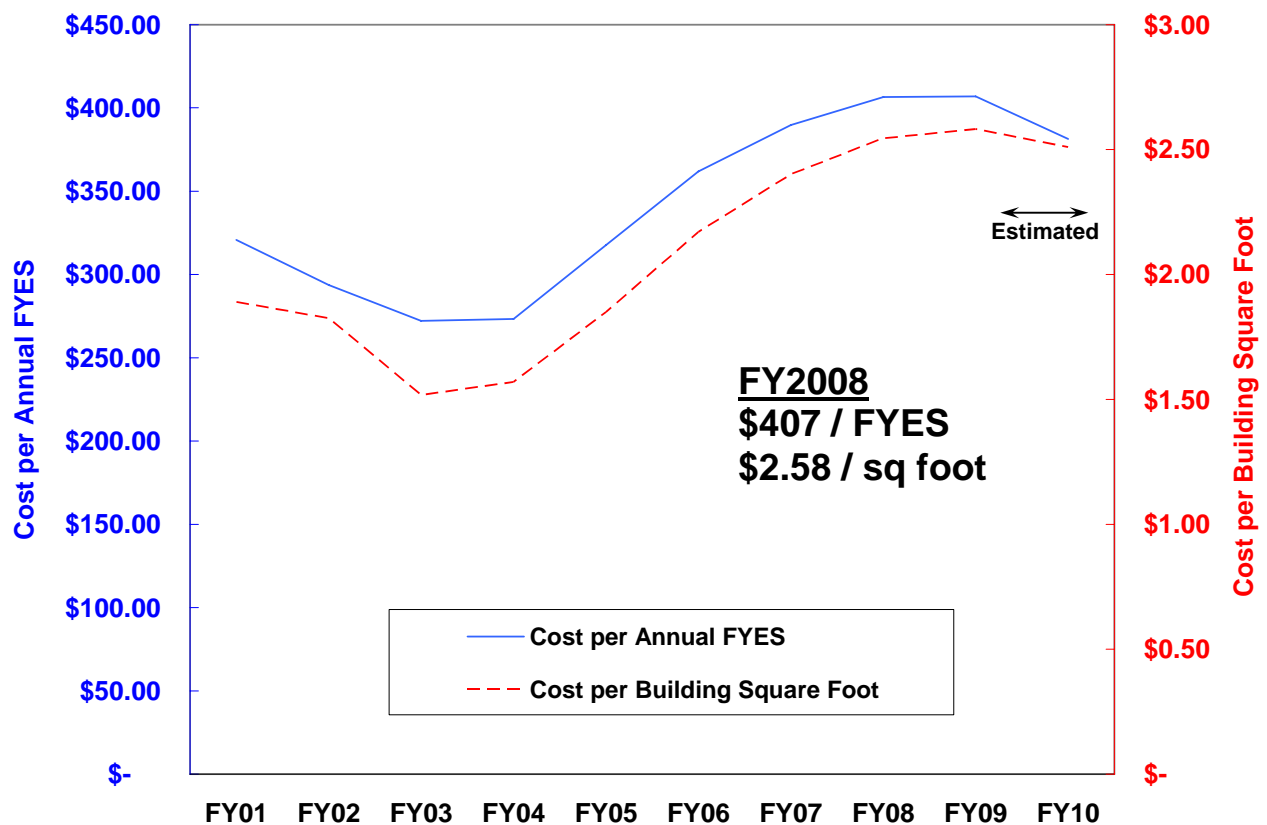
**Figure 2 Ten year combined west campus utility expenditures with cost per square foot of facility space**



## UTILITY COST PER FYES AND SQUARE FOOTAGE

Figure 3 below, depicts this same information adjusted for building square footage and Full Year Equivalent Students (FYES).

This figure is based on our present main campus size of 2,375,000 million square feet, and 15,073 FYES. For a full time, resident undergraduate student with 15 or more credit hours per semester (\$9,075 for both fall and winter semesters), this equates to 4.5% of their annual tuition.



