

**Oakland University**  
**Annual Energy Report**  
**Fiscal Year 2006**

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## EXECUTIVE SUMMARY

The Fiscal Year 2005 summer and winter were both warmer than average. Fiscal Year 2006 was even warmer with a 10% warmer winter and a 33% warmer summer, compared to the previous year, measured by the annual heating and cooling degree days. Fiscal Year 2006 winter was about 15% warmer than the historical Detroit metro average, while the Fiscal Year 2006 summer was nearly 40% warmer than average.

The 10% drop in heating degree days was accompanied by a 3% drop in natural gas usage. Since the majority of our campus natural gas usage provides space heating, the gas usage is proportional to the amount of cold weather, along with hours of usage and square footage. Unfortunately, the 24% increase in natural gas prices more than overshadowed the mild winter weather, pushing up the University gas cost 20% to \$2.06 million.

To forestall these natural gas market price increases, forward purchases have been made with both our supplier, BP Canada, and the State of Michigan energy purchasing consortium for 79% of FY07, 43% of FY08, 22% of FY09, and 10% of FY10. As our present gas contracts expire, unit prices will raise substantially:

Fiscal Year 2006	\$7.48 per million BTU
Fiscal Year 2007	\$8.76 per million BTU (estimated, based on 79% firm contracts)
Fiscal Year 2008	\$9.20 per million BTU (estimated, based on 43% firm contracts)

On the electric side of the ledger, the additional 33% cooling degree days compared to the previous summer contributed significantly to a 6% increase in usage. The electrical consumption is less weather dependent than our gas consumption, but a very hot air conditioning load will definitely correlate to additional kilowatt-hours consumed. These additional kilowatt-hours, coupled with a 4.5% increase in the Detroit Edison electric rate, produced a 10% increase in electric cost (now at \$2.6 million).

If the trends continue, we could expect slightly reduced natural gas usage, but increased electric usage. Coupled with ever increasing natural gas market prices and Detroit Edison electric rates, overall costs are projected to increase to \$5.92 million in Fiscal Year 2007 (up \$800,000), and \$6.23 million in Fiscal Year 2008 (up an additional \$310,000).

## WARMER WEATHER & UNIT PRICE INCREASES

The Fiscal Year 2005 summer and winter were both warmer than average. The recent Fiscal Year 2006 was even warmer with a 10% warmer winter and a 33% warmer summer, compared to the previous year. Fiscal Year 2006 winter was about 15% warmer than the historical Detroit metro average, while the Fiscal Year 2006 summer was nearly 40% warmer than average. The heating and cooling degree days, which illustrate the severity of the weather, are shown in Table 2 below.

The 10% drop in heating degree days did produce about a 3% drop in natural gas usage. Unfortunately, the 24% increase in natural gas prices more than overshadowed the mild winter weather, pushing up the University gas cost 20% to \$2.06 million as shown in Table 1. Unit cost information (or rates) is shown in Table 2.

Long term forward purchases of natural gas have forestalled major cost increase, however, an estimated FY07 gas price of \$8.76 per million BTU (up 17%), and an FY08 gas price of \$9.20 per million BTU (up an additional 5%) will result in significant budget increases for Oakland University. For more information, and a graphical representation of this purchasing strategy, please refer to Figure 5 located on page 11.

On the electric side of the ledger, the 33% warmer than previous summer contributed significantly to a 6% increase in usage. These additional kilowatt-hours, coupled with a 4.5% increase in the Detroit Edison electric rate, produced a 10% increase in electric cost (now at \$2.6 million).

**Table 1 Utility usage & cost for all funds with comparisons to previous year**

	<b>FY06 Usage</b>	<b>Units</b>	<b>% Change from FY05</b>	<b>FY06 Cost (Millions)</b>	<b>% Change from FY05</b>
<b>Electricity</b>	35,112,560	kW hours	+6.28%	\$ 2.61	+10.4%
<b>Natural Gas</b>	284,636	MMBTU	-2.97%	\$ 2.06	+20.5%
<b>Water &amp; Sewer</b>	941,200,000	Cubic Feet	+47.37%	\$ 0.48	+52.3%
<b>TOTALS</b>				<b>\$ 5.16</b>	<b>+17.4%</b>

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

*Note 2: This data is for the main campus only, the general funded east campus utilities are approximately 3% of total expenditures.*

**Table 2 Heating and cooling degree days with comparisons to previous year**

	<b>Average</b>	<b>FY05</b>	<b>FY06</b>	<b>% Change</b>
<b>Heating Degree Days</b>	6,444	6,126	5,503	-10.2%
<b>Cooling Degree Days</b>	736	767	1,024	+33.5%

*Heating 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. A new data source was used for this years report<sup>1</sup>.*

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

If the trends continue, we could expect slightly reduced natural gas usage, but increase electric usage. Coupled with ever increasing natural gas market prices and Detroit Edison electric rates, overall costs are projected to increase to \$5.92 million in Fiscal Year 2007 (up \$800,000), and \$6.23 million in Fiscal Year 2008 (up an additional \$310,000).

Projections looking even further ahead see no relief in sight. The Michigan Public Service Commission has recently reported on the need for additional base load electric capacity which could involve construction of one or more additional generating plants, at some expense to the rate payer. Also, emission upgrades to multiple Detroit Edison coal fired power plants will add hundreds of millions of dollars to the rate base in the coming years.

