

*IHEA Victorian Branch PD2 - Asset  
Management & Energy Efficiency  
12<sup>th</sup> June 2009*

Maintenance - v – Energy Performance

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Wodonga Regional Health Service

Passions

1. Energy Management without inflicting hardship.
2. Committed to maintenance.
3. The Ducati.

# WHY?

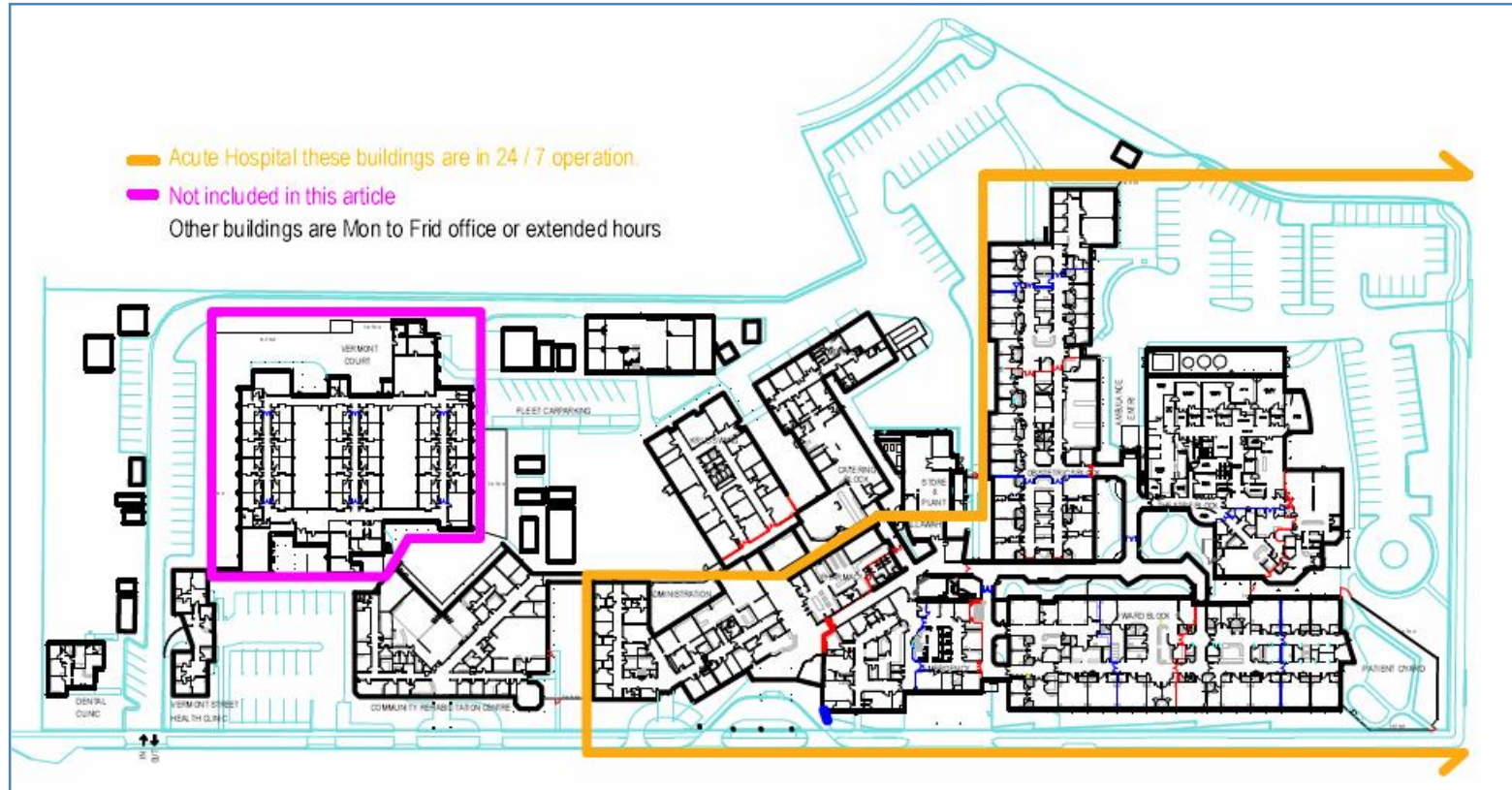
## **The five year project 2003 to 2008:**