**Figure 3 Total utility cost for the main campus per Full Year Equivalent Student (FYES) and per building square foot.**

## HISTORICAL CONSUMPTION AND COST

Figures 4, 5, and 6 illustrate the monthly utility usage and resulting trends over the past decade.

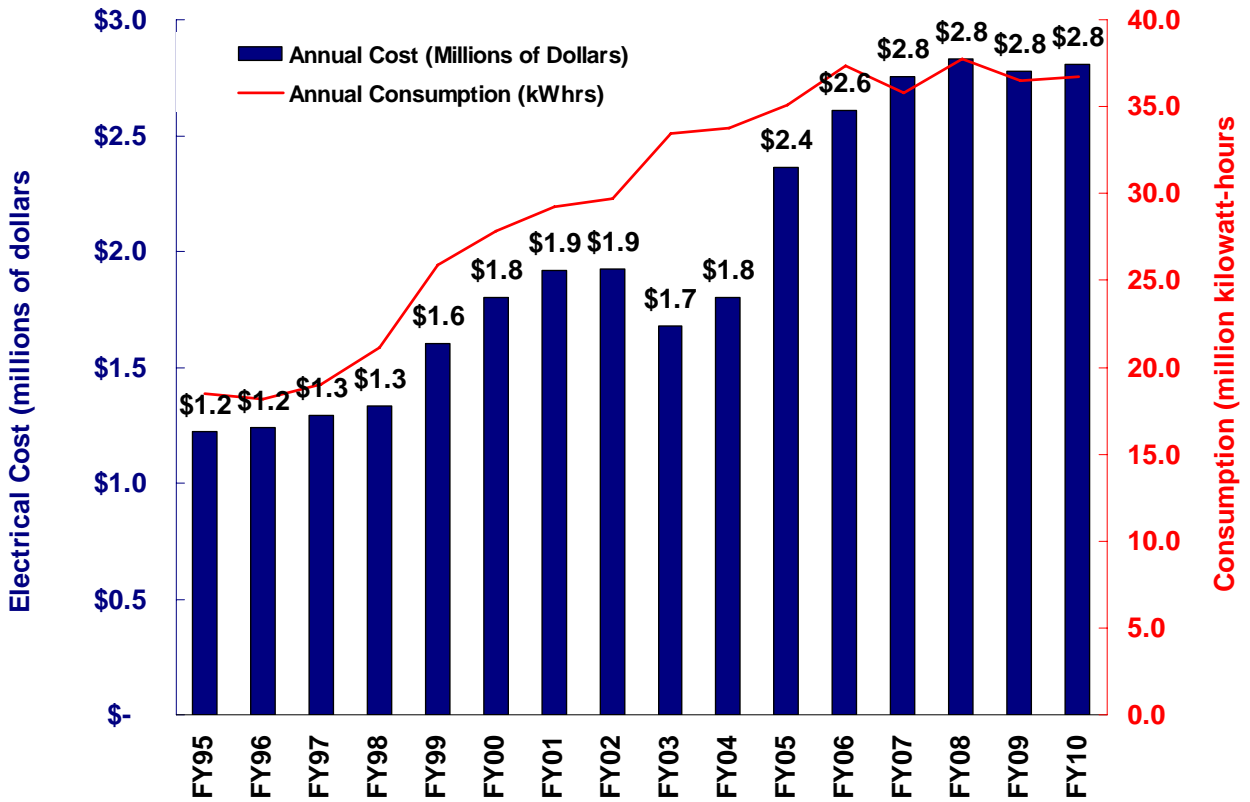


Figure 4 Historical main campus annual electrical cost and consumption