In the absence of any available savings from the electric retail open access market, Facilities Management is investigating alternative electric rates and load management strategies to reduce costs under the regulated Detroit Edison tariffs. Please refer to the section below regarding a potential a backup diesel generator project with an associated interruptible electric rate.

**Table 3 Average unit cost per utility comparisons to previous year**

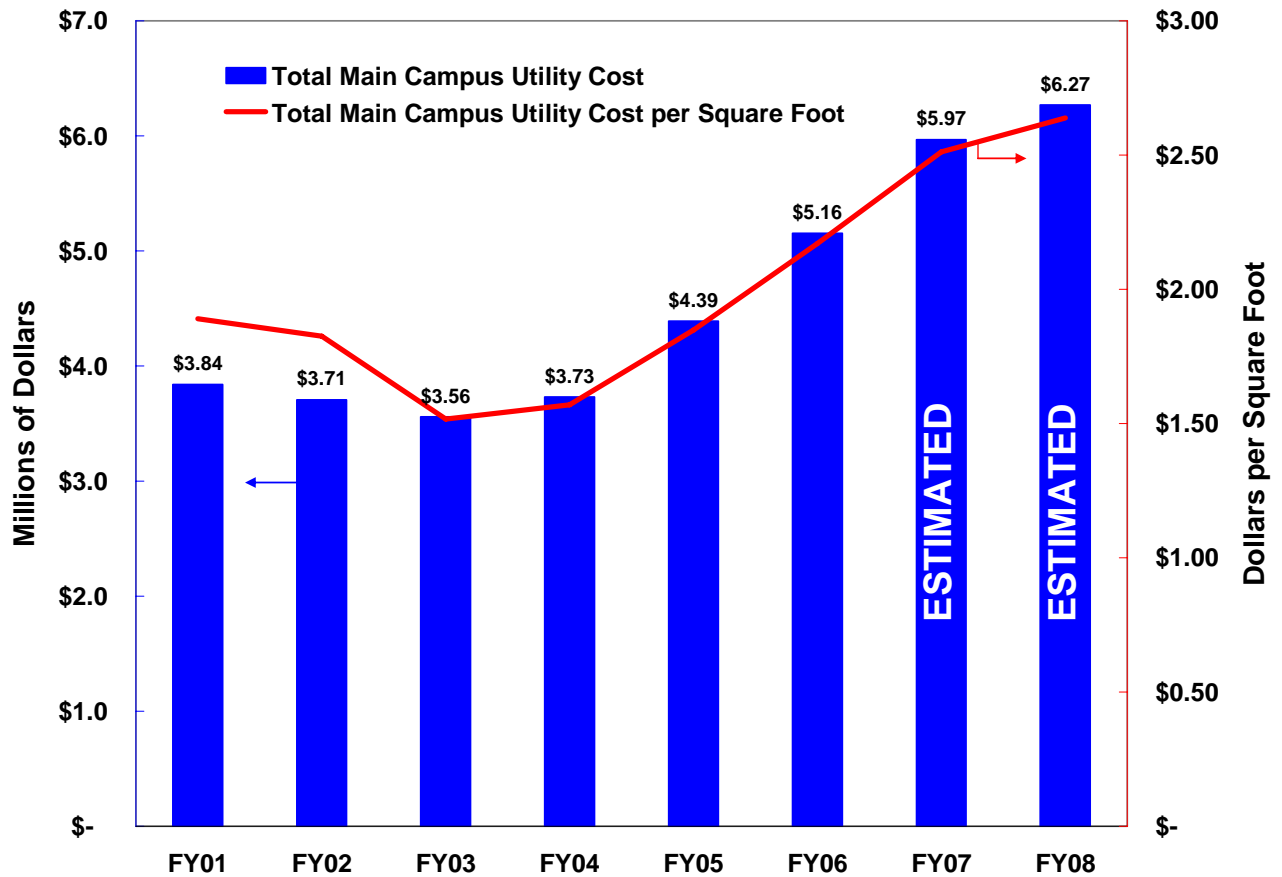
	<b>FY06 Unit Cost</b>	<b>Units</b>	<b>% Change from FY05</b>
<b>Electricity</b>	\$ 0.0705	per kW hour	+4.5%
<b>Natural Gas</b>	\$ 8.762	per MMBTU	+24.2%
<b>Water &amp; Sewer</b>	\$ 0.3460	per 1000 Cubic Feet	+3.3%

**Table 4 PROJECTED FY07 utility usage & cost for all funds with comparisons to FY06**

	<b>FY07 Projected Usage</b>	<b>Units</b>	<b>% Change from FY06</b>	<b>FY07 Projected Cost (Millions)</b>	<b>% Change from FY06</b>
<b>Electricity</b>	37,957,632	kW hours	+1.72%	\$ 2.96	+13.3%
<b>Natural Gas</b>	291,767	MMBTU	+5.64%	\$ 2.51	+21.4%
<b>Water &amp; Sewer</b>	1,431.8	Million CF	+3.23%	\$ 0.49	+2.7%
<b>TOTALS</b>				<b>\$ 5.96</b>	<b>+15.6%</b>

