

STRATEGIC BUSINESS ANALYSIS FOR UBC UTILITIES

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ABSTRACT

This paper presents a strategic business analysis for the utilities department, UBC Utilities, at the University of British Columbia (UBC).

UBC Utilities provides electricity, water, natural gas, steam for heating and sterilization, water supply and distribution, and waste water services to the university. UBC's major focus is on education and research; it considers UBC Utilities an undesirable risk and has the intention of privatizing UBC Utilities to minimize that risk. This paper analyzes comparable utility functions at a number of locations in Canada and the US; assesses UBC Utilities' competencies; considers factors influencing its effectiveness; and investigates options and then makes suggestions to improve the viability of UBC Utilities and increase its attractiveness for sale.

DEDICATION

This project is dedicated to my family, to my friends and to Ed Bukszar for their encouragement, curiosity and humour in helping me through the development of this project.

ACKNOWLEDGEMENTS

I wish to acknowledge the courtesy extended to me by the staff at the various utility plants during our in-person and telephone interviews.

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GLOSSARY

BCUC	British Columbia Utilities Commission
CHP	Combined Heat and Power is district heating, district cooling and cogeneration, and is a way of categorizing power plants
CHR	Condensing Heat Recovery
FME	Financial Management Enterprise, a US-based software system for tracking purchasing, work orders and labour costs at UBC
GPO	General Purpose Operating fund
GVRD	Greater Vancouver Regional District of British Columbia, Canada
HVAC	Heating, Ventilating and Air Conditioning
IDEA	International District Energy Association, serving 700 members in 12 countries. Association members operate district energy systems owned by utilities, municipalities, hospitals, military bases and airports
LEED	Stands for Leadership in Energy and Environmental Design and is a voluntary, points-based standard for developing high-performance sustainable buildings
Lo NOx	An acronym for burners whose nitrous oxide emissions are in the range of 50 ppm or less
Market Housing	The UBC Market Housing communities include all residences on campus that are not part of the university
MCW	MCW is a leading Canadian energy services company
MMBTU	Million British Thermal Units, a measure of the heating value of natural gas
MW	Megawatt, which is 1,000 kilowatts;
MVA	Mega Volt Ampere
Tenant and Ancillaries	The UBC Tenant area includes on-campus teaching and research tenants such as the Vancouver School of Theology, National Research Council and Discovery Parks Incorporated. The Ancillaries areas include independent departments such as the Bookstore, Food Services, Recreation Housing and Conferences for student, faculty and staff housing, and Parking and Access Control Services

TREK 2000	A UBC program promoting environmental awareness and action
UEL	University Endowment Lands
ULSF	Association of University Leaders for a Sustainable Future
University Core	This is the area of UBC required to conduct teaching, associated research and the administrative areas supporting the entire university

Note: All currency values in this report are stated in Canadian dollars.

1 INTRODUCTION

1.1 UBC and UBC Utilities Overview

The University of British Columbia (UBC) is Canada's third largest university by student population, with 43,000 students enrolled. Incorporated in 1908, the university began development at its current location in 1915; it opened in 1925 and is now a global centre for research and learning. UBC's main campus is located at the western tip of the Point Grey Peninsula, bordering on the City of Vancouver in British Columbia. UBC encompasses 402 hectares, of which 172 are developed.

UBC has stated its vision as follows:

The University of British Columbia, aspiring to be one of the world's best universities, will prepare students to become exceptional global citizens, promote the values of a civil and sustainable society, and conduct outstanding research to serve the people of British Columbia, Canada, and the world. (University of British Columbia [UBC], 2000, cover page)

UBC's (2000) mission is as follows:

The University of British Columbia will provide its students, faculty, and staff with the best possible resources and conditions for learning and research, and create a working environment dedicated to excellence, equity, and mutual respect. It will cooperate with government, business, industry, and the professions, as well as with other educational institutions and the general community, to discover, disseminate, and apply new knowledge, prepare its students for fulfilling careers, and improve the quality of life through leading-edge research. The graduates of UBC will have developed strong analytical, problem-solving and critical thinking abilities; they will have excellent research and communication skills; they will be knowledgeable, flexible, and innovative. As responsible members of society, the graduates of UBC will value diversity, work with and for their communities, and be agents for positive change. They will acknowledge their obligations as global citizens, and strive to secure a sustainable and equitable future for all. (p. 2)

UBC's (2000) "People Strategy" is a major guiding principle for UBC Utilities:

To provide the best possible environment for all members of the campus community. To continually review and enhance the quality of UBC physical environment – its buildings, academic facilities and natural setting – to ensure that all members of the UBC community have the best possible surroundings in which to live, work and play. (p. 6)

UBC's utility infrastructure is managed by UBC Utilities, a separate operating unit within UBC's Land and Building Services department. UBC Utilities and its staff of 55 union and management employees are located at 2040 West Mall, near the centre of the academic core of the campus. This building is also known as the Power House or Steam Plant.

The UBC Utilities staff work closely with the staff in Plant Operations, a parallel operating unit within the Land and Building Services department, as shown in Figure 1.1, to provide the full range of utility and building services to the campus. UBC Utilities provides distribution services and Plant Operations provides reticulation services inside each building.

1.2 UBC Utilities' Mission and Vision

UBC Utilities (n.d.) has articulated its vision and mission as follows:

UBC Utilities is an entrepreneurial ancillary unit of the University of British Columbia, and a member of the Land and Building Services family. Our sole mission is to support the realization of the TREK 2000 Vision and the UBC Academic Plan by providing a basket of utility services to the campus core at the lowest cost. For other ancillary groups and UBC Tenants, we provide the same services at market rates. UBC Utilities supplies six utility services to the campus: electricity, natural gas, steam, water, and sewerage capacity for storm water and sanitary lines. (Our Operations section, para. 1)

1.3 Organization

UBC Utilities is a member of the Land and Building Services department, as shown in Figure 1.1; and UBC Utilities is organized as shown in Figure 1.2. UBC Utilities operates as a quasi-entrepreneurial

business unit; budgets are approved by the UBC Board of Governors, and the financial conditions of UBC Utilities are monitored closely by the UBC Treasury department, which is led by UBC Treasurer Terry Sumner.

Land and Building Services also encompasses Plant Operations, most often referred to as “Plant Ops,” and Plant Operations staff work closely with UBC Utilities staff in providing utility services reticulation inside each of the campus buildings, technically referred to as “plant.”

Figure 1.1 UBC Land and Building Services Organization Chart

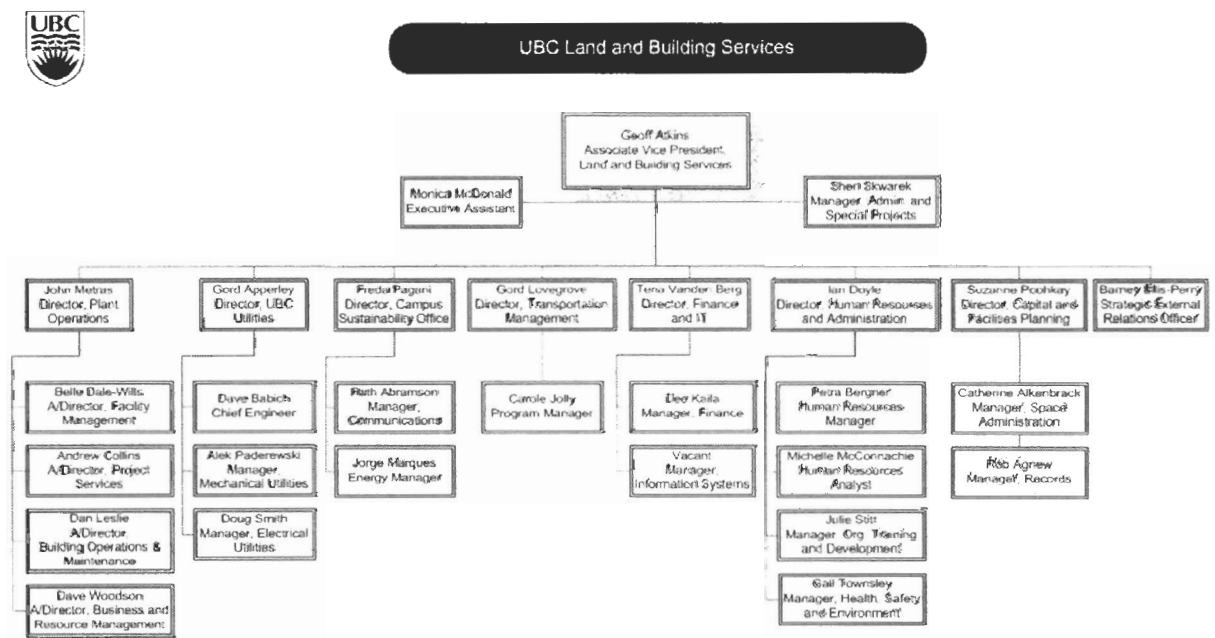
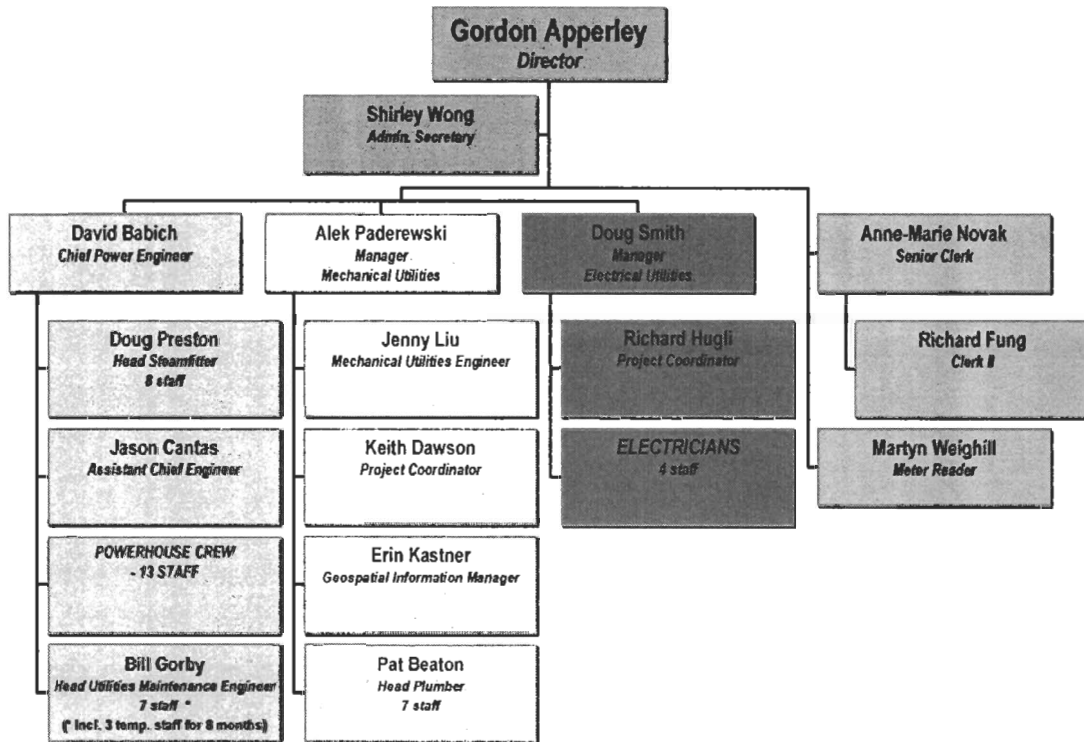


Figure 1.2 UBC Utilities Organization Chart



1.4 UBC Utilities Assets

1.4.1 The UBC Utilities Building

The UBC Utilities building was initially built in 1924 and underwent major expansion in the 1960s and 1970s to accommodate the influx of baby boomer students. The UBC Utilities building encloses the Power House, also known as the Steam Plant. As well, the offices and shops for UBC Utilities management and trade staff are located within the UBC Utilities building.

The Power House includes the four water-tube steam boilers and auxiliaries used for steam production for heating most campus academic and housing buildings bounded roughly by Wesbrook Mall, Thunderbird Boulevard and North-West Marine Drive. The boilers are from 40 to 50 years old and have utilization rates from 5% for #1 boiler to 65% for #5 boiler. The boilers are all rated for 200 psi operation and as such are not suitable for the production of high-pressure steam for electric power generation. The oldest boiler, which is #1 boiler, underwent an assessment for pressure parts reliability in 2004, and the assessment indicated that the boiler showed no significant sign of deterioration. That boiler's control system is outdated, so the boiler is typically run on base load. The other three boilers are in better condition as concerns control systems. Auxiliary equipment in the plant has also been well maintained and has been assessed at being reliable for at least another 20 years. Control and instrumentation systems are a hybrid of electronic and pneumatic systems. The systems are serviced by two contractors: one specializing in electronics, and the other servicing all of the pneumatics and some of the older electronic components.

The city-water booster pumps for the fire-water and domestic systems on campus are also housed in the Power House.

The average annual steaming rate for the UBC Utilities plant is about 100,000 pounds of steam per hour, with about 800 million pounds being produced each year in recent years. Steam flows for the 2004 calendar are shown in Appendix 1. Cost of natural gas and electricity is in the order of \$20 million per year, as shown in Appendix 2. While no formal evaluation has been made of the financial value of UBC Utilities, the writer estimates the assets would cost about \$60 million to replace.

1.4.2 Electrical Assets

The UBC campus is serviced by electrical power from BC Hydro, and the electrical power comes onto campus by two 69 KV lines into two substations. One electrical substation is at the corner of

Thunderbird Boulevard and Health Sciences Road; the other is on South Campus, that area of the UBC Point Grey campus south of 16th Avenue, near the TRIUMF accelerator building. As well, there are dual high-voltage electrical distribution systems comprising 69 KV and 12 KV lines throughout the campus and the associated electrical transformers and switch gear in electrical rooms in each building. These high-voltage electrical distribution systems include overhead cabling systems and underground duct banks and vaults, also known as manholes. Estimated asset value is \$50 million. UBC Utilities has budgetary responsibility for all electrical equipment down to the low-voltage side of all 12 KV transformers. The low-voltage systems are the responsibility of Plant Operations, as that group provides reticulation and distribution service inside each building.

1.4.3 Steam and Condensate Systems

There are 14 kilometres of underground piping that deliver steam and return condensate (condensed steam). The steam and condensate systems were also originally built in 1924 and have been upgraded numerous times over the years. Major upgrades were made in the 1960s and 1970s, and several new additions have been made since 2002 to accommodate the \$2 billion worth of construction that is under way and planned for the campus. Most buildings are not currently fitted with steam-flow meters, as there was originally no intention to charge for steam used in academic buildings; however, there is a program currently under way to install meters in each building receiving steam from the system. Estimated replacement cost for the steam and condensate system is \$50 million.

1.4.4 Natural Gas Systems

The natural gas system on campus receives natural gas at a pressure of about 100 psi from the Terasen system and has numerous lower pressure systems to deliver gas for use in the various buildings around campus. The bulk of the system piping is maintained by UBC Utilities staff, with Terasen maintaining the supply to the Power House. The UBC campus natural gas system is similar to that in

downtown Vancouver, with one very large consumer and many small users. Natural gas is used primarily for building heat, and consumption is largely seasonal.