- 80% of the site had been redeveloped between 1992 and 2001.
- The redevelopment covered all the inpatient and outpatient facilities.
- The site is landlocked and there would be no further major developments within the foreseeable future.
- WRHS had committed to the implementation of a CMMS with appropriate resourcing.

In brief the pre-determined outcomes based on experience and literature were:

1. An increased planned maintenance (PM) regime,
2. Should reduce the risk of unforeseen breakdown maintenance (RM), and
3. Manage the energy consumed to run the facility more effectively.

# Albury Wodonga Health - Wodonga Hospital Campus



Usable floor area (UFA) single storey; with the bulk of building assets being light weight construction.	12,468.7 m2 set on 3.738 hectares
Treated floor area (TFA) that is; conditioned in some form (HVAC).	82.5% or 10,285 m2
77% of the TFA runs 24/7.	that is; 7,974.5 m2
Plant areas	942m2
Covered ways and court yards	1,314m2

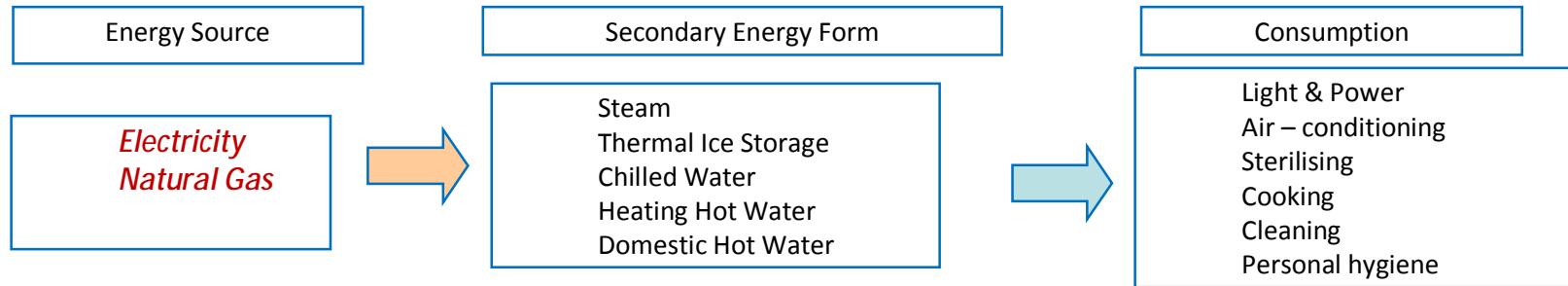
# Maintenance Plan (extract) 2008

June 2008			
Ice Machine, Building 11	Ice Machine service - Monthly	0.50	\$10.00
Lancer 1300UPDIN Utensil Washer-Disinfector CSSD, Building 8	Maintenance contract Lancer 1300UPDIN - Quarterly	0.00	\$4,068.00
Ice Machine Bream CB316, Building 7 (shared between Med/Reh and Sur).	Ice Machine service - Monthly	0.50	\$10.00
Power Factor Correction Unit, Building 10	Electrical PFC Filter Maintenance - Monthly	0.50	\$15.00
Ice Machine CB416 Brema, Building 09	Ice Machine service - Monthly	0.50	\$10.00
Air-handling Unit No.1, Cafe - Building 11	Fan supply air/Air Filters, combined Level 1 - Monthly Building 11	1.00	\$22.00
Air Handling Systems for PM - Building 2	Fan supply air/Air Filters, combined Level 1 - Monthly Building 2	1.00	\$22.00
Air Handling System for PM - Building 4	Fan supply air/Air Filters, combined Level 1 - Monthly Building 4	3.00	\$66.00
Air Handling Systems for PM - Building 5	Fan supply air/Air Filters, combined Level 1 - Monthly Building 5	4.00	\$88.00
Air Handling Systems for PM - Building 6 ED/Imaging	Fan supply air/Air Filters, combined Level 1 - Monthly Building 6	4.00	\$88.00
Air-handling Systems for PM - Building 7 Paeds/Acute/General	Fan supply air/Air Filters, combined Level 1 - Monthly Building 7	5.00	\$110.00
Air Handling Systems for PM - Building 8	Fan supply air/Air Filters, combined Level 1 - Monthly Building 8	3.00	\$66.00