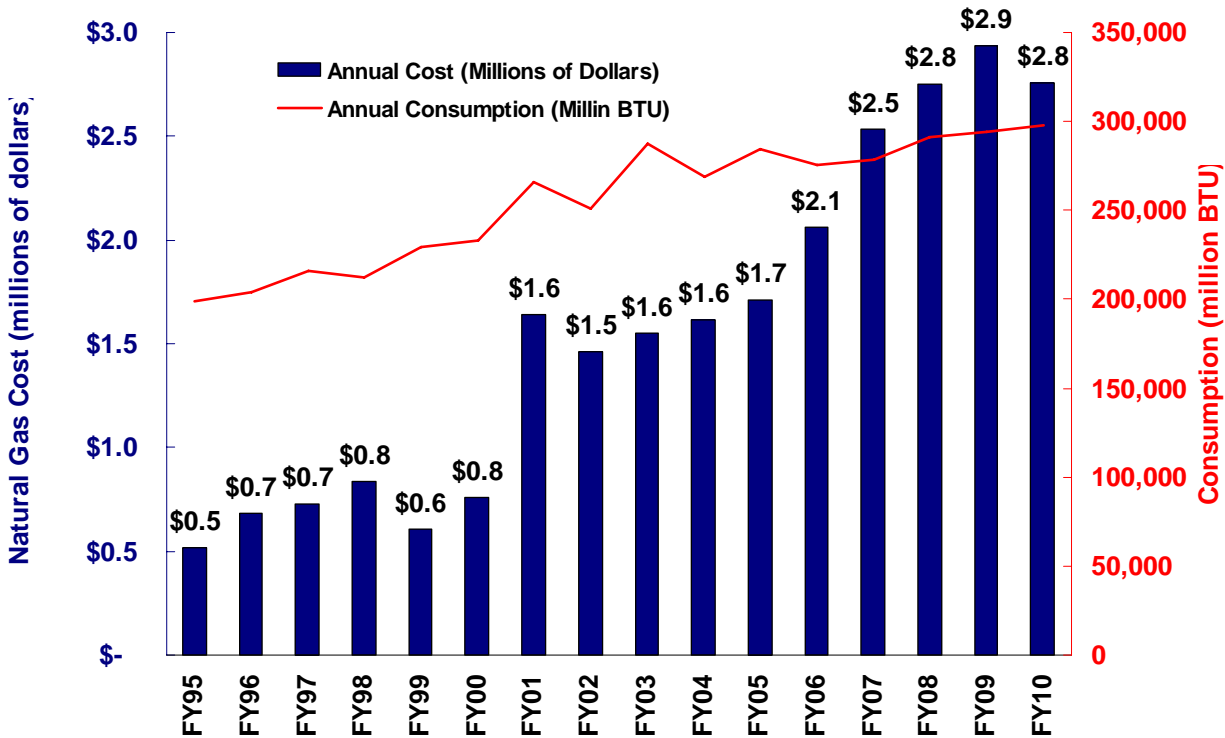


Figure 5 Historical main campus annual natural gas cost and consumption

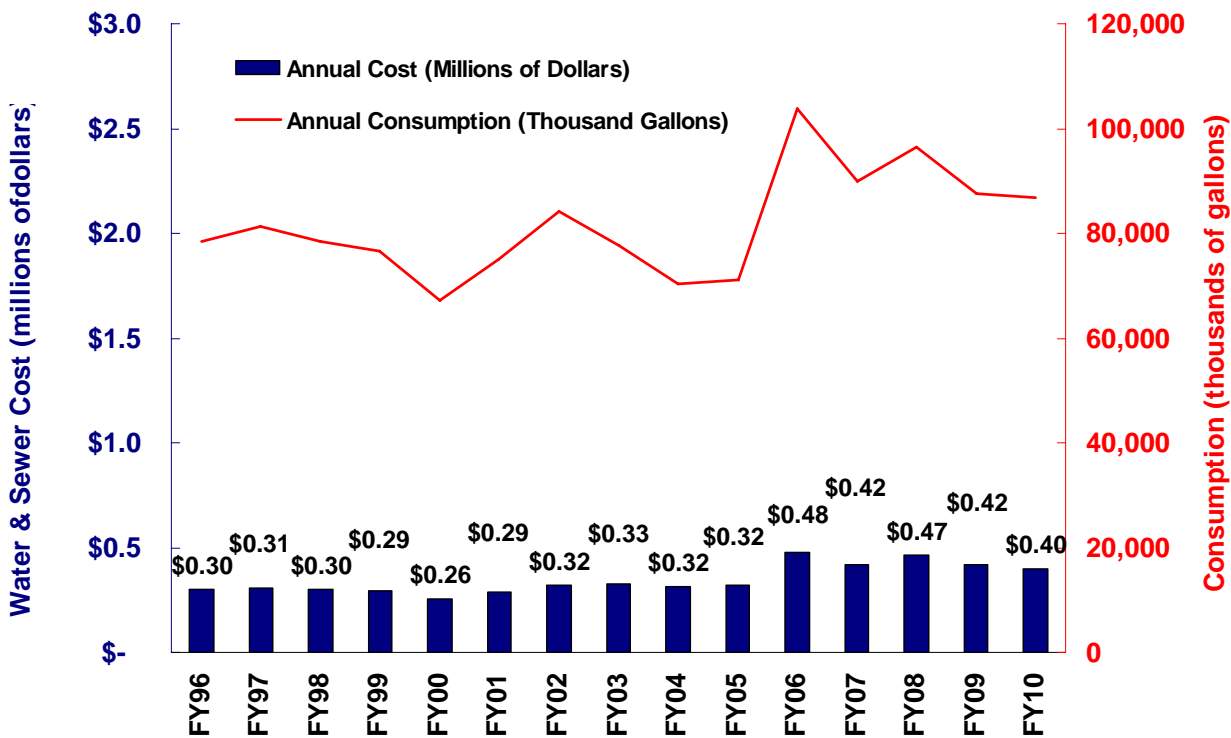
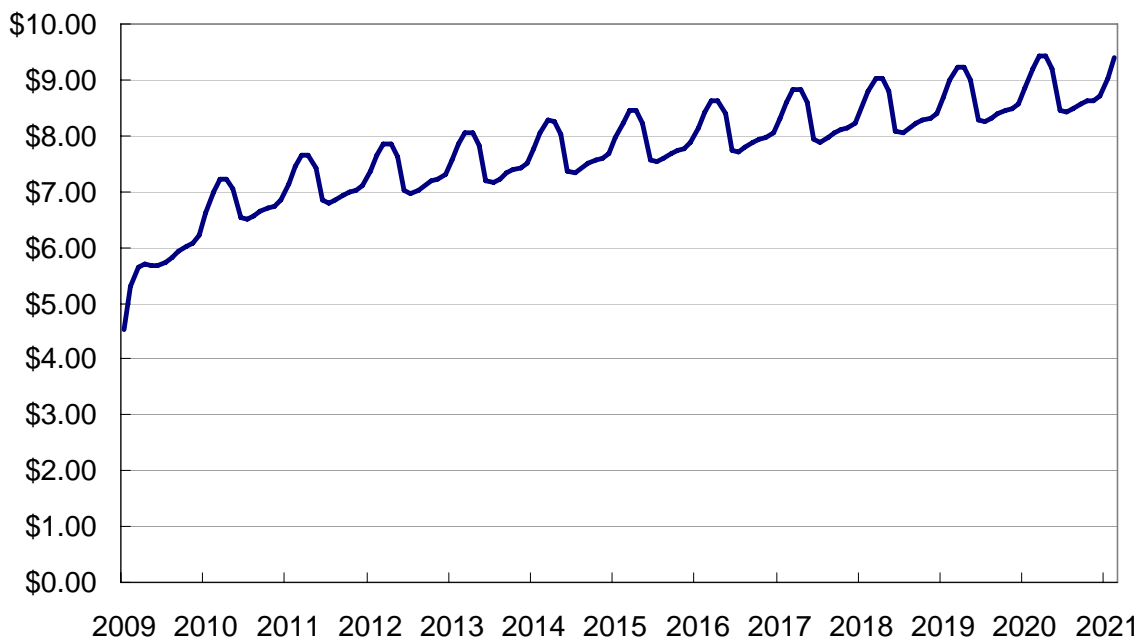


