Sustainability

South Regional TAFE

BSBSUS401 Implement and Monitor Environmentally Sustainable Work Practices

Computer Bank 3

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Introduction

This unit describes the skills and knowledge required to effectively analyse the workplace in relation to environmentally sustainable work practices and to implement improvements and monitor their effectiveness.

Our class split into three groups of three or more people to collect information on environmental and resource efficiency by analysing resource usage (power readings) on various pieces of equipment in D Block at South Regional TAFE.

The equipment we chose to investigate included:

- Water meter ground level
- Water meter level one
- Printer level one hallway
- Computer Bank 2 Room D23
- Computer Bank 3 Room D23

We used power meters to record the following readings each day:

- Volts
- Amps
- Watts
- Kwh
- Power Factor

The class collected and organised information from the range of five different sources to provide advice for improvement opportunities. The initial readings were measured daily and documented for a period of two weeks. The readings of the equipment were taken whilst running in their normal day to day operation. All class members recorded readings for all equipment items during the initial two weeks where no changes were made to how the equipment was operated.

Following the initial record taking each group was assigned one equipment area to make changes to and record the power readings for a further two week period. My group consisted of myself, Jaiden and Rheine and we were assigned the Computer Bank 3 - Room D23 equipment. This equipment consisted of a bank of four computers running throughout the day from 8.30am – 3.30pm. These computers were left running between those hours in the initial recording phase.

We analysed the current work practices and data and identified that we could easily make improvements to the resource usage by simply turning off the computer screen during breaks or when the lecturer was instructing on the whiteboard for extended periods of time. Furthermore, during lunch breaks we could turn off our computers completely for the 45 minute break.

During the following two week period, we planned to started up our computers then turn off all computer screens off and record the same readings as in the initial recording phase.

Expectations

During the two weeks of changes being made, the resource usage was recorded as planned with the same reading types. We expected to see some changes in the power readings during this period of time, however we were quite unsure of what those changes would be and their significance.

Below is a table of our results from the initials reading and the readings after the changes were made.

Computer Bank C - D23

Initial Readings

Day	Date	Time	Volts	Amp	Watts	kwh	Power Factor
Tuesday	30/08/2016	9:00	246	1.46	243	0.2	58
		15:00	245	0.7	105	1.2	58
Wednesday	31/08/2016	9:00	249	1.48	244.3	2.3	58
		15:00	247	1.2	186	3.5	67
Thursday	1/09/2016	9:00	245	1.3	179.5	4.6	66
		15:00	251	0.81	122.3	5.5	58
Friday	2/09/2016	9:00	250	1.5	187	6.3	66
		15:00	247	1.1	191.6	7.8	69
Monday	5/09/2016	9:00	247	1.44	238	9.9	64
		15:00	247	1.37	220	11.1	65
Tuesday	6/09/2016	9:00	246	1.74	246.5	12.1	65
		15:00	249	1.43	235.1	13.6	65
Wednesday	7/09/2016	9:00	247	1.47	238.4	14.7	66
		15:00	247	1.12	69.9	15.3	58
Thursday	8/09/2016	9:00	245	1.11	186	16.4	67
		15:00	251	1.1	179.5	17.5	66
Friday	9/09/2016	9:00	250	1.2	190	17.4	58
		15:00	247	1.3	69.9	17.9	66
		AVERAGE	247.56	1.27	185.11		63.33

After the Changes

Day	Date	Time	Volts	Amp	Watts	kwh	Power Factor
Monday	17/10/2016	9:00	251	0.77	122.7	0	63
Tuesday	18/10/2016	9:00	249	0.84	147.7	2.2	68
Wednesday	19/10/2016	9:00	249	0.57	85.9	4.7	63
Thursday	20/10/2016	9:00	247	0.65	122.7	6.4	65
Friday	21/10/2016	9:00	248	0.73	147.7	8.7	64
Monday	24/10/2016	9:00	251	0.76	118.7	11	62
Tuesday	25/10/2016	9:00	250	0.86	133.6	13.5	66
Wednesday	26/10/2016	9:00	248	0.92	127.7	15.8	65
Thursday	27/10/2016	9:00	247	0.89	118.7	17.5	63
Friday	28/10/2016	9:00	248	0.78	133.6	19.6	61
		AVERAGE	248.80	0.78	125.90		64.00

Cost Benefits

Of all the readings that were taken, most stayed fairly stagnant; however there was a significant drop in the Amps and Watts readings. The Amp reading dropped by 39% and the Watts reading dropped by 32%.

The amp (short for ampere) (SI unit symbol: A), is the System International (SI) unit of electric current.

Watt is the unit of power (symbol: W). One watt is defined as the energy consumption rate of one joule per second. 1W = 1J / 1s. One watt is also defined as the current flow of one ampere with voltage of one volt.