**Table 5 Extended Projections for FY08 utility usage & cost for all funds**

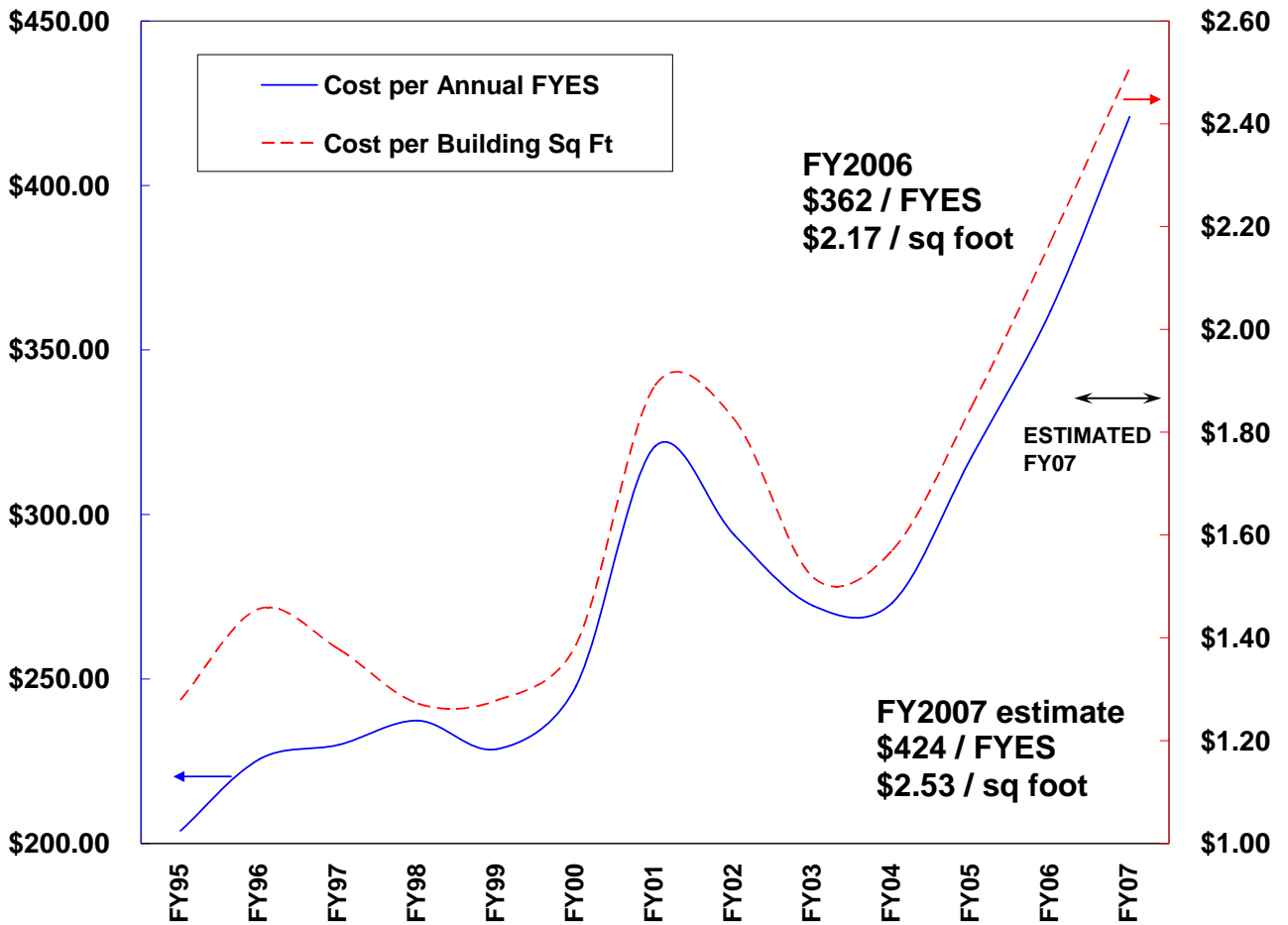
	<b>FY08 Projected Usage</b>	<b>Units</b>	<b>% Change from FY07</b>	<b>FY08 Projected Cost (Millions)</b>	<b>% Change from FY07</b>
<b>Electricity</b>	39,096,361	kW hours	+3.00%	\$ 3.05	+3.1%
<b>Natural Gas</b>	294,606	MMBTU	+0.97%	\$ 2.71	+8.1%
<b>Water &amp; Sewer</b>	1,474.8	Million CF	+3.00%	\$ 0.51	+3.0%
<b>TOTALS</b>				<b>\$ 6.27</b>	<b>+5.2%</b>



**Figure 1** Eight year combined west campus utility expenditures with cost per square foot of facility space

The above chart illustrates the previous cost savings from the electrical Retail Open Access purchasing program in FY03 & FY04, as well as the anticipated increases for FY07 & FY08.

Figure 2, below, depicts this same information corrected for building square footage and Full Year Equivalent Students (FYES).



**Figure 2 Total utility cost for the main campus per Full Year Equivalent Student (FYES) and per building square foot.**

Based on our present main campus size of nearly 2,375,000 million square feet, and a reported 14,245 full year equivalent students, Figure 2 illustrates the rising utility costs per these units of measure.

The cost that each full year equivalent student pays in tuition is expected to rise from \$362 to \$424 per year. For a full time, resident undergraduate student with 15 or more credit hours (\$6,956), this equates to 6% of their annual tuition.