1.4.5 Water Systems

The water distribution system comprises water supply mains of 24 inches in diameter and multiple small-diameter subsystems on the campus, all fed from the University Endowment Lands (UEL) water system. The booster pumps in the Power House receive water from the UEL system at about 60 psi, raise the pressure to about 120 psi and pump the water throughout the campus for domestic and for fire suppression systems. The system is a loop arrangement that supplies most areas of the campus with more than one direction of supply, as this set-up permits area outages for repair and upgrades.

1.4.6 Work Yard and Service Vehicles

A works yard in South Campus was set up in 2002 and is used for storage of service vehicles and equipment such as piping, pipe insulation and electrical equipment. UBC Utilities owns a fleet of 11 service vehicles, including nine vans, a backhoe and a dump truck for the repair and maintenance of the various utility systems on campus.

1.5 Services Provided

From the UBC Utilities (n.d.) website: “UBC Utilities supplies six utility services to the campus: electricity, natural gas, steam, water, and sewerage capacity for storm water and sanitary lines” (Our Operations section, para. 1).

UBC Utilities provides distribution utility services to most of the developed university property areas. Natural gas, electricity and water are all obtained and delivered under wholesale contractual agreements from Terasen, BC Hydro and the University Endowment Lands respectively. The only utility

production service is the gas-fired steam plant located near the centre of the campus core facilities. UBC Utilities does not provide chilled-water utility services to the campus, as UBC policy is not to provide air-conditioned facilities for comfort. However, those facilities that do contain chilled-water systems utilize the services of Plant Operations HVAC (Heating, Ventilating and Air Conditioning) trades staff for operations, maintenance and repairs, as they provide interior maintenance services to most all buildings on campus.

UBC Utilities performs its own bookkeeping services, while accounting and human resource (HR) services are performed by Land and Building Services administration.

1.5.1 Project Management Services

Given that UBC equates fairly well to a growing, medium-sized Canadian city, UBC Utilities must maintain the utilities infrastructure, and one component of that is capital project management. The two main components of this work are large projects, those over \$50,000 in value, and smaller projects, under that value. UBC Utilities manages the large projects in keeping with UBC policy by tendering and contracting out such work with the assistance of UBC Supply Management, while projects under \$50,000 are completed by UBC Utilities staff. As well, capital projects are managed by UBC Utilities staff for quality and financial control.

Funding for capital projects totals about \$1.5 million annually and is paid out of UBC Utilities revenue. In addition to this \$1.5 million, Infrastructure Improvement Costs (IICs) have totalled between \$7 and \$13 million per year recently to accommodate the ongoing campus development. Funding for IICs is from UBC corporate sources, and not from UBC Utilities revenue.

The 2003 and 2004 IIC projects included the conversion of several electrical feeders to 12 KV from 4 KV and the 60 KV line relocation on West Mall. Typical Capital and Cyclical Maintenance

electrical projects in 2004 were the substation upgrades and 60 KV breaker upgrades. Electrical capital projects in 2003 and 2004 totalled \$4.6 million.

Capital projects for 2003 and 2004 in the steam plant and steam system totalled \$15.3 million and included a number of steam piping manhole upgrades and condensate pump and return-line replacements, as well as the Lo NOx burner project.

In 2003 and 2004, natural gas system capital projects totalled \$420,000 and included installation of trunk-line services to new residential developments at the Vancouver School of Theology and on Wesbrook Mall.

Water and sewer system capital projects in 2003 and 2004 totalled \$2.1 million and also focused primarily on upgrades for the recent and upcoming campus expansion.

The *UBC Utilities: 2005/2006–2009/2010 Five-Year Business Plan* (Apperley, 2005b) includes \$5.5 million worth of capital projects for 2006.

Natural Gas Distribution: The UBC campus has 24 kilometres of gas lines running throughout the campus. Many buildings, particularly those outside the University Core, use natural gas for space heating and for hot water. UBC Utilities plumbers and gas fitters maintain this natural gas distribution system.

Water Distribution: UBC Utilities provides the UBC campus with in excess of 200 million cubic feet of water annually. UBC Utilities purchases water from the Sasamat Reservoir through a purchasing agreement with the University Endowment Lands, and resells this water to campus occupants and tenants via a distribution system throughout the campus. UBC Utilities plumbers perform maintenance and system upgrade work throughout the campus. Also, weekly tests of water quality are taken from 13 locations on the water distribution mains by UBC Utilities and sent to the Greater

Vancouver Regional District (GVRD) for analysis. UBC Utilities responds to water-quality complaints through the UBC Trouble Call system.

Sewer and Storm Drains: UBC has 46 kilometres of sewer pipes and storm drains. UBC Utilities does not provide sewer treatment services but instead discharges sewerage through the GVRD, while storm water is sent off campus to the ocean through the spiral drainage tunnel located at North Campus. UBC Utilities has an ongoing monitoring program to measure the volume and quality of storm-water runoff from all major discharges.

After-Hours Trouble-Calls: Trouble calls for the campus are routed to the UBC Utilities Power House after normal business hours. The engineers on shift in the Power House determine the priority of the call and coordinate the trouble call rectification. The engineers typically handle an average of six calls per shift.

Electricity: Most of the campus electricity infrastructure is underground. UBC Utilities purchases about 200 million KW hours of power each year from BC Hydro. That power comes to campus through two 60 KV transmission lines running through Pacific Spirit Park. The most common power disturbances are line-to-ground faults, or short circuits, caused by trees falling onto power lines. UBC Utilities does not provide emergency power service to the university. Instead, most buildings are equipped with their own diesel-driven generators, and those units are maintained by Plant Operations staff.

Steam: Steam fulfils a variety of needs on campus. UBC Utilities operates a steam plant, known as the Power House, to generate steam by heating water in natural gas-fired water-tube boilers. Steam produced by the Power House in 2004 is tabulated in Appendix I. The steam is used to heat buildings and provide hot water for washrooms, for sterilization units and for food preparation in academic, research and student residential buildings on campus. UBC Utilities has 14 kilometres of steam lines running underground in the academic portion of the campus to more than 95 core academic buildings, Housing and Conferences' facilities, the Hospital and the Aquatic Centre.

UBC Utilities has chosen to reduce the cost of its services and to increase its effectiveness by focusing on provision of steam supply to larger consumers of steam. In this regard, UBC Utilities has discontinued steam service to a number of very small consumers on campus such as the Barn Coffee shop and the Iona Building at the Vancouver School of Theology. As well, new small buildings such as the Flex Building on West Mall have been fitted with ground-source heat pumps and as such are not connected to the UBC Utilities heating system. UBC Utilities maintains an auxiliary fuel oil system to provide an energy source in case of natural gas supply interruption. Three of the seven underground fuel oil tanks, originally designed for #6 fuel oil for use in the event of loss of natural gas supply, are planned to be upgraded for diesel oil storage in 2005 and 2006 as part of the UBC efforts to reduce environmental impact.

While the steam plant does not have a diesel-driven generator set to provide emergency power, it can operate and provide steam to the campus without electricity from BC Hydro through the use of steam turbine drives on rotating equipment. However, this system is not 100% reliable, and UBC Utilities is in the process of developing a plan to install one 0.5 MW diesel-driven generator for emergency electrical power for the steam plant as an addition to the turbine-driven system, to increase reliability.

Sustainability Function: UBC Utilities works closely with the staff of energy services company MCW and its contractors to implement the UBC sustainability initiatives. In 2003 and 2004, UBC Utilities staff were involved with a major upgrade to the steam and condensate systems in the Power House and throughout the central portion of the campus. In 2005, work is continuing on upgrading condensate return lines outside the Power House, and the UBC Utilities' maintenance engineers (UME) crew is being increased from a staff of five to a staff of eight to accommodate this work.

1.6 Metering of Services

At the time the university was originally built, individual meters were not installed on any utility services, as there was no intention to monitor or control consumption. With the continual increase in energy and utility service value, more and more meters have been installed. Most meters are manually read; however, as new meters are installed, options for remote communication are being provided.

Most Tenant and Ancillaries customers are now metered, and continued efforts have been expended to increase consumption metering to customers. Locations without meters have been identified, and meters are being installed as resources and priorities dictate. A few Tenant and Ancillary customers remain un-metered, as some are part of a larger building containing Core functions, and as the cost of installing a meter is in excess of the value of the meter. Small food stands are such cases, and consumption is estimated and billed accordingly.

1.7 Financial Performance

As shown in Appendix 2, UBC Utilities Total Revenue and Cost of Goods Sold plus Operating expenses ranged from \$26 to \$28 million in the past four years, with net income at \$944,000 in 2001/2002 and a net loss of \$133,000 in 2004/2005. The fiscal year for UBC and UBC Utilities runs from April 1st to March 31st each year. Given that total asset value is in the range of \$200 million and revenue is \$27 million, Assets Turnover is about 15%. It should be noted UBC and UBC Utilities' net tax is zero; no income tax is paid, and any General Services Taxes paid are refunded.

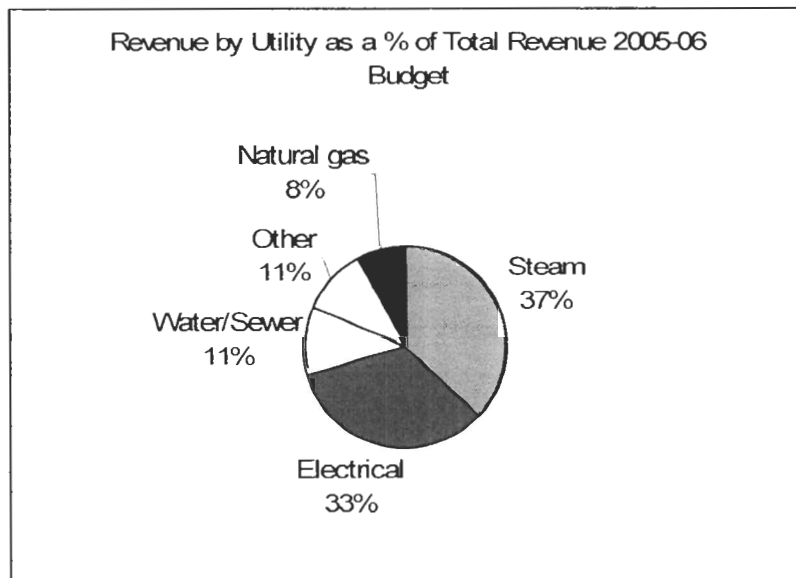
UBC Utilities' operating costs and small projects are financed from operating revenues, while large projects are funded by the government.

UBC Utilities' revenue comes from two main sources. First, it receives payment for utility services provided to the UBC Core and to UBC Tenants and Ancillaries. Second, UBC provides funds to

UBC Utilities through its Infrastructure Improvement Costs program for major utility projects on campus. The “UBC Facilities Infrastructure Management Plan” (as cited in Apperley, 2005b) indicated that deferred maintenance was reduced from \$30 million to about \$20 million in the 2004/05 fiscal year, and it is planned to be reduced an additional \$5 million in the 2005/06 fiscal year.

As shown in Figure 1.3, revenue is received primarily from sales of steam and electricity, with smaller portions of revenue from sales of water and sewer services and natural gas, and from miscellaneous sources such repair and maintenance services provided to campus facilities and infrastructure.

Figure 1.3 UBC Utilities Revenue Sources



Note. From *UBC Utilities: 2005/2006–2009/2010 five-year business plan* (p. 5), by G. D. Apperley, 2005, Vancouver, BC: University of British Columbia. Copyright 2005 by the University of British Columbia. Reprinted with permission.

Cost of Goods Sold runs about 75% of revenue and is primarily for the purchase cost of natural gas and electricity. Salaries and costs for ongoing maintenance of assets account for the bulk of other costs. Natural gas is purchased with the assistance of a broker that specializes in natural gas.

When UBC Utilities trades staff perform repair and maintenance on campus facilities not within the UBC Utilities area of responsibility, the charge-out rate is \$65 per hour. When Plant Operations trades staff perform repair and maintenance on campus facilities outside their area of responsibility, the charge rate is also \$65 per hour. UBC Utilities and Plant Operations have frequent disputes over the handling of such costs, since the \$65 per hour rate includes all costs for full cost recovery and as such is used as a way of increasing revenue.

The effect of capital projects in the past four years has been to reduce UBC's Facilities Infrastructure Management Plan from \$30 million to just under \$20 million.

1.7.1 Billing Arrangements

As detailed in Table 1.1, UBC Utilities provides University Core facilities with utility commodities at cost. In addition, UBC Utilities receives an additional \$1.57 million from the General Purpose Operating (GPO) fund to cover Core utility costs. For Tenants and Ancillaries, UBC Utilities operates at a positive gross margin by charging rates equivalent to those of other utilities operating in the Greater Vancouver area.

Table 1.1 UBC Utilities Billing Arrangements

Utility	University Core	Tenants and Ancillaries
Electricity	Cost of Purchase plus add-on for Operations and Maintenance	Same rates as BC Hydro and City of New Westminster
Steam	Cost of Purchase plus add-on for Operations and Maintenance	Cost of Purchase plus add-on for Operations and Maintenance and Depreciation
Gas	Cost of Purchase plus add-on for Operations and Maintenance	Same rates as Terasen
Water	Cost of Purchase plus add-on for Operations and Maintenance	Same rates as UEL
Sewer	Cost of sewage disposal (based on water consumption) plus add-on for Operations and Maintenance	Rate based on water consumption to recover cost plus depreciation
Storm	GPO funding	Sewer revenues and Hampton Place services levy

Note. From *UBC Utilities: 2005/2006–2009/2010 Five-Year Business Plan* (p. 12), by G. D. Apperley, 2005, Vancouver, BC: University of British Columbia. Copyright 2005 by the University of British Columbia. Reprinted with permission.

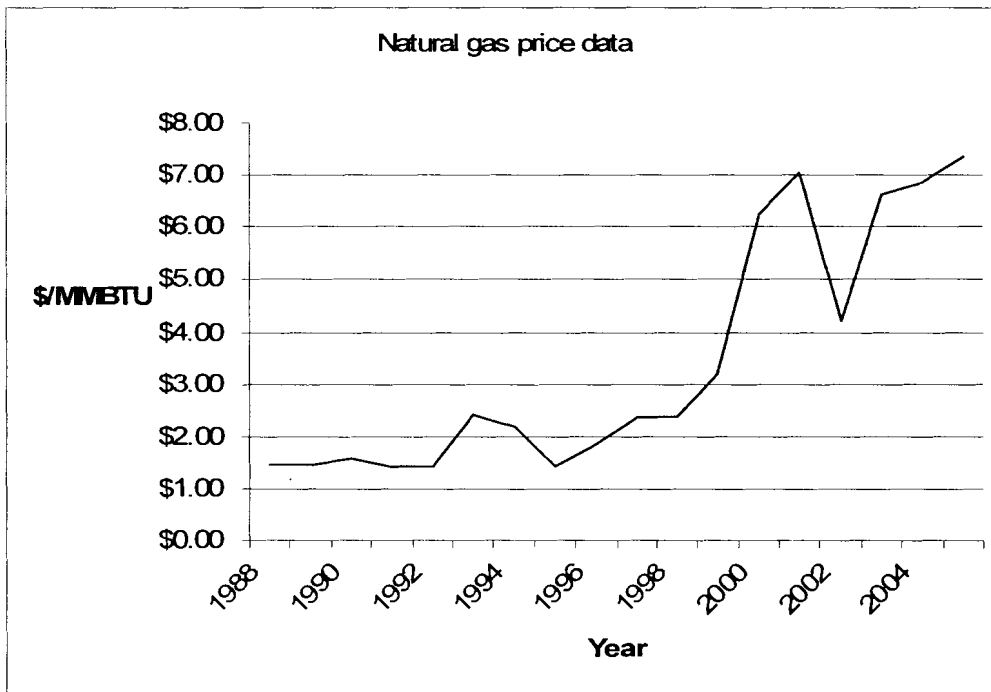
1.7.2 Utility Rates

UBC Utilities commodity rates are detailed in Appendix 3. The effect of revenues gained on commodity rate margins is to offset Core Revenues being lower than cost of services provided.

