

**Oakland University**

**Annual Energy Report**

**Fiscal Year 2005**

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## EXECUTIVE SUMMARY

Utility consumption increased in FY05 by a modest 4.1% in electricity and 5.8% in natural gas, but overall utility costs increased by 17.7%, or \$662,000. This figure correlates well with the estimated 17% increase reported in last years Energy Report.

The vast majority of this increase was due to a 26.3% increase in the electric rate (dollars per kWhr). Oakland University's venture into the electrical Retail Open Access market expired in August of 2004, losing the substantial savings that had been enjoyed for the previous 24 month period. Additionally, the Michigan Public Service Commission ruled in a significant rate case (U-13808), effectively increasing our Detroit Edison electric rate by 7%.

Natural gas cost and usage both increased a modest 6.2% and 5.75%, respectively, for FY05 as compared to the previous year.

For the current fiscal year, FY06, the overall budget was increased by 8.2%. The budget includes utility expenses as well as some operational expenses. Estimates for FY06 utility expenditures are for a 7.1% increase over FY05. Our present FY06 utility budget will cover this increase, and no further funding will be required.

All energy markets have risen substantially in recent months. Natural gas trading continues to be volatile and on the rise. As of August 23, 2005, natural gas prices on the New York Mercantile Exchange are at an all time historical high at nearly \$11.00 per million BTU for winter contracts. Although, the forward looking gas purchase strategy has protected the University from significant cost increase for FY05 & FY06, future purchases, if made in today's market conditions, will increase the FY07 budget by over \$850,000.

Lastly, a second energy services agreement, which proposes to tackle approximately 50 deferred maintenance and energy savings projects, is being scheduled for presentation to the Board of Trustees. Only a modest amount of energy savings potential was found due to our relatively new and efficient campus.

## RATE INCREASES CONTINUE TO DRIVE UP UTILITY COSTS

Although the Board re-approved the electrical retail open access program, energy markets have not been favorable. The electrical supply market has been high along with the associated fuel cost of coal, oil, and natural gas. Therefore, we have been unable to return to Retail Open Access, or purchasing electricity from an alternate supplier. Oakland University has returned to full service from Detroit Edison since August of 2004. This has resulted in a 26.3% increase in our electric rate (as shown in Table 3 below) and a 31.1% overall increase in electric cost (as shown in Table 1), or approximately \$560,000 for FY05 as compared to FY04. Detroit Edison electric rates are anticipated to rise slowly over time, but no significant changes are expected in the next few years.

In addition to rising electric rates, the natural gas market has been extremely volatile along with other energy commodities like crude oil. Both gas and oil prices are at all time historical highs. Since the first gas price hike of FY01, the University has been contracting for future gas needs in multiple, layered purchases. This has protected OU from any immediate price shocks, and has resulted in significant cost savings. However, as future contracts are needed for FY07, FY08, and beyond, the University will see substantial increases in gas heating costs unless an alternative fuel supply can be found. In the face of a skyrocketing market, Oakland University's annual gas cost increase was kept to a modest \$100,000 between FY04 to FY05, and under \$100,000 between FY05 and FY06. This is projected to result in a total expenditure increase of 7.1% for FY06 (as shown in Table 4).

However, if markets remain at their present levels, we could expect to see an additional \$830,000 for FY07 for gas cost alone, or approximately \$1M in total utility increase for the year. (see Table 5 below)

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

	<b>FY05 Usage</b>	<b>Units</b>	<b>% Change from FY04</b>	<b>FY05 Cost (Millions)</b>	<b>% Change from FY04</b>
<b>Electricity</b>	35,112,560	kW hours	+4.05%	\$ 2.36	+31.1%
<b>Natural Gas</b>	284,636	MMBTU	+5.75%	\$ 1.71	+6.2%
<b>Water &amp; Sewer</b>	9,412,000	Cubic Feet	+0.10%	\$ 0.315	+0.0%
<b>TOTALS</b>				<b>\$ 4.39</b>	<b>+17.7%</b>

*MMBTU = one million British thermal units (approximately = 1 MCF = thousand cubic feet)*

*Note: This data is for the main campus only, the general funded east campus utilities are less than 1% of the main campus totals.*

Weather effects were not significant as seen by the heating and cooling degree data in Table 2. Heating and cooling degree days are a measure of the deviation from a mild 65 deg F outdoor air temperature. The past two winters have been relatively mild, but the summer of FY05 was warmer than average.

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

	Average	FY04	FY05	% Change
Heating Degree Days	6,444	5,967	6,126	+2.7%
Cooling Degree Days	736	713	767	-5.2%

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>.