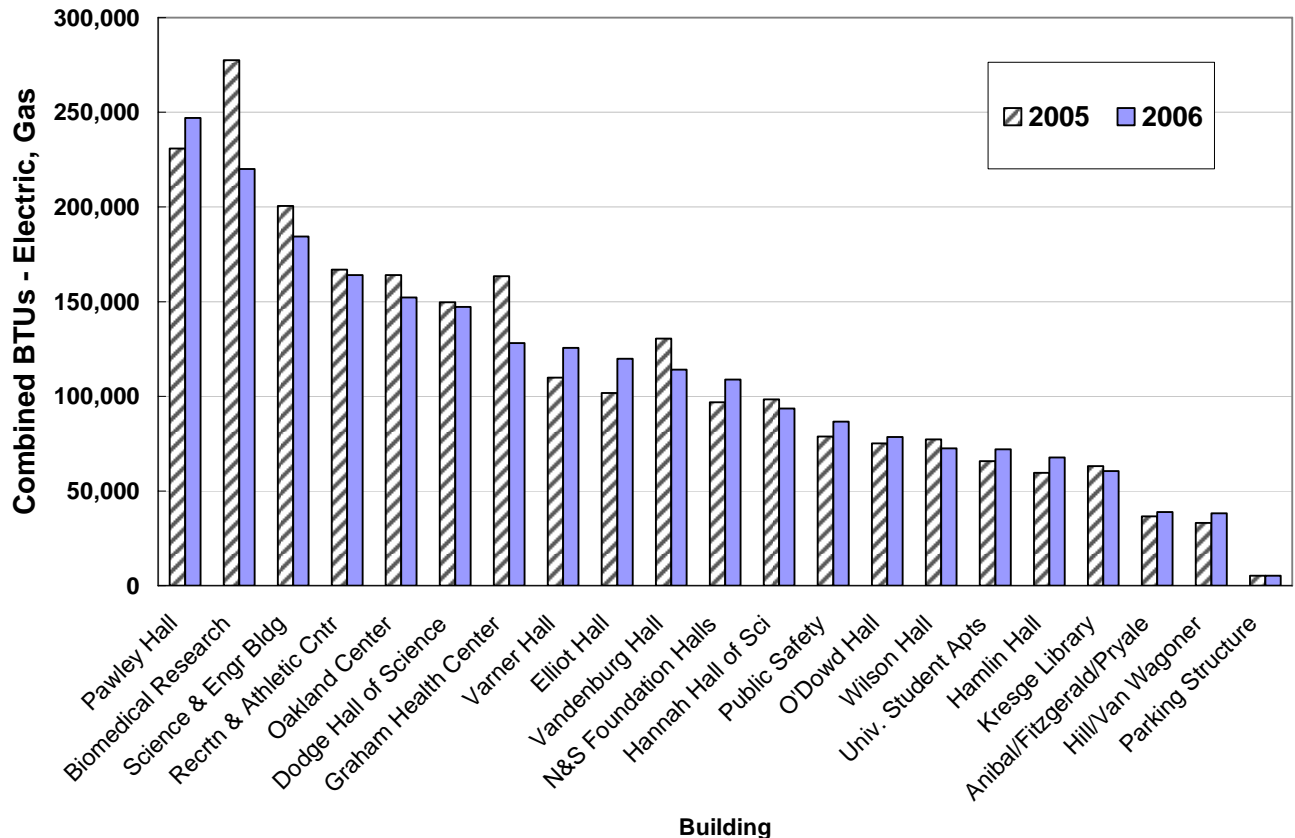
The average annual cost per square foot of main campus facility space is expected to rise from \$2.17 to \$2.53.

## INDIVIDUAL BUILDING ENERGY COST FROM UTILITY SUBMETERING

Figure 3 illustrates individual building energy cost per square foot. Water usage is not included since only auxiliary buildings have been submetered for water.

The metering system has identified numerous areas of concern, and the Chevron Energy Services Agreement will address a few of these issues.

As a long term means to deal with HVAC optimization, a new position has been created at Oakland University for a dedicated Control System Specialist. Between the Chevron project and this new position, we expect to become a more efficient campus.



**Figure 3 Energy usage (in BTUs) per square foot for each main campus building. Includes electrical and heating costs individually metered per building ranked from highest to lowest for 2006. (2005 shown for comparison)**

*Note 1: Anibal, Pryale, & Fitzgerald Houses' heating usage are not metered. The average cost per square foot of the other dormitory buildings was used.*

*Note 2: Hannah Hall of Science, Wilson Hall, Biomedical Research, and Graham Health Center receive un-metered chilled water from other buildings, so their actual energy usage and ranking is higher than shown. NFH provides chilled water to Wilson, SFH, & GHC. Dodge Hall provides chilled water to Hannah Hall*



## **PHASE TWO ENERGY SERVICES PROJECT**

The Chevron Energy Solutions project is well under way. The lighting upgrades were performed in DHE, HHS, KL, NFH, OC, PH, PSS, RAC, SEB, and SFH. Water fixture and faucet aerators were replaced in DHE, EL, HHS, KL, OC, ODH, SEB, SFH, USA, VH, and WH.

The separately bid high-temperature hot water trench tunnel work was recently awarded to a contractor and is scheduled for installation this fall. Work is projected to be completed in October of this year for this portion of work.

Well over 30 additional mechanical and electrical items are in various stages of construction and engineering. Some significant mechanical work will be done late this fall including cooling tower replacements or upgrades in DH, KL, NFH, OC, and VAR. Entire fan systems and some significant window replacement work is scheduled for next summer in NFH and OC.