As concerns planned electricity rate increases, a major consideration in the 2004/05 fiscal year was the new electricity rate introduced by BC Hydro. If UBC had been subjected to those rates, it would have meant higher electricity costs of \$1 million per year within three years for new consumption, as well as requiring UBC to repay the \$4.5 million Power Smart grant. However, UBC Utilities intervened and was successful in having the existing lower rate maintained.

As concerns natural gas purchase pricing, commodity costs are estimated at about \$8 per MMBTU for 2005, whereas they averaged \$6.84 in 2004, \$6.61 in 2003 and \$4.22 in 2002, as shown in the gas pricing in Figure 1.4.

Figure 1.4 Natural Gas Prices 1988 to 2005¹



UBC Utilities' water rates are as shown in Appendix 3 and reflect rates as charged by the UEL to UBC Utilities. Water utility rates charged by the GVRD increased by 13.5% for 2005, and a further 13.5% rate increase is planned for 2006.

1.7.3 Budgeting Process

The budgeting process for UBC Utilities involves the Director and each manager reviewing the previous year's performance, considering areas for improved performance and assessing the upcoming year's projects and operating issues. Projected costs for the next year are then entered into the UBC Financial Management Information System, and the budget is submitted to the UBC Finance Department and then to the Board of Governors for review and approval. However, each year difficulties arise when determining up-to-date costs, since it takes about 45 days for costs to be received from the record-keeping systems.

¹ Data provided by Ken Fuhr of Avista Energy in May 2005.

The UBC Utilities bookkeeping and accounting systems comprise a number of systems. FME (Financial Management Enterprise), a US-based computerized purchasing and accounting system, is used campus-wide for Supply Management and Work Orders, UBC's Financial Management Information System is used for budgeting purposes, and personalized Excel spreadsheets are used by UBC Utilities staff for tracking financial items.

1.7.4 Profit Motive

While UBC Utilities' provision of services to University Core buildings is not fully compensated for on a fee-for-service basis, UBC Utilities benefits financially from selling commodities to Tenants and Ancillaries. Most of the financial benefit is used to supplement the under-funding by the University Core for operations, maintenance and repair expenses. With the growth in academic core buildings in recent years, and with the provision of additional supporting infrastructure, Core costs are increasing without an offsetting revenue source. To solve this problem, UBC Utilities will change the pricing guideline currently applied to the University Core. Using a phased-in approach, over the next three years starting in the 2006-07 fiscal year, the University Core will be charged a net 4.7% increased utility rate above the cost of the utility. This increase is expected to eliminate the need for the fixed annual Operations and Maintenance subsidy of \$1.5 million. At the same time, UBC Utilities will move to separate rates from those set by outside utility providers for UBC Tenants and Ancillaries, thereby allowing for full recovery of UBC Utilities' costs and providing for a positive net annual return.

In those years where revenue is in excess of annual operating expenses, it is re-invested in utility infrastructure. However, in the fiscal year 2003/04, Tenant and Ancillary revenues were not sufficient to provide the full subsidization of Core utility services; thus, \$2.2 million was provided from the GPO fund.

UBC Utilities trades staff members do not share the same focus on the profit motive as does the management team. Daily work activities are executed from the perspective of accomplishing the task or

project at hand, and there is no awareness of current costs to complete the task, or the longer term costs of running the department. As well, staff do not exhibit an ongoing interest in meeting budgets or working to create a profit for the department.

1.8 The Market for UBC Utilities Services

UBC Utilities provides services solely to UBC's Point Grey campus, and is not associated with UBC's downtown Vancouver or Okanagan campus. UBC's Point Grey campus building space, including residences and the "on-campus" hospital, is more than 1.1 square metres (11 million square feet). The university is currently undergoing a major construction program, with more than 40 new buildings under construction; this program is expected to add 0.33 million square metres (3.6 million square feet) of space. UBC Utilities provides utility services to the approximately 40,000 students and 10,000 employees on the UBC campus.

The two main market groups are known as Core and Tenant/Ancillary. A third smaller and new market for UBC Utilities services is Market Housing, which subscribes to all utility services except steam.

As shown in Table 1.2, the Core covers most of the university and includes all academic and non-business-oriented departments. University Core utility services are funded from the university's GPO fund. Commodities have historically been supplied to the Core at the cost of commodity purchase.

Table 1.2 UBC Utilities 2004/2005 Fiscal Year Revenue Source Split

	UBC Core		Tenants and Ancillaries	
	Consumption as % of Total Consumption	Revenue (000's)	Consumption as % of Total Consumption	Revenue (000's)
Electricity	38%	\$3,782	62%	\$6,167
Steam	73%	\$7,732	27%	\$2,892
Gas	27%	\$670	73%	\$1,792
Water/sewer	51%	\$1,651	49%	\$1,582
Totals		\$13,835		\$12,433

Note. From *UBC Utilities: 2005/2006–2009/2010 Five-Year Business Plan* (p. 9), by G. D. Apperley, 2005, Vancouver, BC: University of British Columbia. Copyright 2005 by the University of British Columbia. Reprinted with permission.

1.9 UBC Utilities Staff

The Management and Administration staff in UBC Utilities comprise 55 union and management employees.

As shown in Figures 1.1 and 1.2, the management team of UBC Utilities consists of a director, two technicians and three managers, and the Director reports to the Associate Vice-President for Land and Building Services. The Director is responsible for the financial and operational effectiveness of UBC Utilities. Three of the support staff also report to the Director. The managers – one electrical engineer, one mechanical engineer and one power engineer – have responsibility for managing the trades support staff.

The support staff numbers eight and consists of a receptionist, a project planner, a mechanical design engineer, an electrical technician, a geo-spatial information technician, an accounts receivable clerk, an accounts payable clerk and a meter reader. As well, UBC Utilities typically utilizes two part-time professional engineers and one engineering student to assist with administrative and engineering duties.

There are 41 trades staff members in UBC Utilities, comprising the following:

Electricians: The four electricians maintain the high-voltage electrical distribution system around the campus. As with other UBC Utilities trades staff, they also perform small system upgrade projects within the guidelines of UBC policy. The electricians are members of the Canadian Union of Public Employees (CUPE), Local 116 and they work a seven-hour day and a five-day week on dayshift. Emergency and after-hours work is on an overtime basis as set out in the CUPE collective agreement. The crew consists of three electricians supervised by a head electrician and respond to after-hours trouble calls on the high-voltage electrical system around the campus. The electricians operate and maintain the high-voltage system throughout the campus.

Steamfitters: In a similar manner to the electrical crew, the Head Steamfitter supervises the six steamfitters, who perform mechanical maintenance and undertake small capital projects, typically budgeted under \$50,000 per project. The steamfitters are also members of CUPE Local 116; they work a seven-hour day and a five-day week on dayshift. The steamfitters maintain steam and condensate equipment that is owned by UBC Utilities and allowed for in the UBC Utilities budget. For steam systems, the jurisdictional limit is up to but not including the pressure reducing valve inside each building. UBC Utilities is responsible for the system up to but not including the pressure reducing valve, and Plant Operations is responsible for the pressure reducing valve and all equipment downstream of it. For condensate systems, UBC Utilities has a budget and responsibility for the condensate collection tanks in all buildings and the return piping back to the Power House. The steamfitter crew provides piping fabrication services for the steam and condensate systems, with the assistance of a contract welder.

Plumbers: The six UBC Utilities plumbers are also members of CUPE Local 116 and work a seven-hour day and a five-day week on dayshift. As with other trades staff, a head plumber oversees the detailed work of the trades in his area. These trades staff operate and maintain the UBC Utilities water distribution system around the campus up to the isolation valve at each of the buildings supplied with

water and natural gas by UBC Utilities. As with all trades staff, the plumbers maintain utility equipment that is owned by UBC Utilities and allowed for in the UBC Utilities budget. For water and gas systems, the jurisdictional limit is the first valve inside each building.

Power Engineers: UBC Utilities includes two groups of power engineers: one group to operate and maintain the Power House and one group to operate and maintain the steam distribution and condensate collection systems. They are members of the International Union of Operating Engineers (IUOE), Local 882 and work a nine-day fortnight as agreed to in the collective agreement.

- The operating crew looks after the operation of the plant. The operating crew comprises 12 full-time and one part-time staff. Two power engineers are on shift at all times throughout the year on rotating eight-hour shifts. A British Columbia Institute of Technology (BCIT) student also works three months each summer in the Power House, to gain experience for continued studies. As the plant must be maintained at all times by qualified staff as set out in the Safety Standards Act (2005) of BC, coverage of absence for sickness involves payment of considerable overtime.
- The crew of five utilities maintenance engineers (UMEs) operates and performs routine maintenance on the steam and condensate systems outside the Power House up to the point of reticulation inside each of the buildings supplied with steam. These five engineers work an eight-hour day on dayshift. After-hours call-outs for work on the distribution system are carried out by the UME crew.

The duties and responsibilities of the power engineers are determined to a great extent by the BC Safety Authority, previously known as the Boilers Branch of the BC Provincial Government. To maintain public safety, the Safety Standards Act (2005) stipulates that that the operation and maintenance of the UBC Power House is the responsibility of a First Class Power Engineer, and that the plant be operated and maintained under the direction of one Second Class and one Third Class Power Engineer at all times.

1.10 Business Affiliations and Networking

UBC Utilities staff are actively involved in a number of associations and business groups, including the International District Energy Association, the Lower Mainland Large Gas Consumers Association, the Independent Power Producers Association, the GVRD, the BC Utilities Commission and the Lower Mainland Chief Power Engineers. Involvement with these groups serves to keep UBC Utilities staff abreast of activities and trends so as to be effective in meeting UBC and UBC Utilities' goals.

1.11 Business Objectives

Quoting the *UBC Utilities: 2005/2006–2009/2010 Five Year Business Plan* (Apperley, 2005b):

The purpose of UBC Utilities is to provide uninterrupted electricity, steam, natural gas, water, sanitary sewer and storm sewer service to the entire campus including supporting new campus growth and earning sufficient funds to assist with the correction of infrastructure deficiencies. (p. 3)

To support the UBC core purpose of education and research as stated in UBC's (2000) vision, UBC Utilities focuses on security of supply of utility services, and all staff members are expected to be available after hours to respond to emergency services calls.

1.12 Benchmarking of UBC Utilities

Benchmarking serves as a way of determining the relative cost of operation and the effectiveness in comparison to similar operations. In 1999, UBC Utilities sponsored a study by Willis Energy Services (Tunner, 1999) to benchmark UBC Utilities with respect to the operating practices and the reliability of a number of district heating plants with which the UBC steam plant could be compared. Information was obtained from 21 plants: 17 steam plants (13 universities and colleges including UBC, and 4 urban district heating systems) and 4 hot-water plants.

The UBC heating plant was rated as “on par” with other plants in the study in the following ways:

- Steam capacity and size of distribution system,
- Number and age of boilers,
- Boiler utilization and maintenance,
- Only manual records of maintenance, boiler trips and other failures.

The UBC heating plant was rated as “above par” with other plants in the study in the following ways:

- Combustion efficiency, manpower productivity hence overall productivity,
- Plant utilization and load factor.

The UBC heating plant was rated as “below par” with other plants in the study in the following ways:

- Relatively high number of boiler trips,
- Limited capability to operate during a power outage,
- Distribution system largely buried in the ground,²
- Low distribution system pressure,
- Low percentage of condensate return.

In keeping with the recommendations of the report, since it was prepared in 1999 the UBC Utilities steam plant has done the following:

- Reduced the number of boiler trips from six per month to two per month,
- Installed computer-based recording of boiler trips and other failures,
- Developed and implemented a system to operate the steam plant during a power outage,
- Begun to upgrade the steam supply and distribution system to accommodate the possibility of operating the system at higher pressures.

² Underground steam lines are an aesthetically pleasing, but also high-cost and safety risk feature.

As well, most district heating, cooling and utility plants in North America and a number of plants around the world are members of the International District Energy Association (IDEA) program. The UBC Utilities Power House fits in as an average university district utility plant in the Oak Ridge National Laboratory, US Department of Energy (2002) survey of Combined Heat and Power (CHP) plants in 2001–2002.

1.13 UBC Utilities History, Culture and Business Climate

UBC Utilities was created as a separate department within UBC Land and Building Services in 1996 with the intention of preparing UBC Utilities to become an independent business. Prior to 1996, utility services were provided out of UBC general revenue by staff working out of both the steam plant and the Plant Operations buildings. Staff now working out of the UBC Utilities building were previously assigned as part of services to all campus facilities. The move to separate UBC Utilities was made in an attempt to gain financial efficiency and to work toward the possibility of UBC Utilities becoming a privately owned business entity.

Within its mandate of privatizing crown corporations, the provincial government is encouraging the development of UBC Utilities as a separate business entity. Thus, UBC has considered the opportunity to involve the private sector in the provision of utility services on campus. UBC believes there could be significant benefit from private sector participation in the provision of the full range of services currently provided by UBC Utilities. However, the confidential nature of the intent to privatize UBC Utilities prevents the disclosure of details of that initiative in this report.

1.13.1 Work Environment

UBC Utilities, being part of UBC, being in the Western world and being on the forefront of creating an equitable work environment, endeavours to provide a safe work place in terms of physical and emotional conditions, while attempting to be financially responsible to taxpayers through the provincial

government. For example, policies such as equal opportunity employment, anti-harassment, asbestos abatement, sick leave management and return-to-work programs all add cost to the provision of utility services. UBC Utilities must therefore manage its business affairs with extreme care so as to comply with these sometimes-conflicting objectives.

1.13.2 Union–Management Relations

Throughout the university, the climate of union–management relations is not conducive to excellence in the provision of utility services. Six separate unions are operating on the UBC campus, with frequent inter-union jurisdictional issue disputes in UBC Utilities and in other departments. In 2005, the collective agreements for all six unions, as well as the management and professional union, the Association of Administrative and Professional Staff (AAPS), expire and are due for renewal. In addition, a number of outstanding grievances are backlogged, pending settlement by mediation and arbitration.

Collective bargaining has not been trouble-free at UBC. For example, UBC Utilities unionized staff, with the exception of essential services Power House operating staff, were involved in a short work stoppage strike in 2004. All UBC Utilities staff are members of the larger unions on campus, as UBC Utilities has no separate union associations.

With respect to the possible move to privatize UBC Utilities, the unionized workforce is deemed to be one of the most serious hurdles to cover, as there is strong union opposition to privatizing any government institutions in BC. As well, the 1996 move toward privatizing UBC Utilities was impeded by the unions' resistance to such efforts.

The secrecy in the investigation of the privatization effort, the increasing focus on use of contractors for project work and the history of labour–management relations have resulted in an atmosphere of less than desirable morale. While the working climate between the management and the

unions of UBC Utilities is not openly adversarial, the climate is also not one of highly functioning cooperation, nor one that strives for increased productivity or efficiency.