Air-handling System for PM - Building 9 Obstetrics	Fan supply air/Air Filters, combined Level 1 - Monthly Building 9	5.00	\$110.00
Air Handling System Kruss Wing - Building 12	Fan supply air/Air Filters, combined Level 1 - Monthly Building 12	2.00	\$44.00
Boiler Station x 2 steam boilers	Steam Boilers, daily inspections / rounds - Building 11 Monthly	30.00	\$576.25
Fluid Cooler Theatre Ice Storage Reg# CTS903	Cooling Tower Audit and Servicing, Annual	8.00	\$1,000.00
Fluid Cooler Theatre Ice Storage Reg# CTS903	Cooling Tower, Servicing - Monthly	14.00	\$488.15
Exhaust Fan - Main Canopy, Building11	Kitchen Exhaust, Level 1 Monthly	3.00	\$60.00
2184 Emergency Generator (Main)	Emergency Generator, Annual	7.00	\$570.00
2184 Emergency Generator (Main)	Emergency Generator, Fortnightly (continued from previous month).	1.00	\$20.00
2184 Emergency Generator (Main)	Emergency Generator, Monthly (1st Thursday of the month)	2.00	\$45.00
Fan Coil Unit FCU-CP 1 Supply - Building 10	Fan supply air/Air Filters, combined Level 1 - Monthly	1.00	\$22.00
Sterilizers under Getinge Contract, Building 8	Maintenance Contract Sterilisers CSD, Getinge - 3 Monthly	0.00	\$2,480.00
Steam Boiler No 1 - Maxitherm "D" Frame (922), Build 11	Boilers Periodic and Annual Inspections	0.00	\$270.00
Ice Tank No. 1 Trane/Calmac - Building 4 CRC	Ice Storage System melt - Annual	3.00	\$60.00
Ice Tank No. 2 Trane/Calmac - Building 4 CRC	Ice Storage System melt - Annual	3.00	\$60.00
Ice Tank No. 2 Calmac - Building 8 Theatre	Ice Storage System melt - Annual	3.00	\$60.00
Ice Tank No. 3 Trane/Calmac - Building 8 Theatre	Ice Storage System melt - Annual	3.00	\$60.00
	June Sub total	108.00	\$10,500.40
	2007/08 Annual Totals	1,467.5 hours	\$213,750.82

Two important aspects of any plan are:

- Determine if it is a labour only inspection or labour and parts servicing of the plant and equipment?
- Have the whole plan as close as possible costed for budgeting purposes.

# Measures included



Works Categories	Planned	Repairs
<i>Electrical safety testing</i>	WRHS	WRHS
<i>Electrical switchboard inspections</i>	WRHS	WRHS
<i>Emergency lighting &amp; exit signs</i>	WRHS	WRHS
<i>Exit Doors &amp; paths travel</i>	WRHS / CONT	WRHS / CONT
<i>Lighting services</i>	WRHS	WRHS
<i>Air-conditioning systems</i>	WRHS / CONT	WRHS / CONT
<i>Cooling towers</i>	WRHS / CONT	WRHS
<i>Mechanical plant</i>	WRHS	WRHS
<i>Steam boilers &amp; reticulation</i>	WRHS / CONT	WRHS / CONT