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

	FY05 Unit Cost	Units	% Change from FY04
Electricity	\$ 0.0675	per kW hour	+26.3%
Natural Gas	\$ 6.0180	per MMBTU	+4.5%
Water & Sewer	\$ 0.0335	per Cubic Feet	+0.0%

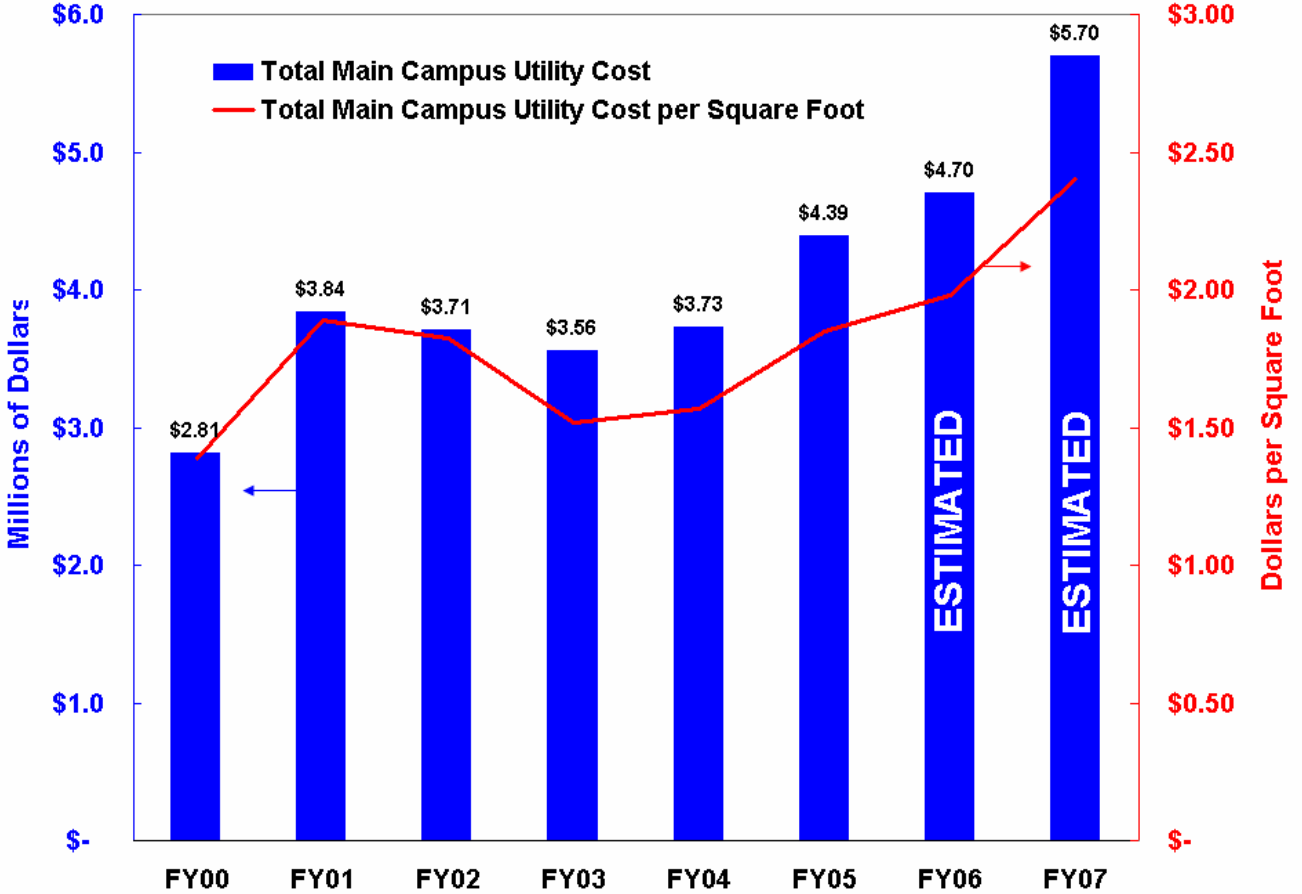
**Table 4 PROJECTED FY06 utility usage & cost with comparisons to FY05**

	FY06 Projected Usage	Units	% Change from FY05	FY06 Projected Cost (Millions)	% Change from FY05
Electricity	37,099,734	kW hours	+5.66%	\$ 2.57	+8.9%
Natural Gas	287,680	MMBTU	+1.07%	\$ 1.80	+4.8%
Water & Sewer	9,412,000	Cubic Feet	+5.00%	\$ 0.33	+5.0%
<b>TOTALS</b>				<b>\$ 4.70</b>	<b>+7.1%</b>

**Table 5 Extended Projections for FY07 utility usage & cost**

	FY07 Projected Usage	Units	% Change from FY06	FY07 Projected Cost (Millions)	% Change from FY06
Electricity	38,954,721	kW hours	5.00%	\$ 2.73	+5.9%
Natural Gas	295,576	MMBTU	2.74%	\$ 2.63	+46.4%
Water & Sewer	10,376,730	Cubic Feet	5.00%	\$ 0.35	+5.0%
<b>TOTALS</b>				<b>\$ 5.70</b>	<b>+21.3%</b>