As for incentives, neither UBC nor UBC Utilities offers material incentives for superior performance. De facto incentives come in the form of overtime pay for work that is performed out of normal work hours and the sense of satisfaction that staff derive from the execution of their duties. By taking advantage of overtime work opportunities, some unionized UBC Utilities staff members are able to increase their salary by as much as 50%.

1.13.3 Interaction with Plant Operations Staff

Because of established practices and university policy, Plant Operations staff perform some work for UBC Utilities, and UBC Utilities staff perform some services for Plant Operations. For example, all plumbing, carpentry and metal fabrication work inside the UBC Utilities building is performed by Plant Operations staff, as this practice is consistent with Plant Operations staff performing all trades services inside all university buildings on campus. The charge rate for such services is \$65 per hour, and it serves as a point of dispute between management and staff in Plant Operations and UBC Utilities. While trades staff in both groups belong to the same unions, an adversarial climate prevails at times and leads to less than desirable outcomes; tasks most often take longer to complete, and project and interdepartmental costs are often higher than budgeted.

1.13.4 Interaction with Supply Management Staff

UBC Utilities staff routinely interact with UBC Supply Management staff for the tendering of purchases of project services and for the purchase of goods valued over \$10,000. UBC Utilities staff report frequent and ongoing delays with purchasing being completed on time owing to the inability of Supply Management staff to meet their commitments to UBC Utilities. These interactions also involve the use of the FME computer-based purchasing and accounting system. This software package does not

interface effectively with other UBC financial management systems, so staff must manipulate and transpose data back and forth between the various accounting, bookkeeping and purchasing systems. The effects of the combination of these two issues is that UBC Utilities staff spend additional time bringing projects to completion, specifically the time they spend following up on delays in the purchasing process. There is also a time delay of about 45 days to bring all costs into the financial statements for a true assessment of fiscal status.

While UBC Utilities is responsible for providing utility distribution services, Plant Operations is responsible for providing customer satisfaction and endeavours to accomplish this through its staff as they operate and maintain the various HVAC systems throughout the campus. Given that UBC Utilities and Plant Operations staff were all one department prior to 1996 and that UBC Utilities still receives trouble calls after hours, there is still a perception that UBC Utilities is responsible for HVAC comfort issues, but this is clearly not fact.

1.13.5 Sustainability

In 2002 UBC announced “Ecotrek,” Canada’s largest university energy and water retrofit program. Designed to reduce excessive consumption of energy and water, this upgrade was to generate savings of approximately \$2.5 million annually. While improving comfort for building occupants, the project was to reduce core energy use on campus by up to 30% annually. It was also to reduce CO₂ emissions by about 30,000 tonnes annually and water use in core facilities by up to 45% each year. The Ecotrek project was valued at \$35 million and was funded by energy savings from the project.

UBC Utilities is involved with the Ecotrek program in two major areas – the Lo NO_x burner project and the condensate return improvement project – and in a number of smaller initiatives such as variable frequency drive installations, water conservation and lighting upgrades. The implementation of the Lo NO_x burner project resulted in NO_x emissions being reduced from 180 ppm to 40 ppm.

1.14 Energy Procurement

The two main energy supplies required by UBC Utilities are natural gas and electricity. For the purchase of natural gas, UBC Utilities uses the services of Avista Energy, a natural gas broker. Natural gas purchasing strategies and gas commodity prices are continuously monitored to minimize gas purchase costs. UBC Utilities management works with Avista and uses gas storage and hedges to purchase natural gas in advance of the time when it is required for steam production.

Electricity is purchased on a bulk rate from BC Hydro under the General Services Transmission rate #1821. Billings are provided to UBC Utilities on a monthly basis and are paid based on KW hours consumed. Electricity is then distributed through the UBC high-voltage systems and billed to UBC Utilities customers at the rates shown in Appendix 3.

UBC Utilities also maintains a reserve of #2 diesel fuel for use in the event of shortage of supply of natural gas. Diesel oil for heating fuel is purchased locally through a tendered contract through UBC Supply Management.

1.15 BC Utilities Commission and UBC Utilities

The British Columbia Utilities Commission (BCUC) is an independent regulatory agency of the provincial government that operates under and administers the Utilities Commission Act (2004). The BCUC's primary responsibility is the regulation of British Columbia's natural gas and electricity utilities.

The BC Utilities Commission does not control rates charged by UBC Utilities. However, the BCUC and UBC Utilities maintain a relationship. The BCUC normally controls rates charged by utilities when the utility has 100 or more metered customers. While UBC Utilities does have more than 100 billable customers and over 200 un-billable customers – un-billable customers being those in the University Core that are currently supplied and paid on a blanket basis – there are two reasons for the

BCUC not setting rates that UBC Utilities charges. First, UBC Utilities sells its services primarily to other UBC departments, and as such those services are considered essentially transfers. The second reason is that UBC Utilities charges the same rates as Terasen, BC Hydro and the University Endowment Lands for rates of natural gas, electricity and water, respectively; however, with UBC Utilities moving to financial independence, this situation is about to change.

1.16 Planned Growth for Utility Services

Over the next five years, the market for UBC Utilities services is expected to grow as the university expands its Core and Tenant/Ancillaries development. Revenue streams are expected to increase by 30% as more building development occurs both in the academic area of the campus and through the campus community planning process, a process begun by UBC in the past 5 years in order to increase on-campus housing. Utility consumption by Core buildings is expected to increase by about 40% as new buildings such as AERL, Life Sciences, the I.K. Barber library expansion and the Michael Smith addition to the Bookstore come into full use in 2005 and 2006. Revenue from Tenant/Ancillary utility services is expected to grow by 30% as projects such as the Olympic Arena and Marine Towers are completed.

The steam-generating capacity of the Power House has been in question with respect to the ability of the Power House boilers to reliably meet the heating load of the existing and upcoming steam heating load. During 2004, “firm capacity” was increased 28%, from 230,000 pounds per hour to 295,000 pounds per hour, with the Lo NOx burner upgrade (Apperley, 2005a). Firm capacity is defined as total capacity less the capacity of the largest unit; in UBC Utilities’ case, this is 295,000 pounds per hour, as shown in Table 1.3. Total capacity was also increased in 2004 by 100,000 pounds per hour to 450,000 pounds per hour. Considering that maximum load in the winter of 2004/2005 was 240,000 pounds per hour, the Power House has sufficient capacity for demand growth for a number of years yet, as steam demand is expected to grow by 6% in 2005 and by 5% in 2006. This increase would bring the peak load to 255,000

pounds per hour in 2005/2006 and to 268,000 pounds per hour in the winter of 2006/2007; thus the 295,000 pounds per hour firm capacity is estimated to be sufficient until 2009.

Table 1.3 UBC Utilities Firm Capacity

Firm Capacity Calculation	
Boiler	Capacity, lbs/hr
#1	50,000
#2	125,000
#4	120,000
#5	155,000
Total	450,000
Less largest boiler	155,000
Firm capacity	295,000

Note. From *Major Powerhouse Improvements and Status* (p. 1), by G. D. Apperley, 2005, Vancouver, BC: University of British Columbia. Copyright 2005 by the University of British Columbia. Reprinted with permission.

As a result of the expected growth in utility consumption driving the need for significant capacity upgrade, the gross margin is expected to grow by 70% to \$4.3 million over the next five years as UBC Utilities is fully compensated for Core and Utility services.

Management and staff of UBC Utilities are actively involved in preparing for the provision of utility services to new buildings throughout the campus. The Director and managers regularly attend planning meetings to be on schedule with services when they are required for building occupancy. The addition in 2004 of the Life Sciences Centre for Blood Research was preceded by the addition of a steam line connecting the two ends of the south steam system. Among other system upgrades was the re-piping of the steam line on Agronomy Road, to ensure ample steam supply to the UBC Hospital during winter periods of high steam demand.

2 INDUSTRY ANALYSIS

2.1 Structure

The district utility industry is fragmented, as with few exceptions each university, college and city utility is separately owned and operated.

As with UBC Utilities, each district utility does not have a financial connection to other district utilities, and the plants surveyed in the Willis Energy Services study (Tunner, 1999) are independent of one another. As a specific example, Central Heat Distribution Limited (CHDL) in Vancouver owns and operates a steam generating plant and a network of underground steam lines delivering steam to numerous buildings in the downtown core. The Seattle Steam Company (SSC), an independent district heating utility in Seattle, Washington, is also privately owned and operated, as opposed to being part of a larger utility organization.

In a few cases, such as in San Diego, California, two or three university campuses and their associated utility providers in one geographical area are managed by the university board.

While district utility operations such as UBC Utilities provide a full range of utility services, a number of district heating plants, about 80 in Canada, are similar to the UBC Utilities Power House and provide only heating services to their customers. The Oak Ridge National Laboratory, US Department of Energy (2002) report includes data on 200 district utility systems in North America.

District utility operations typically are located on university and college campuses, while district heating plants typically serve the downtown core of large cities.

District utilities differ from district heating plants in that like UBC Utilities, district utilities provide a full range of utility services. On the other hand, “for-profit” district utilities, such as CHDL in Vancouver and SSC in Seattle, typically provide one service and are based in commercial areas.

As well, district utilities comparable to UBC Utilities are for the most part government or quasi-government institutes and are publicly owned and operated. While understanding that UBC Utilities is in fact a full-service district utility, it is worth noting that in 1999 a heating plant benchmarking study (Tunner, 1999) was carried out by Willis Energy Services for UBC Utilities. The results of the study are indicative of UBC Utilities’ position relative to that of other comparable heating plants. Additional details on that benchmarking study are covered in the Benchmarking of UBC Utilities section in chapter 1.

Public utility commissions govern many aspects of the financial operation of district heating plants; however, district utilities are seen as part of government systems and are not regulated by utility commissions.

Rates for commodities such as natural gas, water and electricity sold by utility companies are set by public utility commissions. Such rates are determined through a review process that takes into account commodity costs and a mark-up for operating costs. In those instances where utility commissions do not set rates, such as with UBC Utilities, cost of operations, precedent, public opinion and market rates are largely responsible for controlling utility prices.

2.2 Trends

Most trends in the district utility industry are of a technical nature, as opposed to managerial. Many aspects of district utility plant operations and management are aligned with systems developed by professional associations such as the IDEA (International District Energy Association), TUC (The Utility Connection) and the APPA (American Public Power Association), and comply with standards such as LEED (Leadership in Energy and Environmental Design). Managerial trends in the district utility

industry, such as excellence in customer service, worker efficiency and real-time accounting systems, often take longer to be implemented in public utilities than in the private sector.

2.2.1 Energy Efficiency

Given that energy purchases are by far the greatest costs to district utilities, rising fuel prices are the major driving force behind most trends in the district utility industry. District utilities typically buy their energy as commodities, and convert the energy in natural gas, electricity or oil into heat in the form of steam or hot water, for sale to their customers. UBC, the University of Manitoba, the University of Toronto and a number of similar institutions have recently embarked on energy-saving initiatives. These typically take the form of a partnership with a company that specializes in energy conservation programs.

Gains from reduced energy consumption are used to offset capital costs for equipment purchases and modifications. Payback on such initiatives is typically in the range of 10 to 20 years and is undertaken in conjunction with sustainability programs for emission reductions from the burning of fossil fuels for heating and transportation.

2.2.2 Privatization

As in BC, there is some effort to privatize university and district utility and energy plants in the international scene. The Alberta government initiated a Request for Expression of Interest in the mid-1990s; however, that process was not successful, as those utilities parties contacted found there was insufficient financial gain to justify their involvement in the university utility³. As well, the Colorado University – Colorado Springs campus has been in debate in the recent few years on whether to allow Sempra Energy to own and operate the university utilities plant. However, at CU – Colorado Springs as elsewhere, efforts toward outright privatization of university and public utilities are met with formidable public opposition. In the mid 1990s when UBC Utilities was created as a separate department to prepare

the way for privatization, serious opposition from the unions was a major factor in stopping the privatizing of UBC Utilities at that time. The undercurrent of opposition at UBC remains as it was in the 1990s, and it is expected to be the major hurdle to pass with the current effort as well. This undercurrent is evidenced by bulletin board posters deriding privatization and an open opposition to contracting out of services.

In telephone interviews with the universities covered in this report, the author found no other instances of government intention to privatize their university utilities.

2.2.3 Sustainability

Sustainability is a major trend driving universities worldwide since the 1990s. The Association of University Leaders for a Sustainable Future (ULSF; 2001) states that its mission “is to make sustainability a major focus of teaching, research, operations and outreach at colleges and universities worldwide” (para. 1). And the “ULSF pursues this mission through advocacy, education, research, assessment, membership support, and international partnerships to advance education for sustainability” (para. 1). UBC, UBC Utilities and most Canadian universities embrace sustainability as a serious driving factor in determining the direction of the institute.

Sustainability affects most aspects of district utility services. For example, the universities of Toronto, Winnipeg and BC include their Office of Sustainability in all strategic decisions on campus. For example, UBC signed a \$30 million contract with the firm MCW in 2002 to reduce its energy and water consumption; and UBC Utilities is one of the departments most affected by that agreement.

³ information provided by staff at the University of Alberta, Edmonton.

2.2.4 Deep Lake Cooling for Air Conditioning

While UBC has no district cooling system, many utilities do include district cooling service in their range of services. As electricity prices rise, district utilities will look to other sources of cooling. A recent trend in central air conditioning systems is called deep lake cooling. This method of cooling utilizes the heat sink in a large body of water near the site and uses 90% less electricity than conventional air conditioning. To reduce operating costs and environmental impact, the University of Toronto recently implemented a deep lake cooling system.⁴

UBC Utilities staff members have been involved in discussions on the viability of district cooling. The proximity of the ocean to the Point Grey UBC campus may make it a viable heat sink for district cooling. However, the Wreck Beach Preservation Society is a powerful political force and would likely have serious opposition to any development that would impact the waterfront. The recent public outcry with the development of the Marine Towers high-rise apartments on Marine Drive near the access to Wreck Beach is indicative of the type of opposition that would have to be dealt with if deep lake cooling were to be considered at UBC.

2.2.5 Profit or Cost Centres

District utilities surveyed for this report all reported being considered as cost centres. While UBC Utilities is currently a cost centre, the move to increasing its utility rates is an effort to have UBC Utilities turn a profit.

⁴ Information from a telephone conversation with Rafaat Helmy of the University of Toronto

2.3 Comparable Utilities

Since the majority of district utilities are essentially monopolies, assessing the performance of comparable utilities may be more relevant than assessing only competitive forces. District utilities comparable to UBC Utilities include the utilities plants at Simon Fraser University, Burnaby Mountain; University of Victoria; University of Alberta, Calgary; University of Alberta, Edmonton; Central Heat Distribution Limited in downtown Vancouver; the Seattle Steam Company in Seattle, Washington; and Vancouver General Hospital. All such plants operate 24 hours per day, 365 days per year, and typically burn natural gas in boilers at about 150 psi.

2.3.1 Universities

University utility service organizations are the largest component of the district utility market, and most university utilities provide a full range of utility services.

Simon Fraser University

Simon Fraser University (SFU) on Burnaby Mountain in the GVRD operates a hot-water heating plant. The plant incorporates five hot-water boilers, as opposed to steam boilers, to provide space heating and for domestic use. The plant purchases all of its electricity from BC Hydro, and its natural gas is purchased with the assistance of a natural gas broker. Hot water is not metered at each consumer, and no strong effort is made to account for apportioning energy costs to individual consumers.