The cost can be defined as the following:

A cost of 20.54c per kWh was obtained from the website www.redenergy.com.au

Using the calculator from the website www.maximintegrated.com the following figures were calculated:

Initial Cost

The bank of computers running with the screen turned on for one hour during the day:

ENERGY COST CALCULATOR

How much does it cost to operate an electrical device in your home? It might be more than you think!

Enter Your Data	
Cost of Electricity at Your Highest Rate Tier (Cents per kWh)	20.54
Power Consumed by Device (W)	185
Average Usage per Day	1 hr
Average Usage of Days per Month	22

Calculated Results	
Energy Used per Month (kWh)	4
Cost per Week ($)	0.19
Cost per Month ($)	0.84
Cost per Year ($)	10.03

Cost after changes

The bank of computers running with the screen turned off for one hour during the day:

ENERGY COST CALCULATOR

How much does it cost to operate an electrical device in your home? It might be more than you think!

Enter Your Data	
Cost of Electricity at Your Highest Rate Tier (Cents per kWh)	20.54
Power Consumed by Device (W)	126
Average Usage per Day	1 hr
Average Usage of Days per Month	22

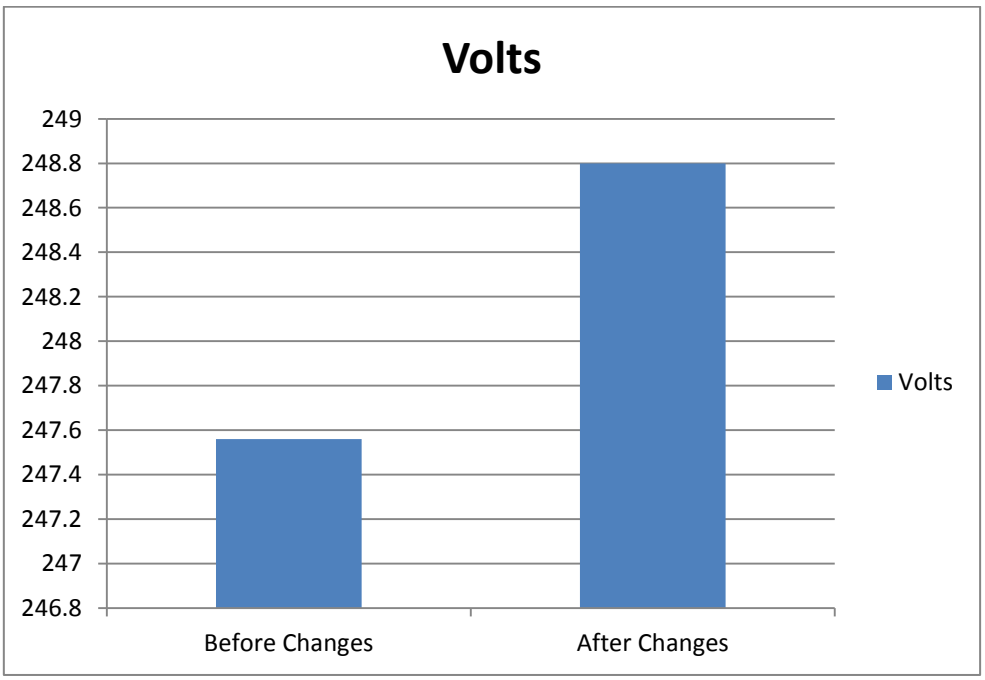
Calculated Results	
Energy Used per Month (kWh)	3
Cost per Week ($)	0.13
Cost per Month ($)	0.57
Cost per Year ($)	6.83

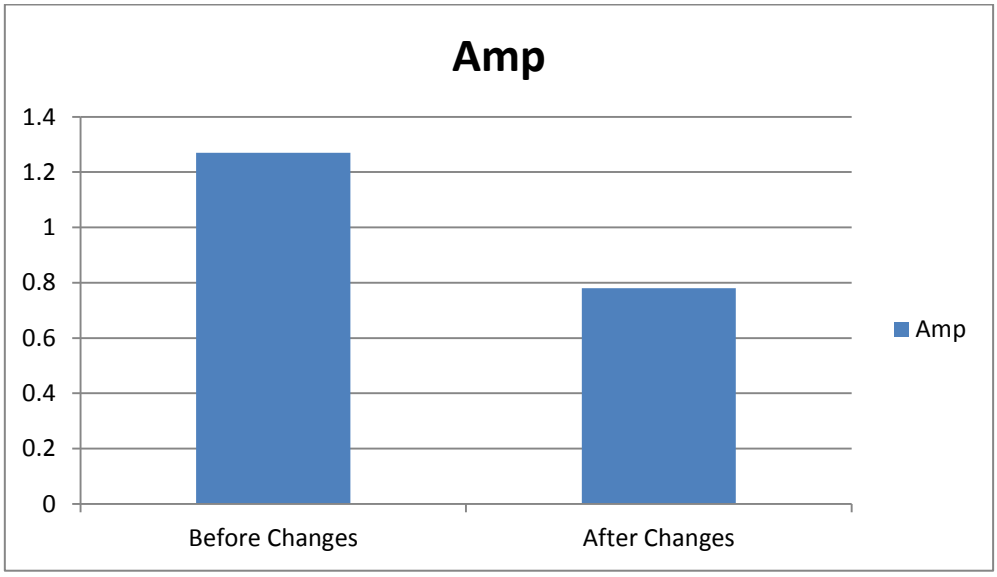
Over the year if you turned your screen off for a total of one hour during the day the yearly cost saving would be $3.20 per bank of four computers per year. Even though this looks like a small saving for four computers, I believe that if this was employed over the whole college this could amount to a significant saving on mass. Within just the D23 room the saving for the year would be approximately $12.80.