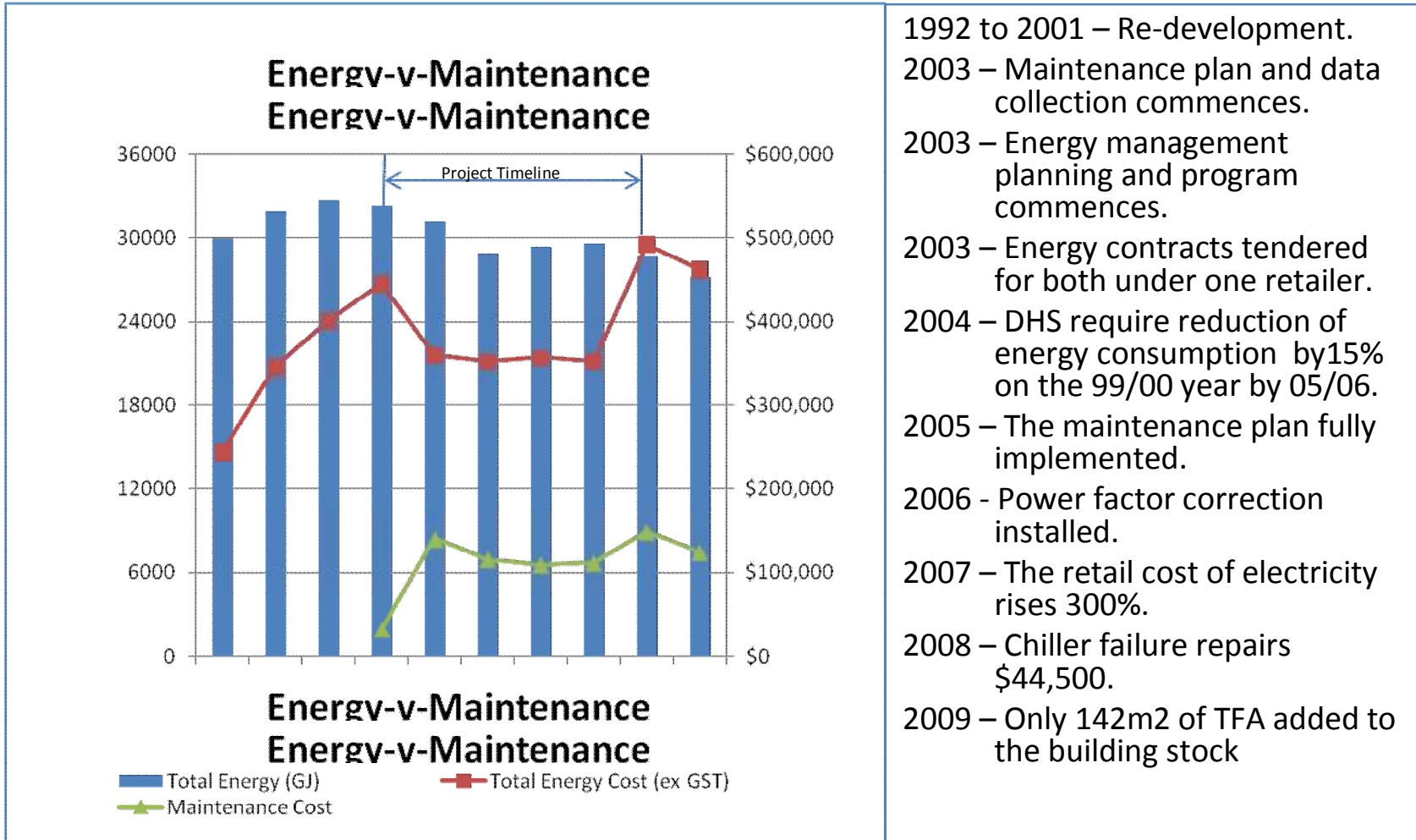
## Rebuilding completed 2001

- Energy efficient features were included.
- The energy usage was slowing but the cost increasing.
- Steam was inefficient due to oversized boilers and poor reticulation.
- HVAC systems were not functioning efficiently.
- No power factor Correction.