The organization structure for the district heating plant at SFU Burnaby Mountain is similar to most colleges and universities in that it is hierarchical, being part of the university and with its budget largely controlled by the government. All trades staff work out of one department, as opposed to being separated as is the case at UBC Utilities.⁵

⁵ Information from a telephone conversation with Gord Nahal of Simon Fraser University, Burnaby.

University of Alberta, Edmonton

The University of Alberta, Edmonton (UofA Edmonton) campus has a total student enrolment of 34,000 student and 9,000 academic and support staff. The UofA Edmonton Utilities department is similar to UBC Utilities, as it provides electricity, steam, chilled water, compressed air, water and demineralised water, sewer and natural gas utilities to the campus.

UofA Edmonton Utilities operates as a public utility as defined in the Public Utilities Act, but does not have shareholders and is not regulated by the Utilities Commission. The utility operates on a full cost recovery basis such that Revenues in excess or short of Total Expenses go into or are drawn from a pool of Operating Reserves; thus no true profit or loss is recognized.

UofA Edmonton Utilities is under the umbrella of the Department of Facilities and Operations. The staff of 50 comprises 3 managers, 6 admin staff members, 22 operating engineers, and 18 maintenance and support staff members, plus the Director of Utilities. UofA Edmonton Utilities also hires a contract welder and fitter for specialty work.

As concerns assets, the steam plant comprises five boilers, three of which are 900 psi units used to produce steam for electric power generation, with the other two used for heating purposes only. Maximum steaming capacity is approximately 1,000,000 pounds per hour and the two steam-turbine-driven generators have combined capacity of 39 MW at 13.8 KV. The maximum campus electrical demand is 60 MVA. As the electricity market is deregulated in Alberta, UofA Edmonton Utilities runs its 26 MW generator as a “pool machine,” and it is on line an average of two days per week, from 8 am to 9 pm, about 200 days per year depending on fuel costs and electricity prices. As with UBC Utilities, UofA Edmonton Utilities is responsible for distribution services only. Reticulation inside campus buildings is handled by Building Maintenance, Operations and Controls staff. There are six electricians in UofA Edmonton Utilities responsible for the high-voltage distribution systems. Heating plant staff comprises two engineers per shift in the summer and three in the winter, with a day maintenance crew of four, as

well as a relief crew of three power engineers. Mechanical utility distribution system maintenance is handled by a crew of four. Condensate return averages between 85% and 90%.

Sewage treatment services are not provided, as the university discharges to the city of Edmonton treatment system. UofA Edmonton Utilities operates and maintains a 22,000-ton chilled-water system on the banks of the Saskatchewan River, and uses the river as a heat sink.

As concerns the financial side, UofA Edmonton is able to provide utility services at about 20% off private rates. The Operating budget is currently about \$55 million, utility rates are set twice annually, in the spring and the fall, with all customers being charged the same rate, and depreciation is not utilized. In the past two years, UofA Edmonton spent \$3.5 on energy efficiency projects. Natural gas is purchased with the assistance of a gas broker, and water is supplied by the city of Edmonton. UofA Edmonton Utilities takes advantage of the university's HR, Legal, Purchasing and Administration services and is charged about \$400,000 annually for those services.

Projects are funded from three sources: a Capital Reserve Fund, an Operating Reserve Fund and an Emergency Reserve Fund. The three funds are capped at a total of \$12 million, and budgets are managed to maintain that reserve. UofA Edmonton Utilities' annual operating and maintenance costs average between \$1.5 and \$2 million, and the fiscal year is April 1st to March 31st. It is to be noted that UofA Edmonton encompasses no market housing. Major capital projects are funded by the Province of Alberta Government, and no taxes are paid by the university.⁶

⁶ Information from telephone conversations with Agnelo Dasilva and Rob Craig of the Utilities department of the University of Alberta, Edmonton.

University of Victoria

The University of Victoria operates a heating plant to service main buildings on campus in Victoria, BC. The plant incorporates natural gas-fired hot-water boilers, buys its gas through Terasen and buys its electricity from BC Hydro.

The heating plant is part of Facilities Management, which deals with maintenance issues on campus, as opposed to UBC Utilities and Plant Operations being separate business units and looking after services outside and inside buildings, respectively. The organization is hierarchical in structure, with no current push to privatization.⁷

University of Calgary

The University of Calgary (UofA Calgary) has a student body of about 28,000 students and a staff of 8,000. Utility services are provided under the umbrella of Building Operations and Maintenance.

The heating plant houses four hot-water boilers that burn natural gas for energy conversion, and a one MW diesel-driven generator for emergency power production. Heat is supplied to the campus in the form of 400° F water at 300 psi from a 40 MW thermal plant, 20,000 KW of which are designated to the chilled-water system. The heating plant controls operate on a 1990s version of the Bailey Infi90 control system with SLCs controllers and are reported as a reliability concern. Instrumentation servicing is performed by heating plant staff. Heating plant staff provide support services up to the heat exchanger; Building Services has responsibility for reticulation inside the buildings. All trades staff operate out of the Building Services complex.

The budget for heating plant staff salaries, as well as maintenance, is currently about \$1.3 million. Natural gas is purchased with the assistance of a natural gas broker. Electricity purchases are funded from

⁷ Information from a telephone conversation with Dick Chapel of the University of Victoria.

the university budget, as no power generation facilities exist on campus with the exception of emergency diesel generator sets.⁸

Conclusion: It is worth noting that during the preparation of this report, with the exception of UBC Utilities, no serious effort to move any university utility services to the private sector was discovered.

2.3.2 Central Heat Distribution Limited

Central Heat Distribution Limited (CHDL) is an independent, privately owned and operated for-profit business operating out of its offices and district heating plant at 720 Beatty Street in Vancouver. CHDL is not financially tied to other district utilities and has a staff of 20 management and operating personnel to operate and maintain the plant. Due to the confidential nature of business events surrounding the BC Government's intention to privatize UBC Utilities, CHDL staff were not available for interviews for this report. All details on CHDL were gained from outsider interviews and publicly available information.

CHDL is perhaps BC's most comparable district heating plant to the UBC Utilities steam plant in that its heating plant is similar in vintage and capacity. CHDL rates are controlled by the BC Utilities Commission, and if CHDL desires to adjust rates for services provided, it must apply to the BCUC. While CHDL supplies only steam to downtown Vancouver, that portion of the utility is about twice the capacity of the UBC Utilities steam plant. CHDL steam rates for operations and maintenance are shown in Table 2.1.

⁸ Information from a telephone conversation with Keith Anderson of the University of Calgary heating plant.

Table 2.1 Operations and Maintenance Steam Rates for Central Heat Distribution Limited

Rate Schedule for CHDL Steam for Operations and Maintenance
\$7.48 per M pounds of steam for the first 50 M pounds of steam per month
\$6.34 per M pounds of steam for the next 150 M pounds of steam per month
\$5.60 per M pounds of steam for the next 800 M pounds of steam per month
\$4.45 per M pounds of steam for the remainder per month

Note. Steam Tariff: BCUC No. 1: 15. Rate Schedule (p. 1), by Central Heat Distribution Limited, 2003, Vancouver, BC: Author. Copyright 2005 by Central Heat Distribution Limited. Reprinted with permission.

For the energy portion of its steam rates, CHDL sets its cost of energy after month-end and allocates the cost to the actual monthly steam consumption of customers. This information is not publicly available, but the writer estimates it to be between \$13 and \$15 per thousand pounds of steam. Total cost for steam delivered to its customers is thus estimated to be between \$18 and \$22 per thousand pounds per month. As can be seen in Table 2.2, this rate is considerably higher than that of UBC Utilities.

Table 2.2 Comparison of Price of Steam from Heating Plants⁹

Name of Utility	Price/Mlbs \$Can*	Plant maximum capacity	Electricity production	Fuel
UBC Utilities	16 – 17	450,000	0	NG/oil
VGH	19.50	300,000	2.2 MW	NG/oil
CHDL	18-22	650,000	0	NG/oil
SSC	21**	700,000	0	NG/oil
UA Edmonton	15.05***	1,430,000	39 MW	NG/oil

*Prices do not necessarily reflect purely identical cost inputs in each case.

** USD exchange rate of 1.24; May 2005

*** Sales of electricity generated by in-house steam-driven generators effectively reduce UofA Edmonton's cost of steam.

As with UBC Utilities, CHDL uses natural gas as its primary energy source for the production of steam. Its network of underground steam lines delivers heat for domestic hot water and steam for manufacturing purposes to customers in the downtown core. CHDL heats more than 170 buildings in the

downtown core, including BC Place, General Motors Place, the Vancouver Public Library, major hotels and the Ford Centre.

It is worthy of note that CHDL implemented a condensing heat recovery system in 2004, since UBC Utilities is also considering the development of such a system.

2.3.3 Seattle Steam Company

The Seattle Steam Company (SSC), a privately owned district heating utility in Seattle, Washington, also supplies only steam for heating and hot water for customers in the downtown core of Seattle, Washington. Steam is generated by burning natural gas in its water-tube boilers; the steam is then delivered to customers through a network of underground lines. Customers use the steam for such purposes as space heating, sterilization of surgical equipment, heating of water for showers, food preparation and laundry services.

The total capacity of the SSC steam plant is 700,000 pounds per hour (pph), with winter peak loads of 550,000 pph, a winter average of 280,000 pph and summer low loads of 85,000 pph. As with CHDL, SSC has about twice the output of the UBC Utilities steam plant. Staff levels are also comparable to UBC Utilities Power House staff and CHDL; operating staff number 14: 7 staff members maintain the distribution system and read the meters, while 7 staff administer the business.

As concerns technical issues, SSC operates its steam system at 150 psi; the plant employs a condensing heat recovery system for gas cost reduction of about 10% and has about 200 customers in the downtown core of Seattle. As with UBC Utilities, SSC also manages all projects. Small projects are carried out by the SSC trades staff, and larger projects are contracted out after being tendered publicly. As with UBC Utilities and CHDL, SSC has four boilers, is in the process of changing from pneumatic controls to electronic and uses a combination of turbine and electric drives. SSC uses an external

⁹ Data from telephone interviews with plant staff at each utility and at BCUC.

consultant for a portion of its controls and instrumentation servicing, and realizes that this approach is a potential liability. The plant is equipped with a direct-contact flue gas economizer, which has provided a 10% fuel reduction and a 7% make-up water reduction since its installation in 2000. Water treatment issues related to the economizer are being addressed. SSC's 200 customer steam meters are manually read, and the data are entered into the accounting system, which is also primarily a manual system. Most customers have signed steam purchase contracts for three years.

SSC's steam sales rates are composed of two components, a standard meter rate and a fuel differential rate. The current standard meter rate is US\$6 per thousand pounds of steam and the current fuel differential rate is about US\$11 per thousand pounds of steam, as it depends on fuel costs. Thus the rate is about US\$17 per thousand pounds of steam.

SSC is encouraging its 200 customers to move to an equal payment plan, to level out SSC's natural gas purchasing program. SSC rates are not set by a utility commission; rather, market demand and availability of substitutes drive prices for the most part.¹⁰

2.3.4 Vancouver General Hospital Utilities

Vancouver General Hospital (VGH) Utilities also operates a gas-fired plant to heat the hospital and associated buildings nearby. As well, VGH Utilities supplies electricity, water and natural gas to the hospital complex. While an underground line to the Women's and Children's Hospital has been installed, the line has serious design and construction issues, is fraught with operating and maintenance issues, and is yet to be put into service, though it is more than 10 years old. The VGH Utilities plant is perhaps the full-service utility most comparable to that of UBC Utilities:

- The VGH Utilities plant houses four boilers as does UBC Utilities, steam production is within 20% of that at UBC Utilities and the VGH Utilities department supplies a full range of

¹⁰ Information on the Seattle Steam Corporation from Paul Prescott.

services as does UBC Utilities. However, VGH Utilities also provides reticulation services throughout the hospital complex, whereas at UBC reticulation of utility services is provided by the Plant Operations staff of Land and Building Services. Three of the four boilers are rated for the production of 600 psi steam to drive the two turbine generator sets, which are each rated at 1.1 MW. Boiler utilization rates are similar to those of UBC Utilities' units and range from 5% on the oldest boiler, to about 75% on the newest unit, with maximum demand being about 50% of total capacity.

- Staffing is also similar to that of UBC Utilities. A director oversees the VGH Utilities plant, has four staff reporting directly to him and is responsible for the provision of similar services as those that UBC Utilities provides. Steam plant staffing is also similar, with two power engineers on shift in the boiler house. VGH Utilities employs 13 electricians, 12 plumbers and 5 HVAC and control technicians.
- Project management services are handled in a similar manner, with small projects being handled by in-house staff and large projects being tendered and then contracted out.
- As concerns electricity supply to the VGH hospital complex, the bulk of electricity for the hospital complex is purchased from BC Hydro, and VGH produces a small portion from its steam-turbine-driven generators. VGH purchases on average about 8.5 MW and produces on average 1.1 MW. Produced electricity is supplied into the grid and sold to BC Hydro. The VGH steam plant maintains four diesel generator sets of 1.6 MW each in the hospital complex, with an additional 1.6 MW unit due to be installed in 2005. Two emergency diesel generator sets, one at 0.5 MW and one at 0.2 MW, are located in the steam plant to permit operation of the steam plant in case of a BC Hydro outage.

However, on the financial side, VGH operates very much as a monolithic governmental entity, in that natural gas purchases for the production of steam are funded out of general revenue. Budgets

are set through a consultative process, and any budget surpluses are utilized to upgrade capital assets in the plant. Only about 5% of the steam produced is sold directly, as it is sent to the two BC Cancer Agency buildings, where it is metered for sale to the agency; all other steam is for use within the hospital complex and is not sold or metered. Similarly, electricity and water purchases are funded out of general revenue. As with UBC Utilities, VGH uses the services of a gas broker to minimize purchase costs.

2.4 Competencies of Typical Organizations

District utilities surveyed in this report exhibit competencies in a number of areas:

1. Providing comparable services at similar or lower cost. Economies of scope are realized when average cost is reduced because of the mix of two or more products, even if the products are not directly related. These district utilities realize some benefit of economies of scope through the provision of multiple utility services on a relatively small scale. Public utilities such BC Hydro and Terasen typically operate very large-scale operations in comparison with district utilities such as UBC Utilities and those addressed in this report. Economies of scale seen in large utilities are not realized in these district utilities, yet these utilities are able to provide comparable services at similar or lower cost.
2. Dealing effectively with the combination of a unionized workforce and government-controlled budgets. The restrictions imposed by these two controlling forces impose serious restrictions on district utilities in terms of being able to meet the demands of providing multiple utility services.
3. Providing safe work environments in terms of physical and emotional conditions. Doing so involves dealing with the implementation of programs such as asbestos in the workplace, equipment lockout and work-permit procedures, anti-harassment policies and return-to-work

programs. University utilities exhibit competency in managing multiple objectives, some of which are conflicting.

4. Dealing effectively with budget restrictions imposed by the environment of relatively low revenues resulting from students being unable to pay normal market price for such services. District utilities are successful in providing adequate service in spite of budgetary restrictions not seen in single-service utility providers. District utilities are able to provide utility services to their customers at lower than market prices partly because of the lack of need to provide a Return on Investment to investors.

2.5 Services Provided

Two types of utility providers are common in the business environment comparable to that of UBC Utilities: those that provide a district heating service only and those that provide a full range of utility services.