Figure 6 Historical main campus annual water & sewer cost and consumption

## NATURAL GAS PURCHASING UPDATE

The present world wide recession has seen a precipitous drop in all commodity prices including oil and natural gas. Presently, gas contracts have been purchased for 100% for FY2010 and approximately 40% for FY2011 and 10% for FY2012. Additional gas purchases will be made in the next few weeks to take advantage of present pricing. The New York Mercantile Exchange (NYMEX) still sees natural gas prices as recovering as the economy recovers. This can be seen in the forward view of natural gas futures contracts, as of October 30, 2009, shown here in Figure 7.



**Figure 7** Natural gas NYMEX futures contracts (+\$0.25 basis points) as of market close October 30, 2009. Price shown is the Oakland University cost per million BTU.

## **WIND POWER PROPOSAL DEVELOPMENT**

Last year, Facilities Management reported on the completion of a two year wind speed data collection and wind power project feasibility study. We are presently working to develop a third party “design, build, own, and operate” project for one or two wind turbines.

A request for proposals was issued to potential developers. A Power Purchase Agreement (PPA) was requested where the University would pay for energy produced on a per kW-hr basis only. Four responses were received. Three of the responses were for conventional financing offers, not a true PPA. The fourth response was a true PPA, but it included a wind turbine and tower that were not deemed suitable for our site, and the price was too high. Therefore, this round of bidding has been deemed as not viable.

After close of bidding, a fifth response was received, direct from a Canadian wind manufacturer. The proposal offered options for a sale outright to Oakland University (with Oakland financing), a quote to finance the project, and an offer of a true 20 year PPA at the lowest cost seen from all offers. If the University were to sell the project “green credits”, or renewable energy credits, at \$0.03 per kWhr or above, this project would be competitive with our present DTE power today.

### **Wind Project recommended next steps:**

- This round of bidding was thrown out.
- Issue another round of bidding if management wishes to proceed.
- Continue to look for alternate means of financing.
- Solicit firm prices for Renewable Energy Credits (REC's).
- Continue dialog with possible collaborators such as the Wyandotte Municipal Services (another wind project under development), Detroit Edison, wind turbine manufacturers, etc...



*(image courtesy of Khaled Dahr & Jim Leidel)*

## **BIOMASS BOILER FEASIBILITY PROPOSAL DEVELOPMENT**

Last year, Facilities Management reported on the completion of a wood chip boiler feasibility study which showed the potential for over \$1.5M per year in fuel cost savings.

Facilities Management is presently working to develop a third party “design, build, own, and operate” project for a combined heat and power Bio-Energy Center, to be located at the south side of campus near the electrical substation.