# Problem examples

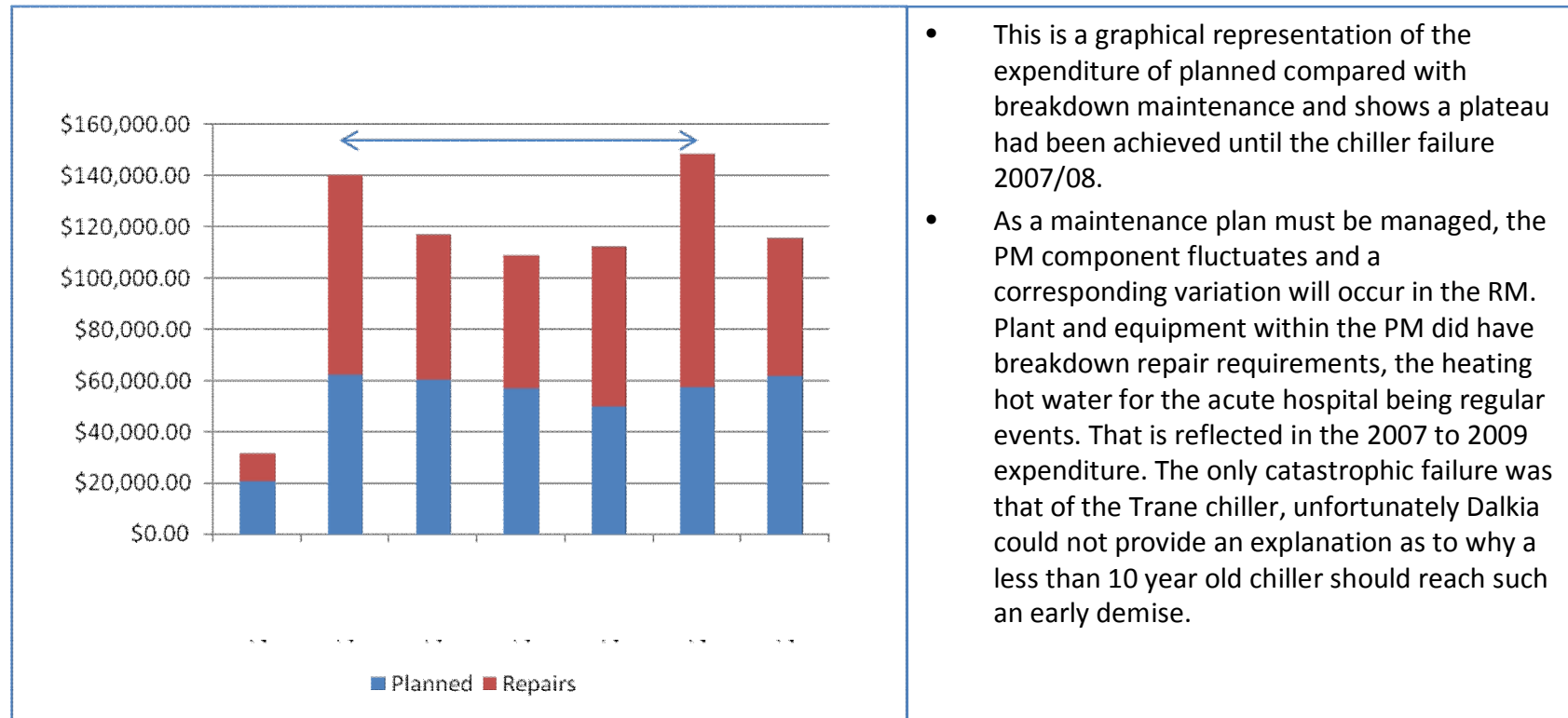
- Adhoc maintenance regime for the 47 AHU / FCUs, 5 Packaged Units and numerous Room A/Cs.
- Poor air quantities being supplied by the A/C plant and equipment.
- Poor steam / water pipe lagging, leaking valves and traps along with problems with the steam condensate return system.
- There was insufficient control over the steam injection on the feed water tank.
- Steam boiler redundancy, the poorest boiler taken off line and placed into wet storage in 2004/05.
- Ice storage systems inefficient not providing full capacity of thermal storage.
- The BMS was not performing efficiently causing problems with facility management controls and security.