UBC Utilities and other full-service utility providers have to be so broad in their focus of providing several utility services that they are less effective and efficient as a result. My knowledge of CHDL and SSC is that they are more efficient in being privately held and customer focused; their employees are more alert and innovative than are staff in quasi-government organizations such as UBC Utilities.

District heating facilities, such as CHDL and SSC, run “simpler” operations in the sense that their business is more focused. This focus of operations equates to an economy of scale and allows for more effective and efficient provision of service.

2.6 University Preferences

Universities prefer to focus on their core functions of education and research, and this focus influences the universities' actions in seeing their utility providers as cost centres. Universities would prefer to increase their depth of involvement in education and research. The risk-averse nature of UBC and UBC Utilities serves to reduce the profit motive and to avoid the possible benefit of improved financial performance. As at UBC, other universities have moved to privatize general services such as the provision of meals and specialized services such as the repair and maintenance of refrigeration equipment.

3 BUSINESS ANALYSIS

3.1 Mission and Vision

Considering that the UBC Utilities mission is to support the UBC vision of “aspiring to be one of the world’s best universities and to conduct outstanding research” (Our Operations section, para. 1), the UBC Utilities management and staff serve UBC well. **However, the most striking difference between the day-to-day-focus and the long-term vision is that there is a continual focus on minimizing costs in day-to-day operations, while there is a university-wide intention to be one of the world’s best universities. Focusing on being the best while also being a low-cost provider is not realistically achievable.** The result of this difference is that there is inadequate information about the true financial status of UBC Utilities at any time, and staff are not well informed as to how to approach their work from a financial perspective. From a technical perspective, UBC Utilities staff are more than capable of supporting the university in achieving its mission as stated.

With the current initiative by the provincial government and UBC Board of Governors to privatize UBC Utilities, options to align this initiative with daily operations should be considered.

3.2 Financial Performance and Analysis

The UBC Finance Department would prefer not to deal with the risk of purchasing natural gas for the production of steam for heating, as evidenced by the current confidential “Call for an Expression of Interest” to private utilities for their interest in purchasing the assets of UBC Utilities. UBC sees the financial aspects of UBC Utilities as a diversion from the university focus on research and education. It should be noted that no other university surveyed in this report is currently seeking to privatize its utility

services, although most universities are moving to outsourcing functions such as food services, construction projects and some aspects of building maintenance.

Given that no additional staff will be required to meet the expected additional demand for increased consumption of all commodity services provided by UBC Utilities and that firm steam production capacity is adequate to accommodate at least four years' demand increase, UBC Utilities is in a position to experience improved financial performance in the next several years.

With reference to Table 2.2, UBC Utilities' price of steam is the lowest except for UofA Edmonton, which is able to offer a lower price because of the sale of electricity resulting from its in-house generation. Economies of scope with UBC Utilities providing multiple services tend to be offset by reduced economies of scale of steam production in comparison with CHDL and SSC.

Given that natural gas costs are the largest and most unpredictable costs for UBC Utilities, it is noteworthy that UBC Utilities rates are the lowest in the category of non-electricity producers.

UBC Utilities has a monopoly position in its supply of utilities to UBC. The layout and design of the campus necessitate the continuance of such services, and UBC Utilities has no competition for provision of those services. Revenue streams are also assured as long as the university operates, since UBC Utilities' services are required for normal functioning of the teaching and research facilities. Rising energy costs may cause financial difficulty, as UBC Utilities is required to purchase utility commodities and wait until the end of the billing period or year-end to accurately know the effect of those costs.

The time lag in the existing financial system threatens UBC Utilities' financial effectiveness. The lack of integration in UBC Utilities financial management systems prevents both UBC Utilities staff and UBC Financial Management staff from having a full and accurate picture of the status of the department. The effect of this lack is that UBC Utilities is unable to react to financial conditions until at least one month after the fact; the lag causes serious concern for both UBC Utilities and UBC. Given that natural

gas prices are higher than ever before and may go much higher yet, this situation is both a risk and a concern. The provincial government has indicated its intention to move toward privatization; and this intention is causing some staff to be less effective in the execution of their duties, as they have indicated they are fearful about the security of their jobs should UBC Utilities be privatized. It is worth noting that UBC Utilities is not required to pay taxes and that if UBC Utilities were to become a privately owned utility, the tax issue would have to be addressed.

Labour rates for UBC Utilities staff are as negotiated in the collective bargaining agreements and are comparable to those of other organizations considered in this report. Administration costs appear to be abnormally high in comparison with those of private utilities, as is expected given the quasi-governmental nature of the organization. Utilization of assets is on a par with that of similar utilities.

The largest component of Cost of Goods Sold is for the purchase of natural gas and electricity, and those costs are commodity costs and so are optimal.

UBC Utilities pays approximately \$200,000 annually to Plant Operations for work that Plant Operations staff perform in UBC Utilities. When Plant Operations staff members are brought into UBC Utilities, specialized training is most often required, with associated costs. Otherwise, work performed on UBC Utilities equipment by Plant Operations could be unsafe, delayed or over budget. The logistics of dealing with Plant Operations staff working out of the University Services Building from the UBC Utilities building cause time delays and crossed communications.

3.2.1 Overtime Work

The nature of the business of all utility providers is such that employees must be on call to respond to after-hours call-outs, as utility services such as electricity, water and natural gas are considered essential services. With large utility providers such BC Hydro and Terasen, more staff are routinely scheduled for evening and night-shift work and are able to respond to trouble calls and to perform needed

tasks for normal business functions that cannot be carried out during normal daytime business hours. In the case of UBC Utilities, the tasks performed by trades staff are so complex and varied and the number of staff is so small that it is not practical for members of each crew to be on duty at all times. The effect of this situation is that UBC Utilities trades staff work an unusually large number of hours out of normal work hours. Because those hours worked are in excess of the 35 hours as prescribed in the IUOE Collective Agreement as a normal work-week, overtime pay rates of 1.5 times the normal rate of pay apply. The nature of quasi-governmental organizations such as UBC Utilities is such that there is a lack of effective control by management to reduce work at overtime rates. This situation is brought about by the lack of personal financial benefit in reducing overtime and by the relatively low rate of pay in comparison with the local cost of living. It has resulted in UBC Utilities trades staff gaining significant financial benefit from overtime work.

The Ecotrek project work has required UBC Utilities staff to perform tasks outside their normal duties in terms of both volume of work and scope of work. For instance, in the past three years the UBC UME crew had to develop and implement a work permit system and revise the Safe Work Lock Out system, in order to allow testing and repair of the underground condensate systems for MCW and its subcontractors. Also, the testing of the underground system of condensate lines required new work procedures to be developed. As a result of these activities, each member of the steamfitters crew and the UME crew has worked an average of one additional day per week to prepare equipment for MCW and its subcontractors.

As well, the BC Safety Authority required UBC Utilities to develop a system of Standard Operating Procedures, to be in compliance with regulations for the safe operation of regulated pressure vessels and equipment. This development required changes in the IUOE Collective Agreement, as the job descriptions of all IUOE members had to be revised during the negotiations in 2003 and 2004.

In addition, the IUOE and CUPE collective agreements provide for 12 annual days of paid sick leave, and employees readily take advantage of this benefit of paid time off for reasons that are not common in private utilities. Overtime pay for coverage for absence from work for sick leave is also 1.5 times the normal rate of pay.

The innovativeness of UBC Utilities' unionized staff in being able take advantage of the overtime work option to increase their gross earnings by up to 50% is counterproductive to the UBC Utilities goal of being in control financially.

Compensation for overtime work by members of UBC Utilities' management team is for management members to take equivalent time off during the month in which the overtime was accumulated; however, taking time off in this manner has not been a workable arrangement in all cases, and such time off has been an ongoing source of concern for UBC Utilities managers.

3.3 Spin-offs

While no other university district utility analyzed during the preparation of this report has been "spun off," it is conceivable that UBC may want to consider the spin-off of the various utilities of UBC Utilities. The natural gas segment could be taken over by Terasen, the electric power by BC Hydro and the water and sewer systems by the GVRD or the city of Vancouver. This would leave the steam plant as a simpler business to manage, which may make it attractive to a private firm. However, if UBC Utilities were to be split up into its various utilities, the economies of scope would be lost.

3.4 Strategy

3.4.1 UBC Utilities Strategic Fit Analysis

The movement in recent years by the BC Provincial Government to privatize government services and corporations, the financial risk posed in purchasing natural gas and the recent and ongoing construction demands at the Point Grey campus are putting pressure on UBC to seek ways to reduce costs and increase the effectiveness of UBC Utilities. UBC Utilities is not a publicly regulated utility, and until recent years revenue has been determined by the UBC Finance Department, with input from UBC Utilities. UBC Utilities is now moving to a cost-based strategy for setting rates, in a move to offset rising natural gas costs and in response to the university and the provincial government’s push to improved financial performance. As shown in Table 3.1, UBC Utilities is clearly a low-cost provider.

Table 3.1 UBC Utilities – Strategic Fit Chart

Generic Strategy	Cost Based Low Cost / Adequate Quality					Differentiation High Quality / Adequate Cost	
	Score	1	2	3	4	5	
Innovation	Low R&D		◆				High R&D
Structure	Centralized		◆				Decentralized
Decision Making	Less Autonomy		◆				Greater Autonomy
Labour	Mass Production			◆			Highly skilled / flexible
Market Strategy	Comparative / Push	◆					High Cost / Pioneering pull
Risk Profile	Low Risk	◆					High Risk
Financial Strategy	Status Quo	◆					Innovator
Capital Structure	Leveraged	◆					Conservative

Note. From *MBA Lecture Notes* (Table 1), by E. Bukszar, 2004, Vancouver, BC: Author. Copyright 2004 by E. Bukszar. Adapted with permission.

1. Innovation: The overall level of innovation in the organization is relatively low. In comparison with private utilities such as SSC and CHDL that have moved ahead with the installation of

Condensing Heat Recovery (CHR) systems, UBC Utilities is only now considering a CHR system as an option. The lack of innovation by UBC Utilities trades staff in not embracing multi-trade skills is not congruent with a cost-based structure or a profit-seeking stance as multi-trade work practices serve to reduce operating costs. The push by the UBC Finance Department toward improved financial performance and the push by the UBC Sustainability Department and from environmental groups to reduce NOx and CO2 emissions resulted in UBC Utilities recently obtaining admirable improvements to its operating conditions without internally being innovative.

2. Market Strategy: UBC Utilities' move away from small-volume steam customers and from those customers in a physically separate location – for example, the elimination of supply to the Vancouver School of Theology and the Barn Coffee shop – is indicative of UBC Utilities' strategy to capitalize on Core and Tenant/Ancillary customers. As a physical monopoly, UBC Utilities has put little focus on developing new markets. New buildings in the University Core continue to take advantage of utility services available from UBC Utilities. Since UBC Utilities operates essentially as a monopoly in providing utility services to UBC, the primary competitive force is to be a low-cost provider. UBC Utilities is clearly set up as a cost-based organization, and the lack of marketing exemplifies this strategy. UBC Utilities management takes a proactive position in solving problems related to utility service on campus. Rather than allowing new buildings to be built without legislative and regulatory compliance, UBC Utilities management works closely with the design, maintenance and construction crews on new and upgraded buildings.

3. Financial Strategy: The revising of rates to reflect cost of service for Core customers and to market rates for other customers is in harmony with corporate forces to improve financial performance. UBC Utilities' success in 2004 in maintaining the historically low electricity purchase prices from BC Hydro has also benefited the university with lower than market cost for the provision of electricity rates to Core customers. Competency in financial documentation and analysis is not strong in UBC Utilities, and this situation is compounded by the hybrid system used for monitoring financial performance. Being a

cost-based organization while receiving pressure from the provincial government and the UBC Finance Department, UBC Utilities is moving to increase its focus on full cost recovery, as opposed to having to rely on ongoing subsidies.

4. Structure: UBC and UBC Utilities are structured as hierarchical organizations with clearly defined lines of responsibility and authority. The transfer of the steamfitters crew to the Power House Manager's area of responsibility in 2004 has improved organizational effectiveness in UBC Utilities. The current effort to develop a separate line of seniority for the union members in UBC Utilities is another effort to establish UBC Utilities as a clearly separate organization. As well, the move to divest the UBC Utilities Chief Power Engineer of responsibility for pressure vessels outside UBC Utilities has helped to improve organizational effectiveness within both UBC Utilities and Plant Operations. Because of ongoing cost overruns on projects carried out by staff from Plant Operations, UBC Utilities is considering options for managing such projects. While UBC Utilities utilizes the administration staff of Land and Building Services to provide accounting and HR services, privately owned utilities provide and control all their own administration, bookkeeping, accounting and HR services.

5. Decision Making: The well-established hierarchical structure within UBC and UBC Utilities has led to a centralized decision-making approach. For the greatest part, UBC Utilities employees exhibit little individual autonomy in the execution of their work. Decision making is generally pushed up the organization, as employees seem to consider they are not empowered to make decisions. This approach is consistent with a cost-based organization, where decisions are seen as the responsibility of management, as opposed to being within the scope of each worker's authority and responsibility. The centralized decision making contributes to delays in decision making, adds workload to managers and impedes delivery of quality service. The staff expects this approach from management, and the move to participatory decision making is quite slow. The preference to defer decisions to higher levels of authority results in delays and inefficiencies.

6. Labour: UBC Utilities staff follow normal industry standards in terms of trade guidelines in that steamfitters do not move into doing the work of power engineers or plumbers; accordingly, there are common instances of delay in completion of tasks as one trade group waits for another to complete its duties. The reasons for this approach are both respect for the safe completion of duties and the following of established trade jurisdictions. The UBC Utilities trades staff are highly skilled; the work is high quality and requires considerable innovation, as opposed to standardized work routines. However, their willingness to be innovative in terms of going beyond trade jurisdictions and embracing multi-trade skills is quite low, and this approach does not improve efficiency.

Efforts by UBC Utilities management to deal with the issue of labour being relatively inflexible in their approach to their duties include the management's intention to automate meter-reading duties; this automation should help to improve the effectiveness of staff and to reduce time delays in collecting accounts receivable.

7. Risk Profile: UBC Utilities' risk profile is low, despite the potential for lost research, disruptions to teaching activities and exposure to media awareness that could result from failed utility service. The deferred maintenance backlog of \$20 million poses risk, which does not fit with the university's vision of providing the best environment for education and research.

8. Capital Structure: UBC Utilities' capital budget structure is set by the UBC Board of Governors, follows established practice for UBC and is very similar to that of other university utilities. Small projects are funded from revenues, and large projects are financed by the university receiving funding from the provincial government.

3.5 UBC Utilities History, Culture and Business Climate

Overall, the industrial relations atmosphere is not one of excellence. While UBC maintains policies of workplace equity and stewardship intended to boost morale, there is a climate of distrust of

management by the unions operating on campus. Symptoms of this distrust result in inter-union rivalry and resentment of contractors performing work on the UBC campus.

Prior to 2003, UBC Utilities trades staff routinely undertook capital projects over \$50,000 in value. As UBC has recently moved to focus more on its core mandate of education and research, UBC operating policies encourage capital projects larger than \$50,000 to be contracted out. Large projects such as the recent upgrade of the Power House and all new construction are contracted to firms such as MCW and Ledcor. Smaller projects such as underground manhole upgrades and repair of short sections of steam or water lines are routinely taken on by UBC Utilities trades staff.

However, in recent years there has been a move to contract out more and more project work, and UBC trades staff members are showing signs of fear of losing their jobs. As a result of this move, inefficiencies occur daily as UBC union trades staff routinely focus on the work of contractors.