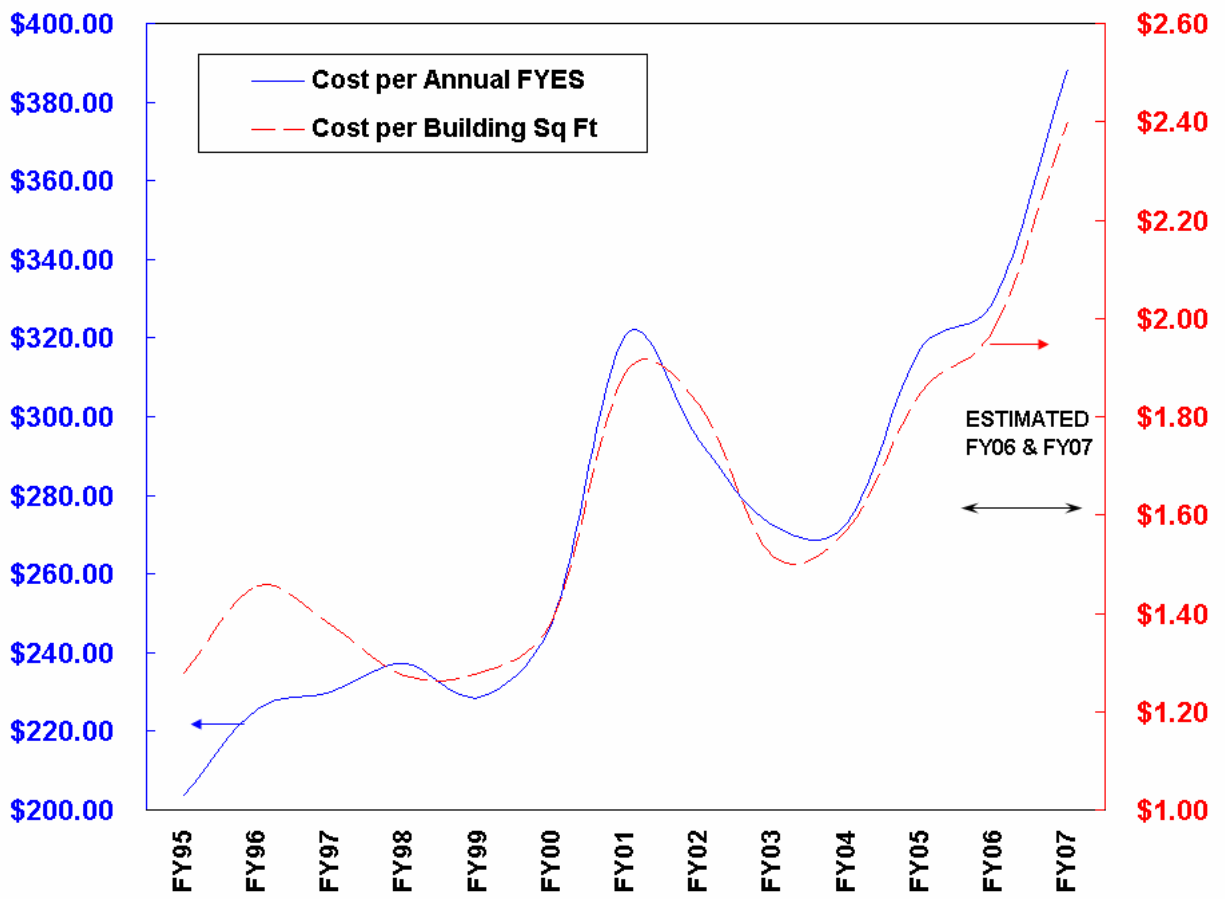
<sup>1</sup> National Oceanic and Atmospheric Administration, National Center for Environmental Prediction, [http://ftpprd.ncep.noaa.gov/pub/cpc/htdocs/products/analysis\\_monitoring/cdus/degree\\_days/archives/](http://ftpprd.ncep.noaa.gov/pub/cpc/htdocs/products/analysis_monitoring/cdus/degree_days/archives/)



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

The above chart illustrates the first natural gas price spike in the winter of FY01, the previous cost savings from the electrical Retail Open Access purchasing program in FY03 & FY04, as well as the anticipated increases for FY06 & FY07.

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.