Although this project mainly addressed deferred maintenance issues, there is an energy cost saving component combined with some maintenance cost savings for a approximately total annual savings of \$344,569.

Due to the modest amount of actual utility cost savings provided here, other avenues of cost saving must be undertaken if Oakland is to slow these rising expenses.

## **ELECTRICAL PURCHASING UPDATE & ON-SITE POWER GENERATION (DIESEL PEAKING OPTION)**

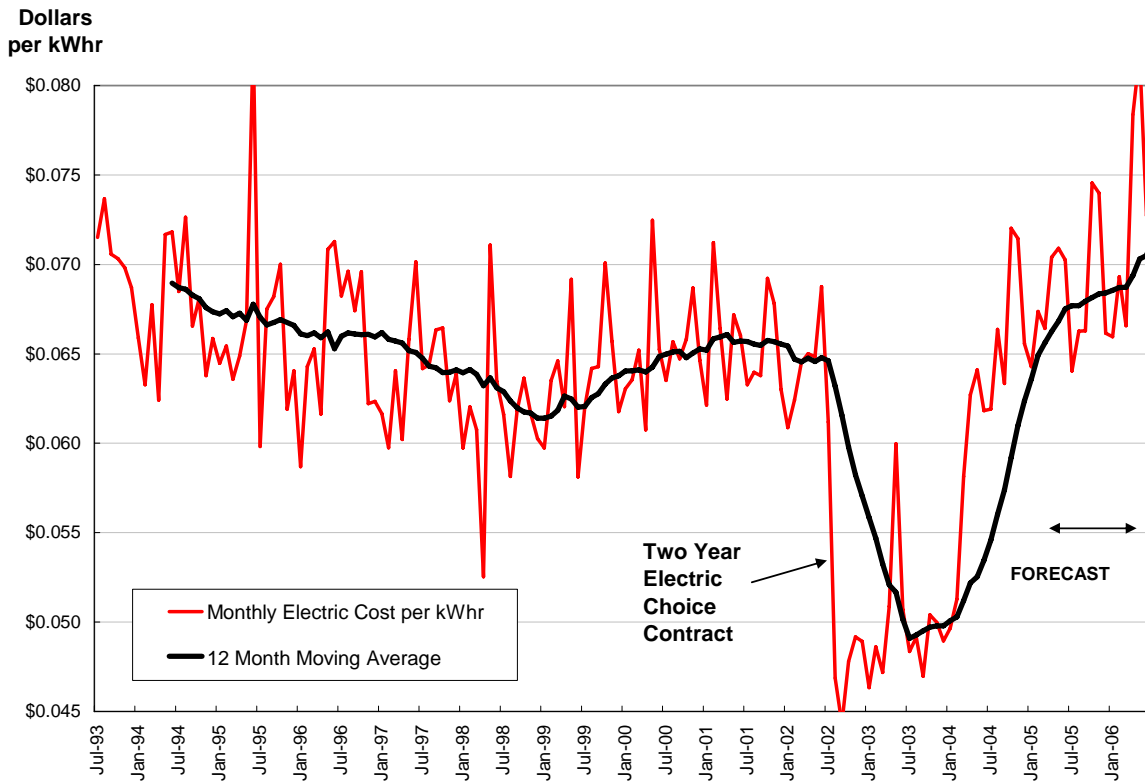
Oakland University remains on full service with Detroit Edison. Over the past few years, several rulings from the Michigan Public Service Commission have added additional cost to the Retail Open Access tariff. This, coupled with an unfavorable electric power market has made the default Detroit Edison tariff more economical.

Figure 4, on the following page, illustrates the rate decrease from our previous 24 month Retail Open Access contract with Quest Energy, as well as the increasing trend for our present, regulated Detroit Edison rates.

The present Chevron project had looked at installing an on-site combined heat and power project, or cogeneration. However, due to natural gas fuel prices, this option is not favorable any time in the near future.

In light of this, Facilities Management has continued to investigate alternative savings, including transmission level voltage and interruptible D8 service.

A project proposal is under investigation to install a central backup generator plant for Oakland University. We are looking at a five phase project with significant savings opportunity. If completed, it would provide a backup power source for our critical research facilities, data centers, and our increasing resident student population. It would allow the university to manage its peak load while also moving to an interruptible electric rate for some cost savings.



**Figure 4 Monthly electric unit price in dollars per kilowatt-hour**

## WIND POWER STUDY

A temporary wind sensor tower was installed this winter near the south entrance to the main campus, as shown here. We are monitoring the campus wind speed for study by the OU mechanical engineering department and for an assessment of local wind power potential. The study will be completed in the spring of 2007.