Inter-union rivalry is an issue at UBC Utilities, with about half of the trades workers being members of IUOE Local 886, and the other half being members of CUPE Local 116. Inter-jurisdictional disputes have caused serious loss of effectiveness in the past, and Don Munro, a BC Government mediator, has ruled on the matter. However, in spite of that agreement between CUPE and IOUE, some inefficiencies remain, with time lost in interpreting the agreement and occasional disputes between the two unions.

Additional rivalry between members of the IUOE in UBC Utilities and in Plant Operations also arises, as the two groups occasionally claim each other's work or decline to perform work deemed to fall into the other group's area of responsibility.

It is the opinion of the writer that the morale among staff in UBC Utilities is more positive than that in other areas of Land and Building Services. The main reason for the superior morale of UBC Utilities staff in comparison to the morale in the Plant Operations department seems to be the greater

degree of autonomy and respect that UBC Utilities staff are given in comparison to the staff in Plant Operations; as a result UBC Utilities staff are more productive, efficient and effective than those in Plant Operations.

3.6 Analysis of Effectiveness

3.6.1 Reliability of Service

In 2004, one major interruption of steam service to the campus was experienced when a rat entered the Power House from an underground high-voltage cable duct bank and caused a major electrical fault that caused the Power House to shut down. This left a number of core buildings without power and the entire campus without Internet services for several hours. As well, a number of minor interruptions on steam service were experienced during the upgrade of the Power House boilers and control systems.

As concerns student, staff and faculty enjoying climate comfort, UBC Utilities is very effective in meeting its goal of supporting the university's mission. However, there is an opportunity for UBC Utilities to improve the perception of its effectiveness in meeting its goals.

3.6.2 Threat of Substitution

It is possible for individual buildings on campus and for the bulk of the buildings on campus to switch to other sources of heat; some new buildings are opting to install ground-source heat pumps and independent natural gas-fired systems as alternatives to buying steam from UBC Utilities. However, the switching costs for existing buildings are deemed to be prohibitive, since it would require significant capital investment to install heating systems powered by either electricity or natural gas, or via ground-source heat pumps. As concerns water, sewer, electricity and natural gas, UBC Utilities is essentially in a monopoly position, and the only other option would be for the university to buy direct, just as UBC Utilities does. The economies of scale gained by the UBC Utilities central plant and high switching costs

are such that it is not viable for new or existing buildings to switch to other means of heating at the current level of natural gas pricing.

BC Hydro and Terasen do offer electricity and natural gas service on the UBC campus in areas not serviced by UBC Utilities. While Plant Operations staff and contractors do provide similar services to the UBC Utilities trades staff, budget responsibility prevents Plant Operations staff from providing any services that UBC Utilities provides. As well, contractor trades crews have very specific mandates, and no actual competition exists between either Plant Operations or contractors and UBC Utilities; however, there is a perceived conflict of interest in some areas, which occasionally causes loss of worker focus and delays in carrying out tasks.

3.7 Value Chain Analysis

To conduct a value chain analysis, the writer followed the value chain model proposed by Michael Porter (1985). Porter's model lists all the activities a firm performs and serves as the framework for the rest of the discussion on the value chain of UBC Utilities' operations.

3.7.1 Support Activities

Infrastructure: UBC Utilities' organization infrastructure is characterized by a system of accounting that is ineffective at meeting the needs of the university, as there is a delay of about 45 days in determining costs of operations and maintenance. UBC Utilities' planning function has proven effective in meeting the demands of the university in that all utility services are available to meet the current and expected growth.

UBC Utilities is a monopoly provider of utility services under the direction of the university and the provincial government. UBC Utilities projects are financed from two sources. First, each year the UBC Utilities operating budget allows for approximately \$1.5 million worth of projects. Second, each year the UBC Finance Department provides funding for utility infrastructure projects required for the continuation of education and research at the university, but which cannot be funded from UBC Utilities' revenues. This financial arrangement has served UBC well and should be continued. This is similar to the finance arrangement at comparable district utilities; however, it should be noted that heating plants do not have the luxury of large projects being financed by the government.

Human Resource Development: UBC Utilities performs its day-to-day HR management tasks internally and utilizes the university's Human Resources Department. UBC Utilities performs routine administration tasks in-house, while hiring, budget preparations and accounting work are jointly carried out with staff in Land and Building Services. Training that is specific to UBC Utilities is carried out by

UBC Utilities, while training that is common to other departments is provided by Land and Building Services. This approach is similar to how universities surveyed for this report handle such work; however, private utilities perform most of these tasks internally. The involvement of Land and Building Services' HR function in UBC Utilities' affairs provides some economies of scale, though at the same time removing some measure of efficiency, since Land and Building Services HR services add delays to all HR functions.

Technology Development: To a great extent, UBC Utilities relies on others to develop technological solutions such as heat recovery systems, piping system design and accounting systems. This reliance on outside sources serves to reduce risk but also avoids the upside of being more efficient and effective in carrying out department functions. UBC Utilities has a favourable approach to design and engineering in that small projects are handled in-house and the design of large and complex projects is contracted out. This approach allows UBC Utilities to have control of small projects and keep its staff levels stable. Contracting out the design and engineering of large projects brings in appropriate expertise without taking on the commitment of additional staff. This practice is similar to how district utility and heating plants approach design and engineering.

Procurement: UBC Utilities has a mix of in-house and externally provided procurement methods in place. Small items and projects are handled internally, while large purchases and projects are handled by UBC's Supply Management. Within the umbrella of the UBC culture, this method is quite effective in that it results in less duplication of services. However, the lack of in-depth knowledge of UBC Utilities' issues by Supply Management and the university's Human Resources Department does cause frequent delays in bringing projects and purchases in on time.

3.7.2 Primary Activities

Inbound Logistics: UBC Utilities arranges delivery of its materials and commodities but does not provide transportation services for the materials and commodities. Mechanical supplies and parts are typically delivered by suppliers or couriers. BC Hydro delivers electricity to the UBC substation, Terasen delivers natural gas to the UBC let-down station and the UEL delivers water to the UBC Utilities water piping systems. This method of service permits UBC Utilities to focus on distribution of services, while suppliers focus on delivery to their customers.

Scheduling of projects and of employees work day and holidays is one of the main tasks for supervisors and managers.

Projects are reviewed on a monthly basis though-out the year from a progress and a financial perspective. Prior to year-end each manager submits a list of projects for consideration for the coming year and budgets are developed to align funding and those projects which fit into the budget. Cost estimates are developed at the conception of each project and a bill of materials is generated as fits the scope of work.

Working duties and annual vacations are scheduled by the respective supervisor for each of the trade crews and the schedules for the upcoming weeks and months are posted in the respective office areas. Approvals for annual vacation are given by the Manager for the staff in that area. Management and administrative work schedules are coordinated by the Director's assistant and approved by the Director. Staffing for the operation of the Power House is most complex since there must be two engineers on shift at all times thus this limits the number of operating engineers that can be on vacation at any one time.

Operations: Day-to-day operations in UBC Utilities involve operating the Power House steam-generating facility, maintaining utility systems throughout the campus and providing administrative support services for the operational and maintenance staff.

The operation of the Power House involves provision of two power engineers on shift 24 hours per day, 365 days per year, as well as maintenance of the Power House boilers and auxiliary equipment. Since the steam plant is classified as a First Class plant by the Boilers Branch of the BC Safety Authority, a Second Class Power Engineer must be on duty at all times as Shift Engineer, and a Third Class Power Engineer must also be on duty as an Assistant Shift Engineer. Relief coverage for holiday leave and sick leave by these essential services employees requires that two full-time employees are available to work shift to cover for such absences. Two power engineers normally work the dayshift to maintain steam plant equipment, and these staff also provide shift coverage for absences owing to staff holidays and illness. The staff of power engineers totals 19 employees, all of whom belong to the IUOE and report to the Power House Manager, also classified as Chief Power Engineer by the BC Safety Authority.

Maintaining utility systems throughout the campus requires the provision of electricians, plumbers, labourers and steamfitters to ensure normal services, as well as to meet the demands of project and construction services on the campus.

The UBC Utilities electricians monitor and maintain the high-voltage electrical system throughout the campus. This work involves daily inspections of the two 69 KV substations and the 12 KV distribution systems in buildings.

The UBC Utilities plumbers perform routine maintenance and repair work on all water, sewer and natural gas systems, from the point of supply up to the each building on campus. This work involves duties such as fire hydrant flushing, water quality sampling and testing, and underground line location and operation.

The UBC Utilities steamfitters work closely with the utilities maintenance engineers. The steamfitters respond to requests by management to upgrade steam supply systems, to accommodate steam supply to new buildings, modifications to old buildings and maintenance of existing systems. The steamfitters provide mechanical repair to the steam systems, while the utilities maintenance engineers

operate the systems by taking the systems out of service, locking them out for safe work and then de-locking those systems, returning them to operation, once repairs are complete.

Administrative support for the operational and maintenance staff involves a full range of services such as record keeping, computerized drafting, fuel purchase coordination, liaison with other departments and general office management duties.

As with design and engineering, the manufacturing of equipment for utility services is undertaken using a two-pronged approach. Small projects are manufactured by UBC Utilities staff, and large projects are contracted out. This approach is similar to how district utility and heating plants handle manufacturing. UBC Utilities performs all routine mechanical and electrical maintenance with UBC Utilities staff. Specialized tasks such as control instrumentation, major asbestos removal work and pressure welding are contracted out. While major asbestos removal work and pressure welding can be performed by any number of contractors, the nature of control and instrumentation maintenance work is so specialized that UBC Utilities is at risk of being unable to provide heat to the campus for an extended period if the skills of the control and instrumentation contractors were to be lost. While this risk is similar to that faced by other utilities using the same approach to maintenance, the risk is not in keeping with UBC and UBC Utilities being risk-averse. Preventative maintenance work within UBC Utilities shows room for improvement, as there is no clear and consistent spirit of ownership of this work among the staff.

Outbound Logistics: UBC Utilities delivers its services through its own set of systems. Having ownership of the delivery systems allows UBC Utilities to better provide effective and efficient service, which is consistent with most similar utility providers.

One staff member is responsible for meter reading duties. This person reads all the electrical, steam, natural gas and water meters and passes that information on to staff responsible for accounts receivable for preparation of invoices to customers.

Authorization of payment for services received is handled by each supervisor. As each invoice is received it is verified and stamped by the supervisor who coordinated that work or prepared the purchase order for that work, equipment or service.

Marketing and Sales: Being a monopoly, UBC Utilities has a relatively limited need for either marketing or sales. The small amount of marketing and sales required is performed by the UBC Utilities management.

Service: UBC Utilities provides virtually 100% percent of its services to its customers and systems. This service takes the form of responding to trouble calls for service interruptions or failures. As well, prior to any planned utility service outage, a service shutdown request form is processed so as to inform customers of the intent to repair or upgrade utility services. For UBC Utilities, Services is closely linked to Operations in that providing services is integral with maintaining the systems that deliver utility commodities. The provision of 100% of the utility services is one of UBC Utilities' core competencies and is consistent with how similar utilities provide services, as it serves to maximize efficiency and effectiveness. The management and staff of UBC Utilities are proactive in providing utility services that can meet future demand for such services on campus. Long term planning meetings are held each month to assess the upcoming demand for utility services and project priorities are developed from these meetings.

4 OPTIONS FOR IMPROVED EFFECTIVENESS

4.1 Privatization

The most fundamental issue facing UBC Utilities is the intention of the provincial government and the UBC Finance Department to privatize UBC Utilities. Options to address this issue include:

1. Totally spinning off UBC Utilities as it exists to provide the full spectrum of six utility services. This would keep all staff in one group and bring along most of the problems and advantages as they exist. Problems such as the current need for UBC Utilities to further develop the South Campus works yard and the overcrowding problem in the UBC Utilities building would have to be dealt with. This option would likely be more acceptable to the staff and unions as it would be perceived as less disruptive. However, UBC Utilities' providing a full range of services is not compatible with other business models in the utility industry and this would make UBC Utilities less attractive to potential buyers.
2. Breaking UBC Utilities up into its component parts with the electrical component going to BC Hydro, the gas component going to Terasen and the water and sewer portion going to the City of Vancouver or to the GVRD. This would leave the provision of steam to the campus as the only utility service to be run as a stand alone utility very similar to Central Heat or Seattle Steam and thus make it more attractive to potential buyers. This option would eliminate the need to have the South Campus works yard and solve the overcrowding problem in the UBC Utilities building. As well the ability to focus solely

on the provision one utility would improve the efficiency and effectiveness of the new businesses which would develop out of the break-up of UBC Utilities.

3. Not proceeding with privatizing UBC Utilities. This may be an option if none of the targeted firms express an interest in acquiring the department. However, there is and has been a long standing intention by UBC to focus on education and research; handled effectively, privatizing UBC Utilities could offer advantages for all concerned.

No staff need to lose their jobs with these options; and this is very much in keeping with UBC policies of encouraging stability among the staff. In the case of option #1 all staff would remain as one group. In the case of option #2 staff would end up being employed by the respective corporation for that service.

4.2 Union Issues

4.2.1 Unification of Unionized Staff

The ongoing rivalry between CUPE and IUOE, the two unions in UBC Utilities, causes reduced effectiveness and efficiencies. The CUPE and IUOE jurisdictional issues are to a large extent caused by inter-union disputes and the lack of clarity in job duties and areas of work responsibility and authority. For instance, the power engineers are required by the BC Safety Authority to operate and oversee all maintenance on all steam systems. This requirement involves the closing and opening of any and all steam and condensate valves for safe work on the steam and condensate systems, in preparation for repairs or modifications. However, the steamfitters also require knowledge of those systems to perform their work, and the inter-relatedness of the work of these two groups requires detailed communication and planning. The fact that there are two unions, each with an undercurrent of protectionism for their job security and a tendency to blame the other union for errors, results in duplication of some work and avoidance of other work. AAPS is mostly a non-issue in the function of UBC Utilities as AAPS has been

very low keyed in their approach to solving disputes. Options for eliminating union jurisdictional disputes include:

1. Creating a single UBC Utilities union to encompass all non-management workers. This option would involve dealing with issues raised by IUOE and CUPE members, as well as by AAPS staff members. It would also involve dissolving the existing membership in the three groups and creating one union to address all UBC Utilities staff concerns. This option appears most complex but holds the promise of unifying all workers in UBC Utilities so as to improve effectiveness. If the move to privatization is to be successful, this option will hold most promise as it will be most efficient to deal with one union as opposed to dealing with the three unions. Even if UBC Utilities were to be broken up into its various components, leaving only the steam generating facility to be directly privatized, there are currently members of all three unions involved in the steam plant, this option would serve privatization most effectively.
2. Rolling the UBC Utilities IUOE members into CUPE. This option appears to be a simpler one and would eliminate the bulk of current inter-jurisdictional disputes. CUPE has a much larger presence on campus, and this option would eliminate one union contract on campus. However, it would keep the UBC Utilities staff in the same union as in other areas of the campus and would not serve to clearly separate UBC Utilities from the campus.
3. Rolling the UBC Utilities CUPE members into IUOE. This option also appears to be a simpler one than option #1 above and would eliminate the bulk of current inter-jurisdictional disputes. This option would serve to separate UBC Utilities staff from other campus staff and may help UBC Utilities staff to focus on UBC Utilities issues.
4. Clarifying duties of each trade and union. The issue of lack of clarity on the exact scope of work of each trade and each union need to be addressed definitively. This option can be

addressed separately, as clarity in trade and union jurisdictional issues would provide immediate benefits in operational effectiveness.