# Broad Outcomes



- 1992 to 2001 – Re-development.
- 2003 – Maintenance plan and data collection commences.
- 2003 – Energy management planning and program commences.
- 2003 – Energy contracts tendered for both under one retailer.
- 2004 – DHS require reduction of energy consumption by 15% on the 99/00 year by 05/06.
- 2005 – The maintenance plan fully implemented.
- 2006 - Power factor correction installed.
- 2007 – The retail cost of electricity rises 300%.
- 2008 – Chiller failure repairs \$44,500.
- 2009 – Only 142m2 of TFA added to the building stock

# Maintenance

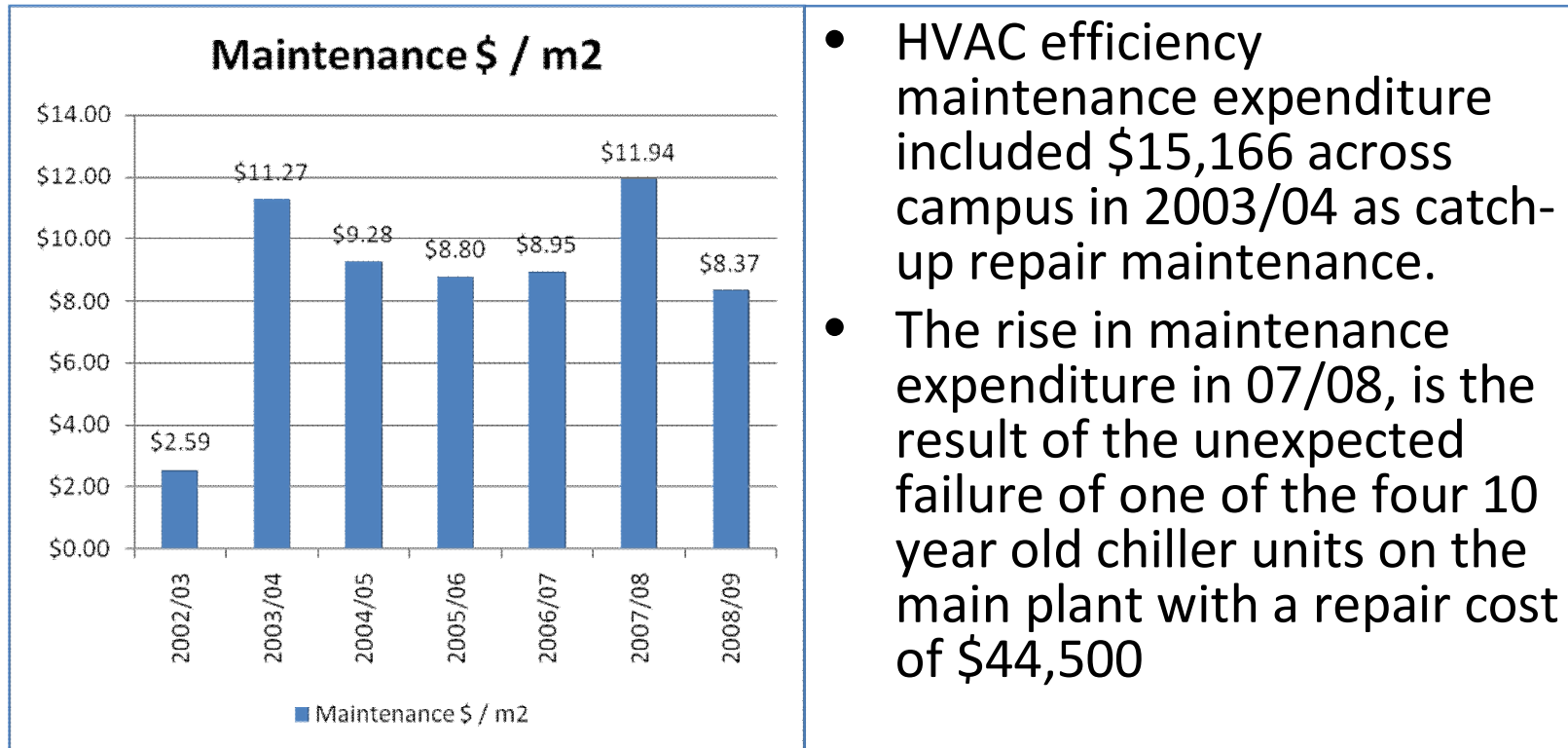