## NATURAL GAS PURCHASING UPDATE

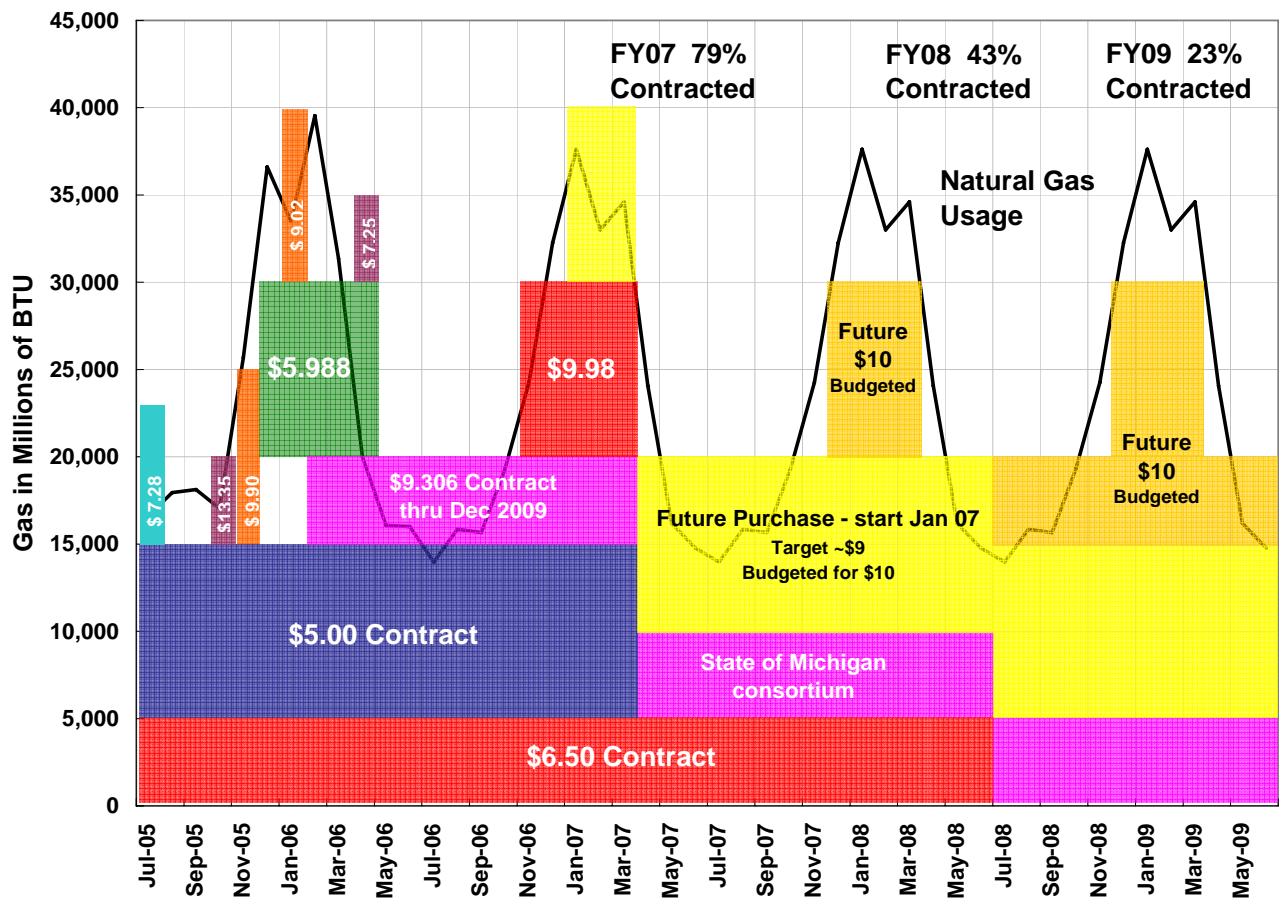
Natural gas prices continue to be volatile and continue to increase. Summertime natural gas NYMEX future prices are remain in the range of \$7-\$8 per million BTU and wintertime future prices have been fluctuating between \$10 and \$11 per million BTU. Prices are not expected to fall substantially. Events such as large hurricanes or other gas (or petroleum) supply disruptions will continue to wreak havoc on the market.

Multiple, forward looking purchases have been very helpful to hold down costs, minimize risk, and provide fiscal year budget stability. Below, Figure 5, is an illustration of the University's gas purchases, their cost, and duration. The different colored blocks represent individual purchase contracts. Multiple blocks are layered in at different times to supply the total gas needs represented by the black line. In addition to independent

purchases through our own retail gas marketers, we have recently entered into a four year purchase with the State of Michigan energy purchasing consortium.

Facilities Management continually monitors the energy futures markets and corresponds with several industry consultants to make prudent gas purchases.

Presently, firm gas contracts have been obtained for 79% of FY07, 43% of FY08, 22% of FY09, and 10% of FY10, as shown below. The two shades of yellow represent two future gas purchases that are being watched. All of the natural gas expense estimates contained in this report are based on existing contracts, or the \$10 per million BTU budget figure depicted here.



**Figure 5 Natural gas purchase contacts (prices are in dollars per million BTU)**

The net result of these purchases has delayed the major increases in gas cost, but the trend continues to escalate. The monthly gas unit price, with a twelve month moving average, is illustrated below in Figure 6.