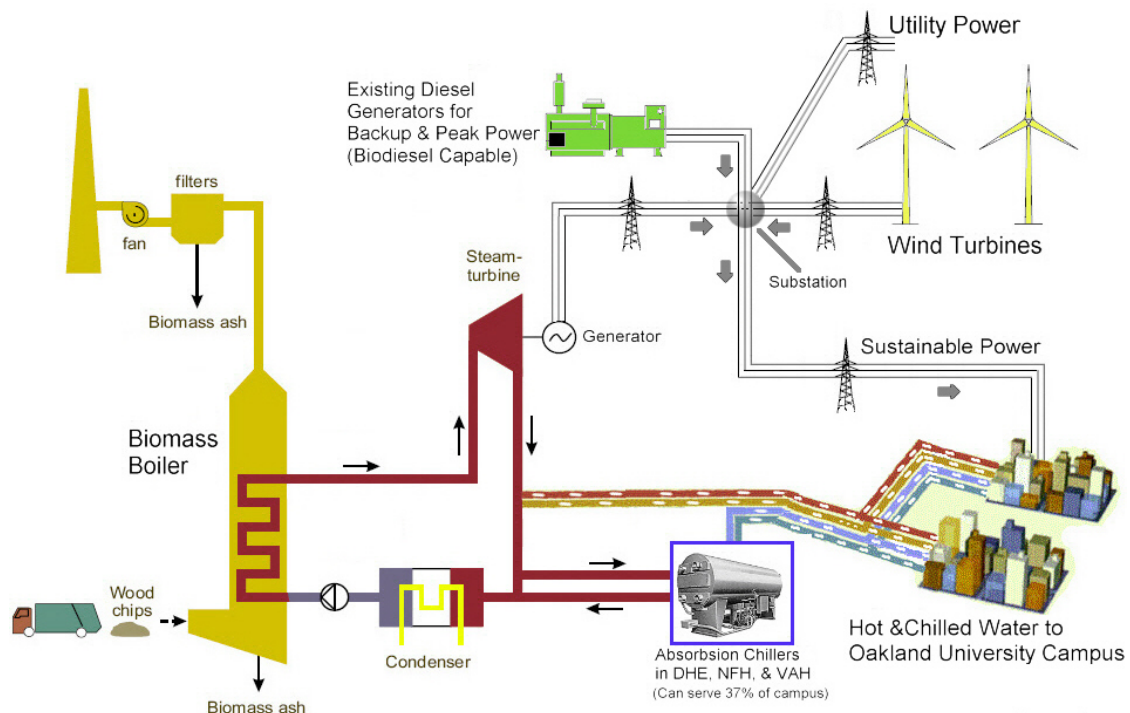
A September 2008 Request for Qualifications was sent to prospective third party developers, and three were selected to submit a full proposal. Of those three, two were interviewed by a University management team including General Counsel.

In addition, a grant application was submitted to the US Department of Energy for approximately 1/3 of the cost of this facility. Results from this application are expected in early November 2009.

The implementation of both the wind and biomass projects, coupled with the diesel generator project, would provide a comprehensive energy infrastructure based on a flexible, renewable, and sustainable fuel supply. The schematic below illustrates the biomass boiler to the left, providing base-load electricity and low cost heating to campus. Our existing district heating infrastructure and four existing absorption chillers (driven by hot water) will efficiently integrate the new Bio-Energy Center to our campus. The diesel generators, running on a blend of biodiesel and natural gas will provide back up and peaking power, and each wind turbine would supplement the electrical supply with approximately 10% of our needs, per turbine.

**Biomass Project recommended next steps:**

- Select a project developer / financier from the two finalists.
- Await the response to the US DOE grant application to the DOE (November 2009).
- Have a discussion with Moody’s regarding energy project impact on bonding capacity.



## NEW HUMAN HEALTH SCIENCE BUILDING

### *Oakland University's First Green Building Construction Project*



The new Human Health Science building will be the University's first venture into a green building project. The minimum goal will be to achieve a GOLD rating from the US Green Building Council for the Leadership in Energy and Environmental Design (LEED), which is an industry rating system. The building will also be the University's first facility to be heated and cooled by a

geothermal heat pump system.

Facilities Management applied for and received a \$75,000 Kresge Foundation, Green Building Initiative grant for additional planning and design services to investigate a LEED platinum rating. An additional grant is being sought from the US Department of Energy for \$2.75M to supplement the building mechanical systems to help achieve the platinum designation, which would be the first for any educational institution in Michigan.

Oakland University's recent utility cost per square foot is approximately \$2.50 per year. Our new Human Health Services building is programmed for 157,300 square feet and would therefore cost the University approximately \$400,000 per year if constructed to conventional standards. If this was reduced by one half for a LEED Platinum building, a savings of \$200,000 per year would be expected.