## **INDIVIDUAL BUILDING ENERGY COST FROM UTILITY SUBMETERING**

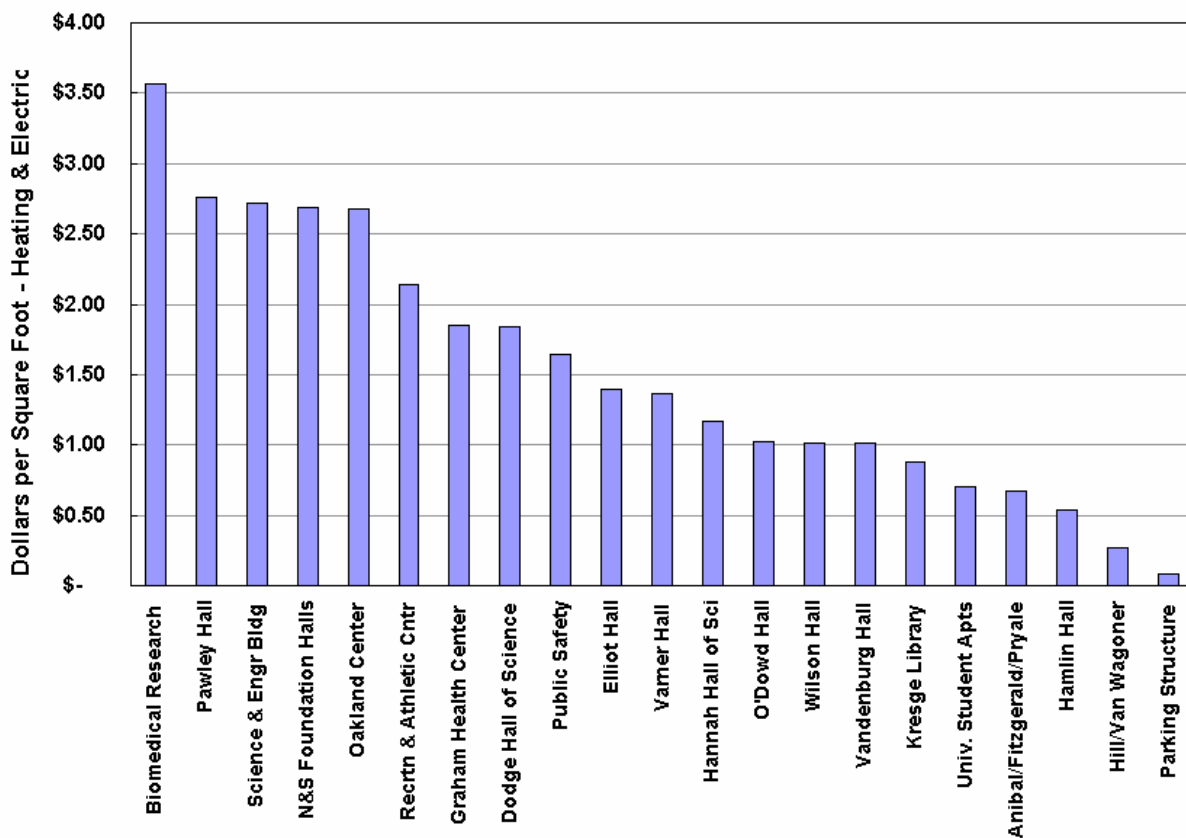
The new utility metering and monitoring system allows us to view each building's heating and electrical usage individually. The auxiliary department's facilities are also metered for natural gas and domestic water.

Figure 3 illustrates the cost per building of the combined electric and heating costs per square foot. At a glance you can immediately notice the energy intensive nature of the laboratory buildings that operate continuously around the clock. The Biomedical Research & Support Facility is ventilated by 100% outdoor air with a resulting energy penalty. The Science and Engineering Building also operates continuously and also has a large number of fume hoods and laboratory equipment.

The metering system has identified numerous areas of concern. Most point to a need to optimize the HVAC control system operations. For example, both Pawley Hall and the RAC have significant room for energy cost savings. For Pawley Hall, the original design team is presently addressing a few construction issues identified by the building metering.

To better achieve these potential savings, a dedicated control system specialist has been requested for funding to optimize systems, and utilize this metering information to realized future savings. In addition, Facilities Management is proposing a Phase II Energy Services Agreement to implement a large number of project items, many of which were identified via the utility metering system. See the Energy Services Agreement section below.





**Figure 3 Energy cost per square foot for each main campus building. Includes electrical and heating costs individually metered per building ranked from highest to lowest.**

*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*

## **HISTORICAL USAGE & COSTS**

For further illustration of the campus growth and weather correlations in comparison to utility consumption refer to the Appendix.

Figure A1 shows natural gas consumption normalized against weather effects by dividing by an index called heating degree days and buildings square footage. Heating degree days describe how many days that the outdoor temperature diverges from a 65 deg F reference point. (the higher the number, the colder the heating season)

Figure A2 shows a similar illustration but for electrical consumption and summer weather, or cooling degree days.

Figures A3, A4, and A5 illustrate the monthly utility usage and resulting trends over the past decade.

## **PROPOSED ENERGY SERVICES AGREEMENTS (ESA), PHASE II**

A separate proposal will be brought before the Board to undertake a 2<sup>nd</sup> phase energy service agreement with our selected partner, Chevron Energy Solutions (formerly Viron Energy Services).

There was found to be little to no “low hanging fruit” available for energy savings. The University is a relatively new and efficient campus, so most of what is to be proposed relates to deferred maintenance items and only a modest energy savings potential.

Please refer to the separate BOT agenda item for additional information.

## ELECTRICAL PURCHASING UPDATE & COGENERATION

The University's twenty-four month contract with the alternative electric supplier, Quest Energy LLC, ended in July of 2004. Since that time, Oakland University has returned to full service with Detroit Edison.

The Retail Open Access electric market has not been favorable for a return to an alternate electric supplier. Additionally, the Michigan Public Service Commission finally ruled on rate case U-13808 adding additional costs to both our Detroit Edison tariff and the Retail Open Access tariff, or Electric Choice under DTE.

In light of this, we are investigating different rate structures such as transmission level voltage, interruptible service D8, interruptible rider R10, and independent power production by Oakland University directly, or cogeneration.