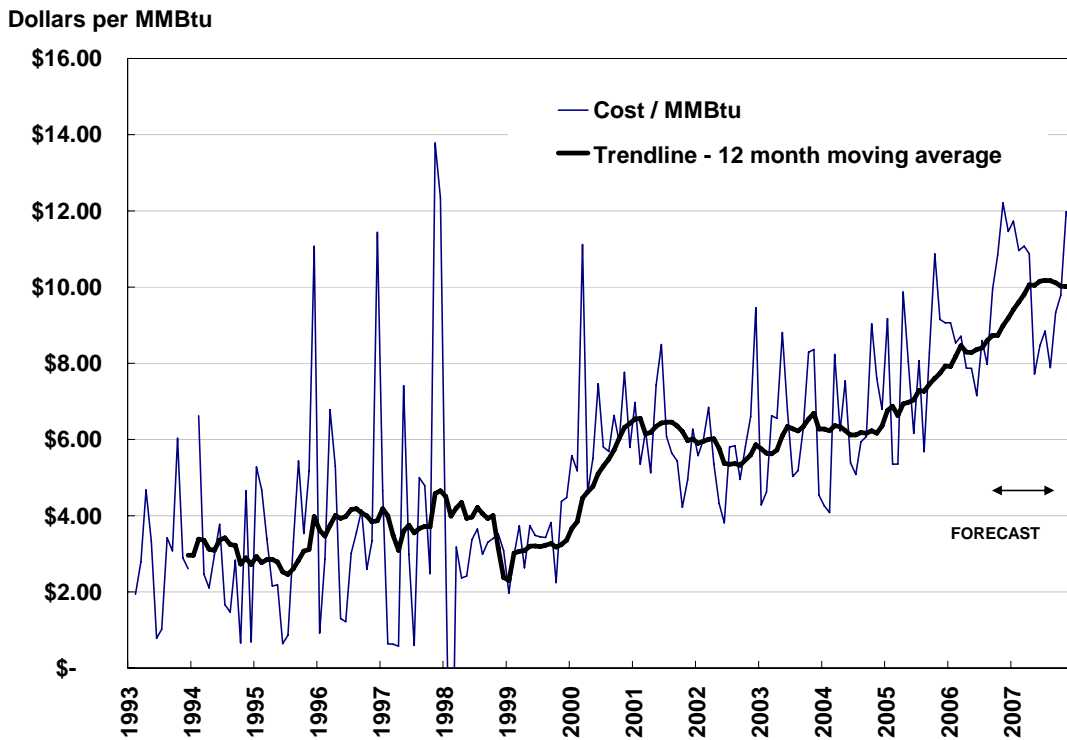


Figure 6 Monthly natural gas unit price in dollars per million BTU

### HISTORICAL USAGE & COSTS

Figures 7, 8, and 9 illustrate the monthly utility usage and resulting trends over the past decade.