While all four of these options present some potential benefits, the first three options are influenced by the current move by UBC to attract a private utility to purchase UBC Utilities. The potential sale of UBC Utilities seems to be an overarching issue, and while it may be best to allow the potential parent utility to address this issue, it may also make UBC Utilities more attractive to a potential buyer if only one union was represented there. On the other hand, if the current effort to privatize fails again, it would be beneficial to pursue these options for improved effectiveness, as well as for the future possibility of making UBC Utilities attractive to private firm.

4.2.2 Union Opposition to Privatization

Given that UBC has indicated its intention to reduce non-core activities such as addressing infrastructure issues and operating UBC Utilities, options to address the conflict resulting from the unions' opposition to privatization should be addressed. In this regard, the move to privatize UBC Utilities meets the objective of UBC focusing on its core activities. Options to uncovering and eliminating union opposition to the privatizing of UBC Utilities include:

1. Convening meetings with UBC Utilities staff, to better understand their concerns about privatization. The issue of privatization is a controversial topic that can lead to misunderstandings, and third-party assistance in this area may be required.
2. Promoting the success of those firms that originated as government institutions.
3. Emphasizing to staff the potential benefits of the privatization of UBC Utilities.

4.3 Financial and Accounting

4.3.1 Cost Control

There is a need for better control of projects carried out by Plant Operations staff in UBC Utilities, to avoid project cost overruns such as those recently experienced with the climate control unit for the new control centre in UBC Utilities and with the Power House city-water-line upgrade. Options to reduce such cost overruns include:

1. Eliminating all Plant Operations staff performing work in UBC Utilities. This would present an easier operation to manage and would thus be more attractive to a private firm interested in buying UBC Utilities.
2. Implementing effective cost control measures for all projects carried out by Plant Operations in UBC Utilities.

UBC Utilities currently pays Land and Building Services an \$800,000 annual fee for central administration costs. Options to eliminate or reduce this fee include:

1. Transferring all related administration activities to UBC Utilities.
2. Introducing a fee-for-service system for all work performed by Land and Building Services staff in UBC Utilities.

4.3.2 Accounting and Purchasing Systems

The existing accounting, billing, work order and purchase order systems are not compatible. The financial systems at UBC Utilities are a blend of systems that evolved within UBC Utilities and those provided by the UBC Finance Department. As a result of the combination of financial systems in use at UBC Utilities, the financial status of the utility is not known until about 45 days later. As the financial

system is currently set up, UBC Utilities is inherently difficult to manage because the financial status is at any one moment is never clearly known and this presents an impediment to attracting a buyer. Options to unify and streamline the current systems include:

1. Implementing integrated, effective, real-time bookkeeping, purchasing and accounting systems. The implementation of a credible system of financial accountability for UBC Utilities is essential no matter what becomes of the utility.
2. Contracting out these services to a third party that specializes in such work. This option may or may not be attractive to a buyer, depending on that firm's preference; however, most firms of the size of UBC Utilities carry out their own financial management tasks.

4.3.3 Reduction of Overtime Costs

Overtime pay for coverage of staff absence from work for sickness and overtime pay for work in excess of a normal work-day or work-week could be reduced by:

1. Hiring part-time staff to be available to cover for sick leave.
2. Working to change the collective agreements to eliminate the abuse of the current allowance of 12 sick days per employee per year.

4.3.4 Elimination of Plant Operations Work in UBC Utilities

Given that UBC intends to have UBC Utilities operate as an independent business and that Plant Operations staff working in UBC Utilities are a source of financial concern for UBC Utilities, the elimination of Plant Operations staff performing work in UBC Utilities should be considered. This would serve UBC Utilities well even if privatization does not come to be a reality and more so if a buyer of found.

4.4 Plant Instrumentation Maintenance

As noted in sections 1.4.1 and 2.4.1, the evolution of the control systems in the Power House presents a risk to the reliability of provision of the steam supply to the campus. Given this risk, there is a need to develop options to reduce the liability from control and instrumentation being a hybrid of electronic and pneumatic systems and from these systems being serviced by two different off-campus contractors. Options to address this issue include:

1. Training UBC Utilities staff to perform the instrument and control maintenance duties currently performed by contractors.
2. Developing alternative suppliers that can provide back-up or superior service to the existing instrument and control service suppliers.

Either option may be acceptable to a buyer; however the option to be chosen would most likely be influenced by the expertise the management team if a buyer were found for UBC Utilities.

5 RECOMMENDATIONS

5.1 Privatization

Understanding the intention of the provincial government and the UBC Finance Department to privatize UBC Utilities so as to allow UBC to focus on research and education, it is recommended to pursue privatization as UBC Utilities as a heating plant only. This business model is functioning well in the form of other utilities such as Central Heat and Seattle Steam and this would make the utility most attractive to buyers. It is the writer's opinion that BC Hydro, Terasen and either the City of Vancouver or the GVRD would be interested in the additional economies of scale to be gained from the utility business available at UBC.

5.2 Union Issues

5.2.1 Unification of Unionized Staff

Understanding that inter-union rivalry results in lower effectiveness, reduced efficiency and less than desirable customer service, it is recommended that UBC and UBC Utilities develop a single union to encompass all UBC Utilities non-management staff. Even if the move to privatization is not successful, UBC Utilities will realize benefits from this strategic effort. It would involve some interim steps such as jurisdictional clarification, with the objective of supporting the UBC Mission and Vision.

It is expected that there would be some union opposition to an effort to bring all UBC Utilities workers under one union since each union has its own sense of self preservation. A business case could be built that would support the unification of the IUOE, CUPE and AAPS staff members since the effect of

having these three groups is counterproductive to the provision of the business functions of UBC Utilities. One union for all UBC Utilities workers would serve to protect the rights of all workers and to allow UBC Utilities to more effectively serve its customers.

5.2.2 Union Opposition to Privatization

It is recommended that UBC Utilities address the conflict resulting from the unions' opposition to privatization. In this regard, UBC Utilities should convene meetings with UBC Utilities staff, to better understand their concerns about privatization, promote the success of those firms that originated as government institutions and emphasize to staff the potential benefits of the privatization of UBC Utilities. These meetings would actively engage both the IUOE and the CUPE, to garner their support in moving UBC Utilities toward more financially responsible performance. Gaining the unions' support would involve understanding their objections to UBC Utilities being a private firm and being open to hearing about and dealing with their concerns.

5.3 Financial and Accounting

5.3.1 Cost Control

To better control projects work in UBC Utilities, the recommendation is to eliminate all Plant Operations staff performing work in UBC Utilities. To reduce UBC Utilities' cost of operations and improve administrative effectiveness, it is also recommended that UBC Utilities take on all administrative duties for UBC Utilities. In addition, developing strategic and tactical plans to mould UBC Utilities into an attractive target for privatization is recommended, to avoid the department being taken over at a less than desirable cost and private industry making and benefiting from all the improvements.

5.3.2 Accounting and Purchasing Systems

The intention of the BC Government and the UBC Board of Governors to move toward privatizing UBC Utilities overshadows all other issues at UBC Utilities. Given that existing accounting, billing, work order and purchase order systems are not compatible with each other, it is recommended that UBC Utilities implement an integrated system of effective bookkeeping, purchasing and accounting. This integrated approach would involve developing an accrual accounting system based on financial commitments by all authorized staff, to provide accurate and real-time information on all aspects of UBC Utilities' operations. This development would also involve determining whether there is a need for new skills in UBC Utilities or whether the existing staff have the ability to competently carry out the accounting work. Even if the move to privatize UBC Utilities does not come to fruition, a real-time integrated accounting system will provide benefits for both UBC and UBC Utilities.

5.3.3 Reduction of Overtime Costs

It is recommended that UBC Utilities work to change the collective agreements to reduce abuse of sick time.

5.3.4 Elimination of Plant Operations Work in UBC Utilities

It is recommended that UBC work to eliminate Plant Operations staff performing work in UBC Utilities. This will serve UBC Utilities well whether UBC Utilities is privatized or not since it would reduce costs and streamline operations.

5.4 Plant Instrumentation Maintenance

An uninterrupted supply of utility services is critical to UBC; it is recommended that UBC Utilities develop a plan to improve the reliability of the control systems in the Power House. The plan

would involve determining the viability of training UBC Utilities staff to maintain the instrumentation and control systems in use and to prevent failures that would compromise the supply of services to the campus.

APPENDICES

Appendix 1

UBC Utilities Steam Production for 2004

2004 UBC Utilities Power House steam, gas, water and condensate summary							Steam flow - lbs/hr		
Date	STEAM (LBS)	Gas / GJ	Cond Ret - usg	Water MU - usg	% M U	% C R	Average	Max	Min
January	103,571,000	122,656	3,501,780	7,588,235	68%	32%	139,208	222,000	88,000
February	89,479,000	109,958	3,473,454	6,066,720	64%	36%	128,562	184,000	94,000
March	85,211,000	105,816	3,403,655	5,821,048	63%	37%	114,531	177,000	60,000
April	61,330,000	76,522	1,876,147	4,560,101	71%	29%	85,181	146,000	44,000
May	45,433,000	59,057	1,027,662	3,813,268	79%	21%	61,066	110,000	35,000
June	36,734,000	47,888	259,641	1,427,797	85%	15%	51,019	96,000	31,000
July	35,231,000	47,072	702,604	3,122,476	82%	18%	47,353	67,000	32,000
August	37,642,000	47,368	2,217,280	3,089,136	58%	42%	50,594	66,500	25,000
September	47,898,000	60,843	818,861	4,282,219	84%	16%	66,525	145,000	32,000
October	67,370,000	85,498	1,191,241	5,752,644	83%	17%	90,551	158,000	50,000
November	91,019,000	115,113	2,472,210	7,085,289	74%	26%	126,415	214,000	13,000
December	107,805,000	130,000	3,267,470	7,627,617	70%	30%	144,899	204,000	92,000
Totals / averages	808,723,000	1,007,791			73%	27%	92,159	149,125	49,667
							maximum	222,000	
							minimum		13,000
Note 1 November minimum steam flow is due a steam plant trip on November 10th									

Note. From *UBC Utilities: Power House Annual Report 2004*, by D. Babich, 2004, Vancouver, BC: UBC Utilities. Copyright 2004 by the University of British Columbia. Reprinted with permission.

Appendix 2

UBC Utilities Operating Budget

(in thousands of dollars)

	Actual 2001/200 2	Actual 2002/200 3	Actual 2003/200 4	Actual 2004/200 5	Budget 2005/200 6
REVENUES					
University – Core					
Electrical	\$3,554	\$3,520	\$3,526	\$3,974	\$3,782
Steam	6,910	7,104	6,563	6,927	7,732
Gas	591	566	578	467	670
Water	859	956	842	855	1014
Sanitary sewer	711	680	647	580	637
Operations and Maintenance	1,420	1,448	1,492	1,537	1,574
Other	-	-	142	-	-
Subtotal University – Core	14,045	14,274	13,790	14,340	15,409
Cyclical Maintenance	501	447	397	915	560
Tenants and Ancillaries	11,613	10,468	11,216	11,856	12,433
Miscellaneous	13	163	145	70	303
Deferred Capital Contribution	894	907	636	631	767
TOTAL REVENUES	27,066	26,259	26,184	27,812	29,472
COST OF GOODS SOLD					
Sewage Levy	1,009	1,014	943	892	857
TOTAL COST OF GOODS SOLD	20,150	19,534	19,603	21,153	22,673
GROSS MARGIN	6,916	6,725	6,581	6,659	6,799
EXPENSES					
Salaries	2,535	2,614	2,773	3,043	2,966
Benefits	420	467	486	515	619
Operational Supplies, Repairs and Maint.	1,321	1,252	1,180	1,432	1,169
Training	35	12	12	42	12
Administrative Service Charge	234	215	232	241	249
Infrastructure Services Levy (GMSL)	101	135	175	205	194
Land and Building Admin Charge	287	395	403	379	316
Cogeneration Study	-	105	-	-	-
Depreciation	1,039	1,112	912	935	984
TOTAL EXPENSES	5,972	6,307	6,173	6,792	6,509
NET INCOME (before extraord. item)	\$944	\$418	\$408	(\$133)	\$290
EXTRAORDINARY ITEM					
Writedown of accounts receivable	-	-	(\$1,400)	(300)	-
Interfund transfer for Capital assets	-	-	-	4,210	\$3,000
NET INCOME (LOSS)	\$944	\$418	(\$992)	3,777	3,290

Equity

Retained Earnings, beginning of year	(\$1,533)	(\$589)	(\$171)	(\$1,163)	\$2,614
Net Income (Loss)	\$944	\$418	(\$992)	\$3,777	\$3,290
Retained Earnings, end of year	(\$589)	(\$171)	(\$1,163)	\$2,614	\$5,904
Equity in Capital Assets	\$3,982	\$3,982	\$4,234	\$5,599	\$3,290
Total Equity	\$3,393	\$3,811	\$3,071	\$8,213	\$9,194

Appendix 3

UBC Utilities

Electrical Rates

Effective April 01, 2004

Rate Code	Rate Amount	
	Energy	Demand
1211	Basic charge \$ 4.45 Minimum charge \$ 12.22 First 14800 kwh @ 0.06960 All additional kwh @ 0.0335	First 35 kwh @ \$ 0.00 Next 115 kwh @ \$ 3.56 All additional kwh @ \$ 6.83
1210	Basic charge \$ 4.45 Minimum charge \$ 12.22 First 14800 kwh @ 0.0696 All additional kwh @ 0.0335	First 35 kwh @ \$ 0.00 Next 115 kwh @ \$ 3.56 All additional kwh @ \$ 6.83
1101	Basic charge \$ 7.42 Minimum charge \$ 6.92 All additional kwh @ 0.0619	First 0 kwh @ \$ 0.00 All additional kwh @ \$ 0.00
1220	Basic charge \$ 8.89 Minimum charge \$ 12.22 All additional kwh @ 0.0696	All additional kwh @ \$ 0.00
1821	Minimum charge \$ 4.411 All additional kwh @ 0.02787	All additional kwh @ \$ 4.73
Ecore*	All additional kwh @ c 0.04481	0.00
1200, ELEC	Basic charge \$ 4.45 Minimum charge \$ 12.22 First 14800 kwh @ 0.0696 All additional kwh @ 0.0335	First 35 kwh @ \$ 0.00 Next 115 kwh @ \$ 3.56 All additional kwh @ \$ 6.83

* Acronym for Electricity to Core Facilities

Appendix 3 continued

Steam Rates

Effective April 01, 2004

	Rate Amount
Rate Code	Rate per 1000 Lbs
R1	\$17.12
SCORE*	\$16.15

* Acronym for Steam to Core Facilities

Gas Rates

Effective April 01, 2004

	Rate Amount
Rate Code	
SML, GAS	Basic Charge \$22.57, All Add. GJ \$9.699
LRG, GAS	Basic Charge \$120.40, All Add. GJ \$9.128
RES1, GAS	Basic Charge \$10.75, All Add. GJ \$10.052

Water Rates

Effective January 01, 2004

	Rate Amount
Rate Code	Per Cubic Feet
21, Water	Minimum Charge \$21.00, All Add. CF 0.01487
ECORE, Water	Basic Charge \$21.00, All Add. CF 0.01124

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