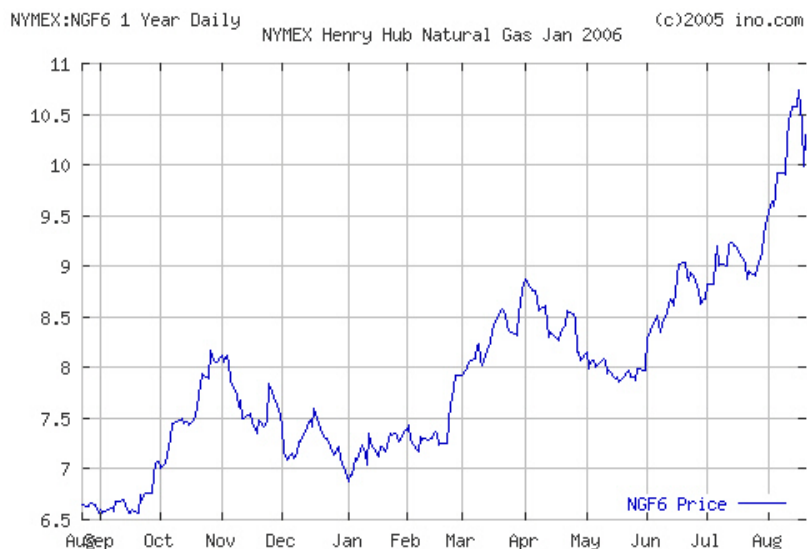
Cogeneration is one of most efficient solutions for the University utility operations, but present natural gas prices do not make this project attractive at the present. If gas prices ease, and the University can obtain a long term gas contract in the range of \$6.00 per million BTU, a cogeneration project becomes very attractive. Cogeneration would provide added boiler capacity for our growing campus, backup power upon a grid failure, a significant reduction in greenhouse gas emissions, and an overall utility cost savings for the university.

## NATURAL GAS PURCHASING UPDATE

Natural gas prices continue to be volatile and continue to increase. All energy commodities have been increasing, with petroleum prices over \$60 per barrel.

To the right is a chart illustrating the January 2006 contract price (dollars per million BTU) of natural gas on the New York Mercantile Commodity Exchange, or NYMEX. During the past year of trading for Jan06 gas, the price has risen from \$6.50 per million BTU, to nearly \$11.00 per million BTU as of August 22<sup>nd</sup>, 2005 when this chart was captured.

Although summertime gas futures are presently in the upper \$8 range, these averaged prices still yield 12-24 month gas contracts in the range of \$9 per million BTU. Historically, Oakland University has enjoyed gas prices in the \$3-4 range until the winter of 2000/2001. See Figure 4



below. Forward purchasing of future fiscal years since early 2001 has resulted in budget protection and gas cost savings to the University.

Presently, firm gas contracts have been obtained with BP Canada for

- 88% of FY06
- 34% of FY07
- 21% of FY08
- 0% of FY09

Recent market conditions have delayed additional purchases. On the advice of numerous consultants, we are taking a cautious and patient approach at the present time regarding additional contracts. The activities of the State of Michigan gas purchasing consortium are also monitored and considered. If prices break, serious consideration should be given to longer term contracts, perhaps in the 5 year range. Alternate fuel sources are also being investigated such as biomass, bio-oils, and other potential sources for the long term.