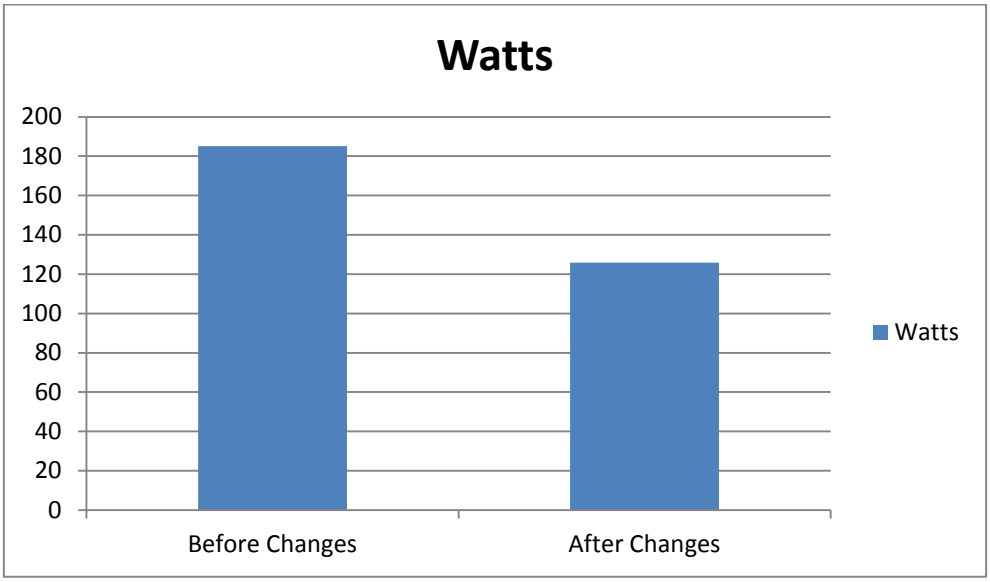
Chart of Results

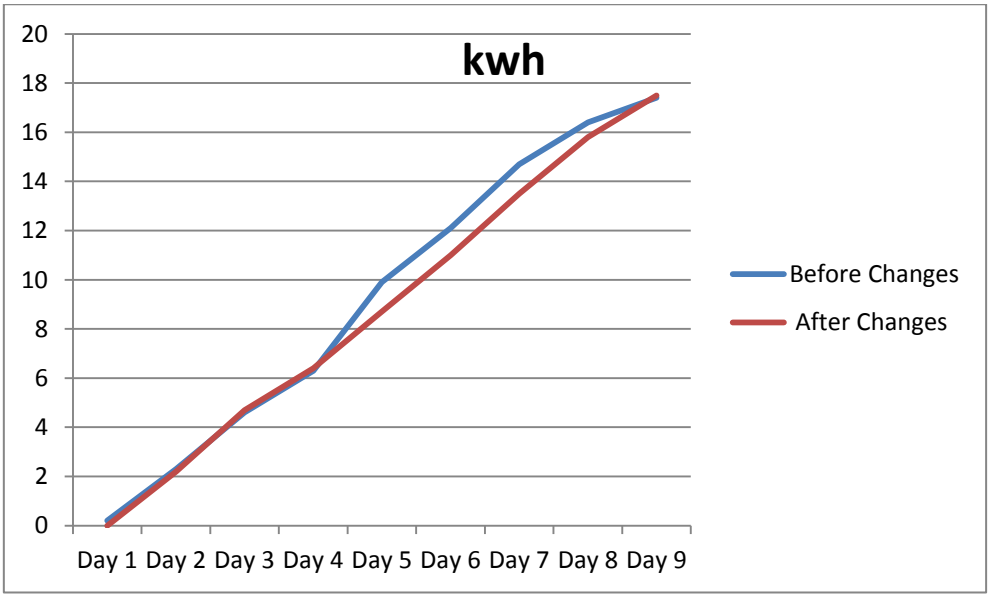
Below are the charts of comparisons for before and after the changes being implemented for following readings:

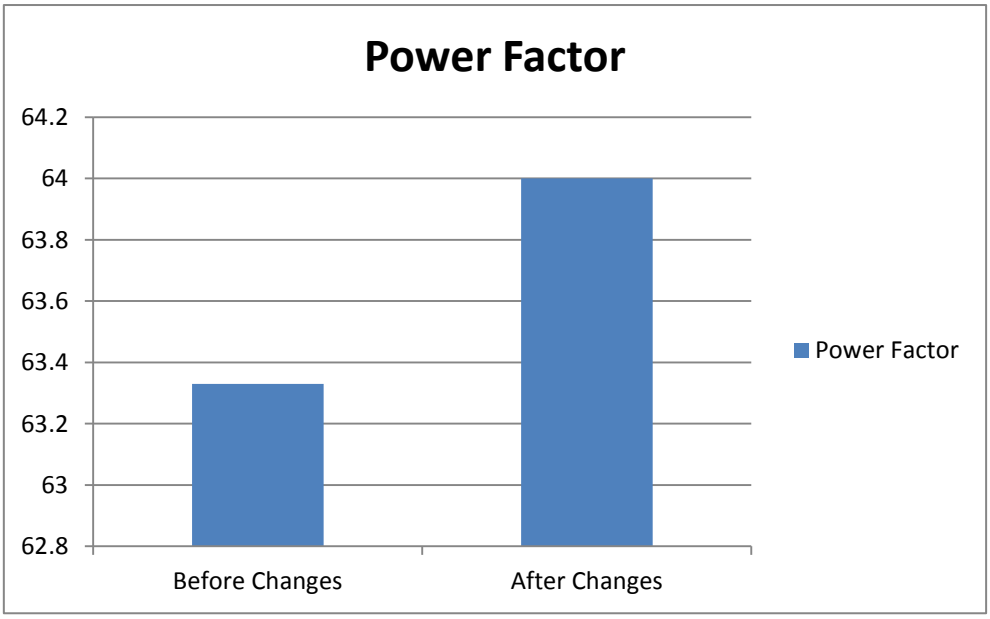
- Volts
- Amps
- Watts
- Kwh
- Power Factor






Watts
200
180
160
140
120
100
80
60
40
20
0
Before Changes
After Changes
Watts


kwh
20
18
16
14
12
10
8
6
4
2
0
Day 1 Day 2 Day 3 Day 4 Day 5 Day 6 Day 7 Day 8 Day 9
Before Changes
After Changes


Power Factor
64.2
64
63.8
63.6
63.4
63.2
63
62.8
Before Changes
After Changes
Power Factor

What could we do better?

There are several ideas that the Institute could look into.

Composting food and garden waste for return back to the gardens. The café, gardeners, staff and students could all contribute to this.

The Institute could also look into having a chicken coop for waste. As in the composting idea, chickens love food scraps and garden clippings and also produce eggs which could be in-turn used in the café or sold to staff and students. The Institute already sells plants from horticulture, provides massage from the massage students and haircuts from hairdressing.

Double glazed windows could be implemented into any new buildings to keep the heat out in Summer and the warmth in during the Winter. Also shutters on windows could be installed to direct sunlight in through Winter to save on heating and block sunlight in Summer to reduce air-conditioning

A skylight could be installed above the first landing in the staircase in D Block. The structure of the building outside allows for this to be implemented. For those who are in attendance at the TAFE in the evening hours, a night light could also be installed in the stair case so that there is only power consumption during that time period instead of the lights that are already installed in the stair case.

The automatic doors could be removed to install regular doors that do not consume energy.

Conclusion

I believe that our results have shown a significant saving to the college if implemented on a large scale. The only other thing we could have changed is if we turned off our computers completely and took readings to see if any energy was being consumed. You could easily assume that if all students turned off their computers during a lunch break it could amount to a substantial saving to the college.

The college has a Sustainability Committee of staff who are dedicated to making a difference for the good of our planets future. Staff and students alike can learn a great deal from the sustainability systems that have been implemented at the college.

References

For anyone who would like to look into how sustainability is promoted in the South West, please visit these links:

Government of Western Australia – Conservation and Sustainability

https://www.wa.gov.au/information-about/environmental-matters/conservation-sustainability

South West Development Commission – Our Environment

http://www.swdc.wa.gov.au/lifestyle/our-environment.aspx

CSIRO – South West Western Australia Sustainable Yields Project

http://www.csiro.au/en/Research/LWF/Areas/Water-resources/Assessing-water-resources/Sustainable-yields/SSWASY

For anyone who would like to read the college Sustainability Policy and Action Plan, please find it attached to this report.