- This is a graphical representation of the expenditure of planned compared with breakdown maintenance and shows a plateau had been achieved until the chiller failure 2007/08.
- As a maintenance plan must be managed, the PM component fluctuates and a corresponding variation will occur in the RM. Plant and equipment within the PM did have breakdown repair requirements, the heating hot water for the acute hospital being regular events. That is reflected in the 2007 to 2009 expenditure. The only catastrophic failure was that of the Trane chiller, unfortunately Dalkia could not provide an explanation as to why a less than 10 year old chiller should reach such an early demise.

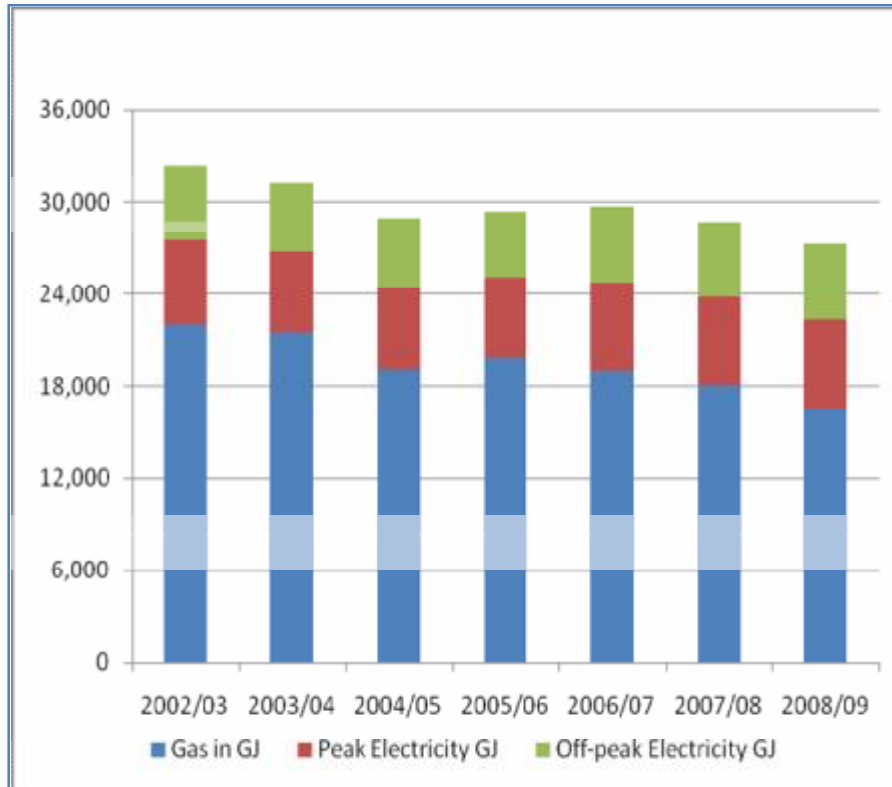
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# Maintenance