Dollars per MMBtu

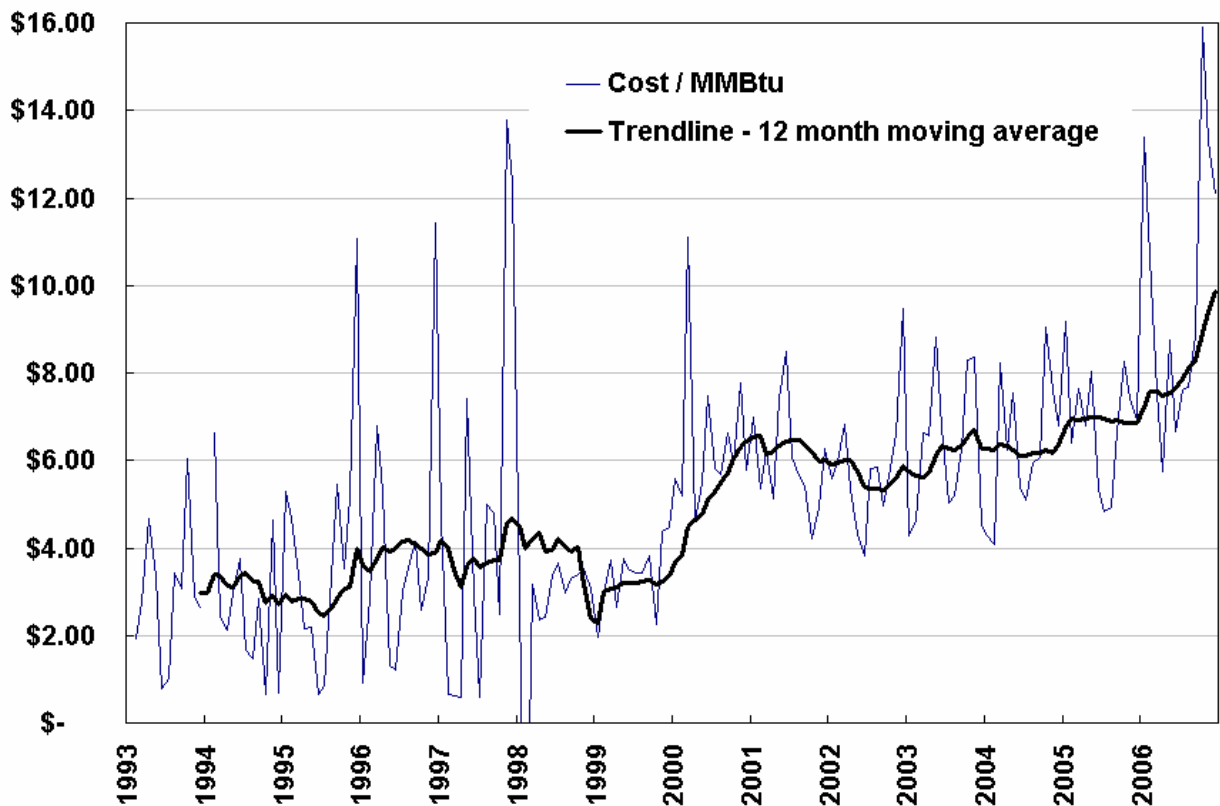
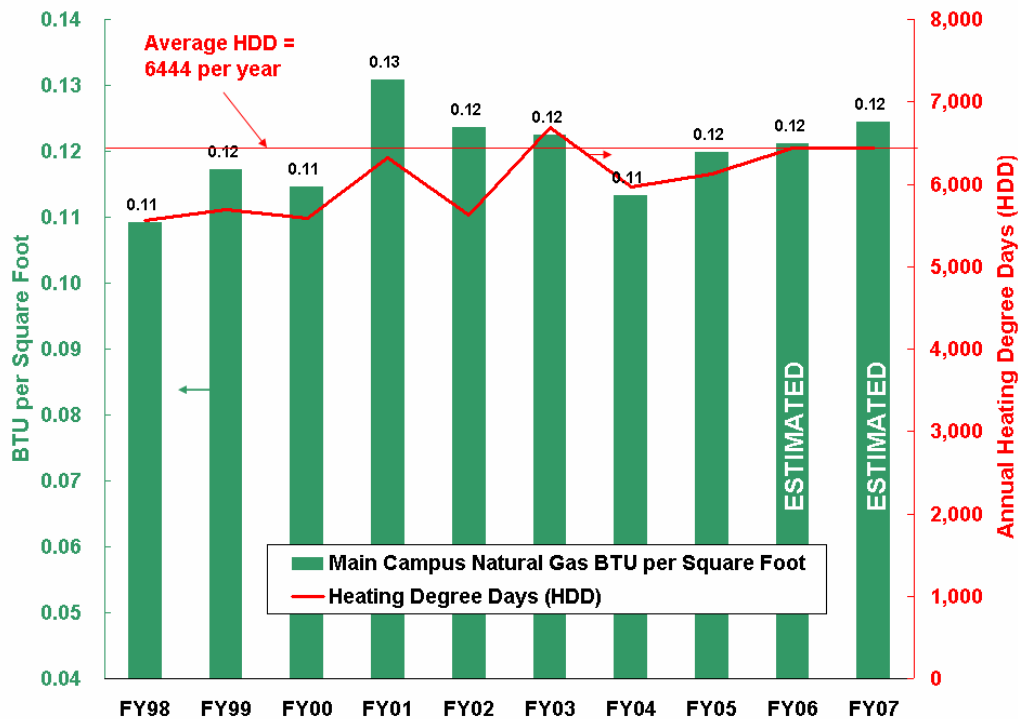


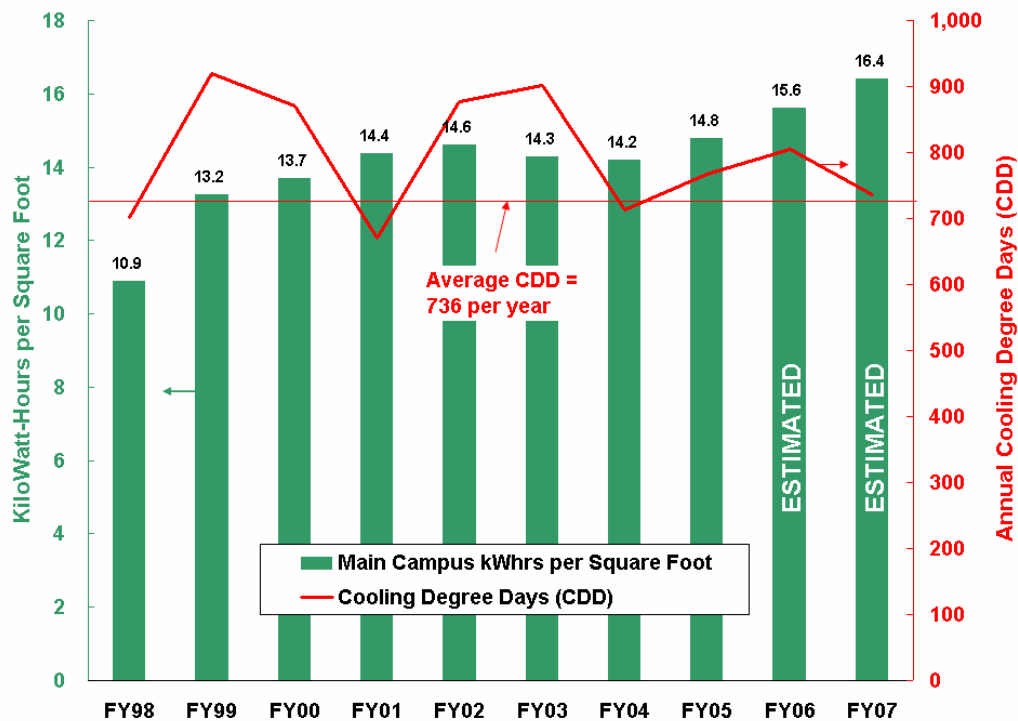
Figure 4 Monthly natural gas unit price in dollars per million BTU