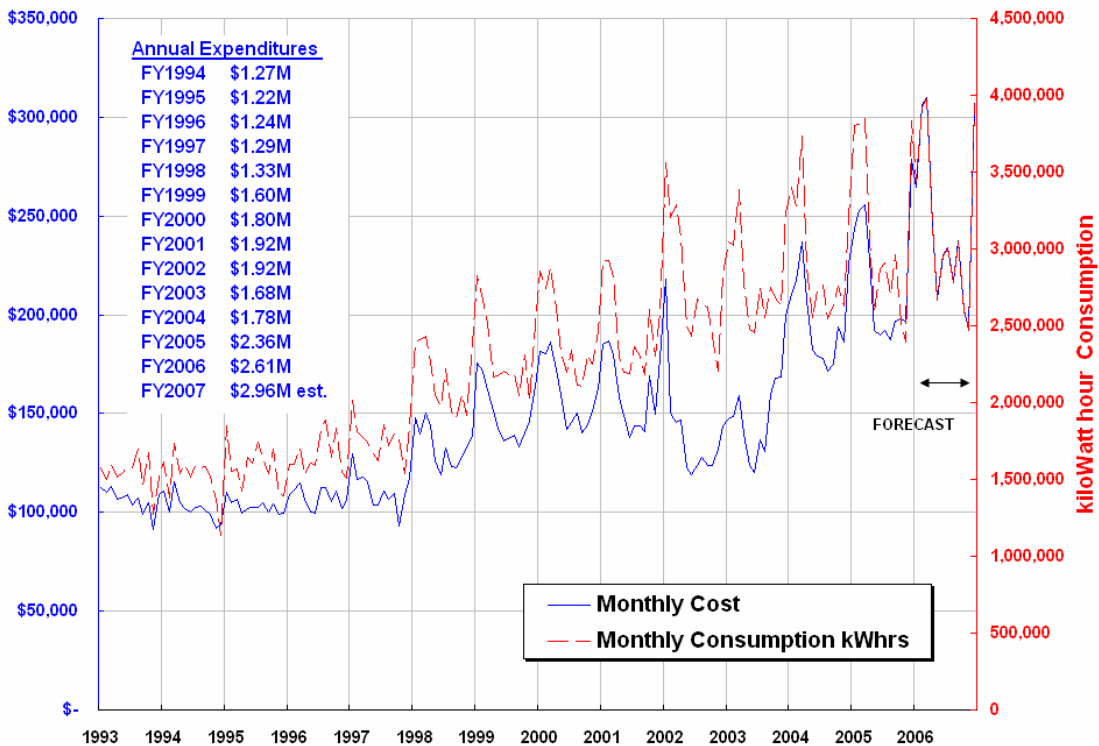
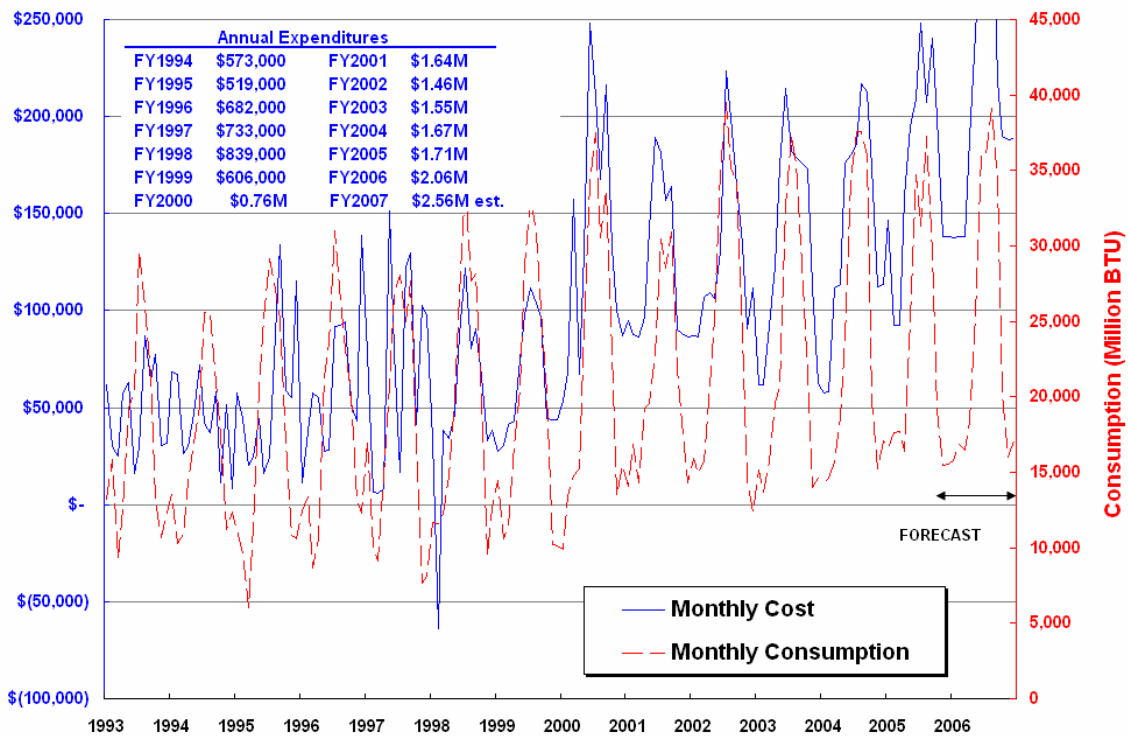
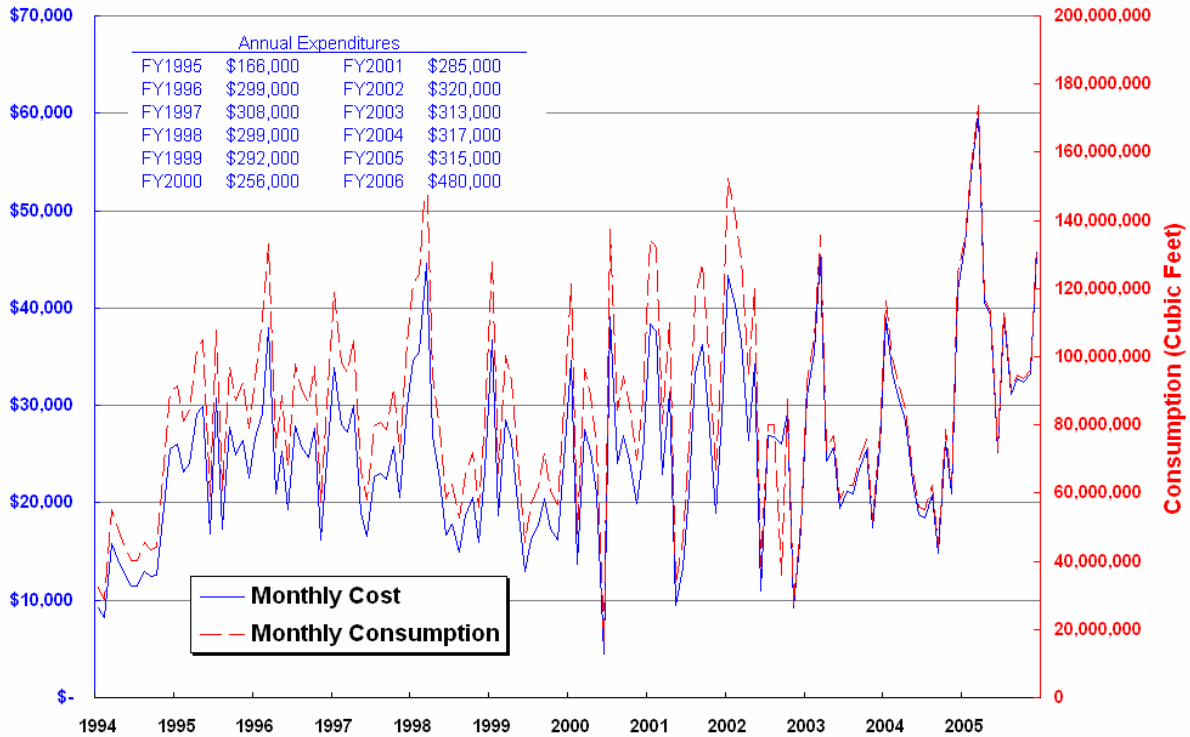


Figure 7 Main campus monthly electrical cost and consumption for a decade



**Figure 8 Main campus monthly natural gas cost and consumption for a decade**



**Figure 9 Main campus monthly water & sewer cost and consumption for a decade**