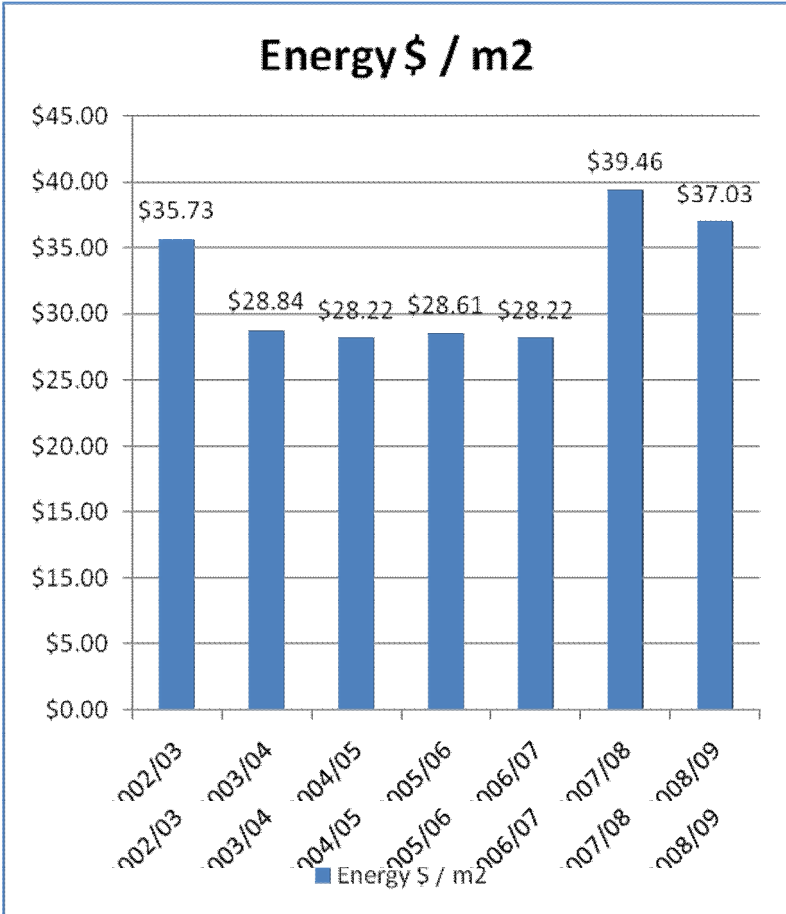
# Energy



- The requirement by Victorian Government to achieve a 15% reduction in energy per square metre on the 1999/2000 benchmark by 2005 was not achieved.
- This can be explained by the campus staffing, client and visitors' population continuing to expand; simply 'more people equals more energy!'
- Figure 5 shows even with the extreme conditions through summer and winter of 02/03, 06/07 and 07/08 the energy consumption throughout the campus has reached a plateau.

1. An increased planned maintenance (PM) regime,
2. Should manage the energy consumed to run the facility more effectively.

# Energy



- The NE of Victoria like most other parts of Australia is now in the grip of a prolonged drought with extreme temperatures and low rainfall. The data in Figure 5 demonstrates that there have been good practices in place to maintain a steady level of consumption of electricity and reduction of gas on the Campus. This is in spite of the increased level of activity related to occupancy.
- The majority of gas used is for steam, then space heating and domestic hot water. The intense maintenance in both PM and RM on the steam and heating hot water boilers/reticulation has been the crucial factor in the reduction in gas consumption.
- Electricity consumption in the off-peak period has remained steady as would be expected with the activities at night and weekends being constant. However the peak consumption has shown a steady rise, reflective of increased activities during normal working hours; refer to previous slide

## Interesting reading

Although not referred to in the article, I have used the following references/information over the years:

- Maintenance Engineering Handbook by the McGraw-Hill Book Company; LofCCN: 656-23560
- NAFA Guide to Air Filtration; ISBN 1-884152-00-7
- Any of the former HOSPLAN materials
- Our own IHEA – Energy Conservation Guidelines from the mid 1980's
- The Resource Implications of Building Maintenance Programs by the SEC of Victoria from the late 1970's