## APPENDIX – HISTORICAL TRENDS



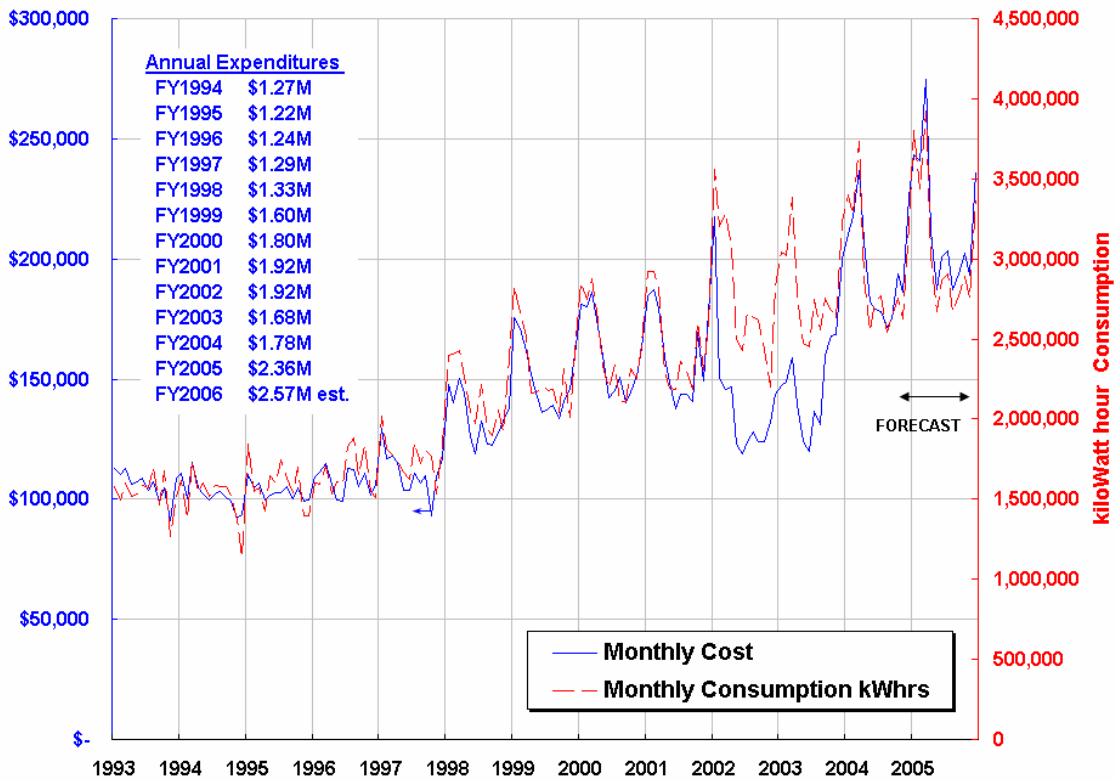
**Figure A1** Main campus natural gas consumption in BTU per square foot, shown with heating degree days (HDD)

*HDD = (65 – Daily Average Temperature) for each day measured at Detroit Metro Airport*

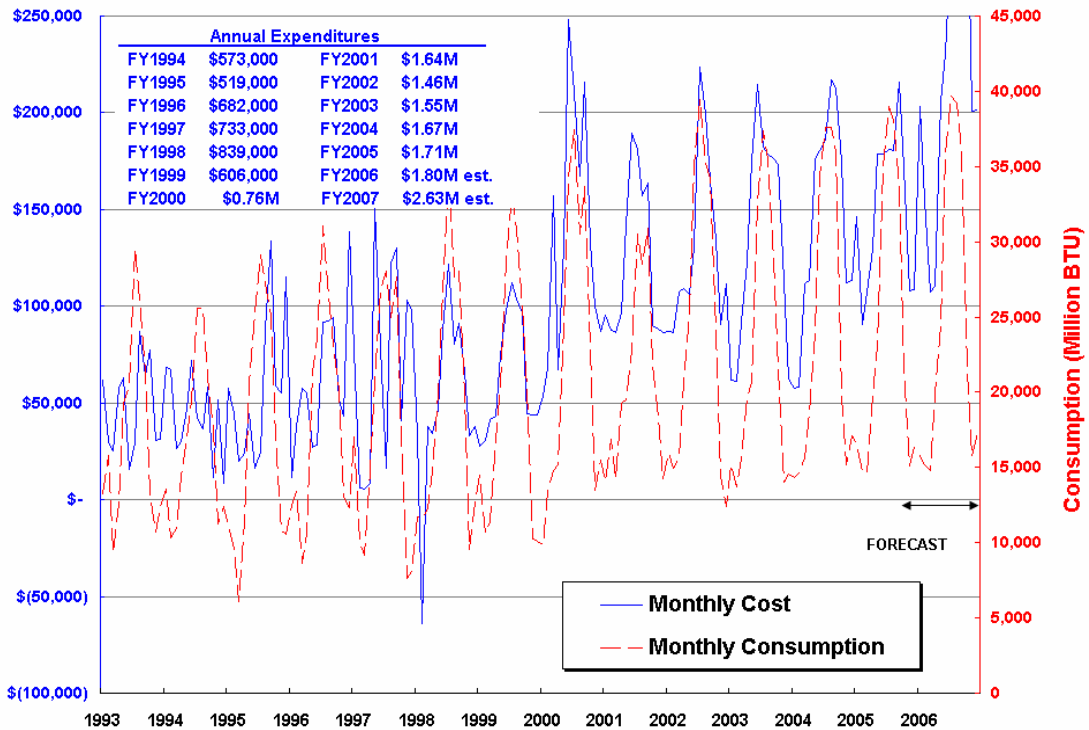


**Figure A2** Main campus electrical consumption per square foot, shown with cooling degree days (CDD)

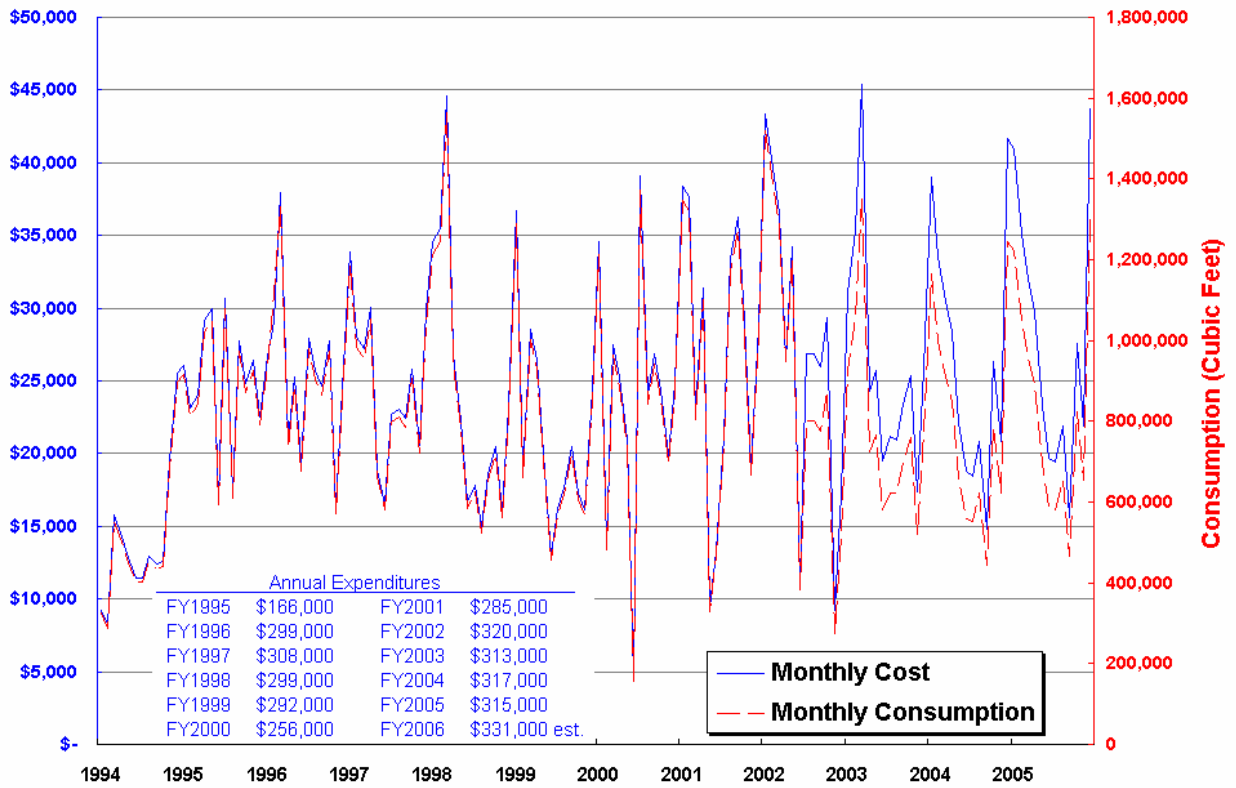
*CDD = (Daily Average Temperature - 65) for each day measured at Detroit Metro Airport*



**Figure A3 Main campus monthly electrical cost and consumption for a decade**



**Figure A4 Main campus monthly natural gas cost and consumption for a decade**



**Figure A5 Main campus monthly water & sewer cost and consumption for a decade**