Preliminary Report Energy Audit of the Ministry of Public Works & Utilities Building December 2011



Energy Planning Unit Ministry of Public Works & Utilities 11/12/2011

Back ground

Energy conservation and energy efficiency programs are essential component of the economic and environmental development for Kiribati. The ultimate goal of energy conservation and energy efficiency programs is the elimination of energy wastages and electricity bills.

Where are the areas of wastages? They may not immediately apparent and they may vary from one building to another building or from one location to another location.

The role of management in any organization is of paramount importance for the successful implementation of energy conservation and efficiency programs.

The energy audits of the MPWU headquarter originated from the Acting Energy Project Engineer's sentiments that 'MPWU should demonstrate what it preaches at home first'. This came with the intentional energy audit programs to be included in the 2011 Ministry Operational Plan.

The Energy audit approach taken was to establish a demonstration project that could be used to develop a methodology for application in other government buildings and interested parties.

This paper provides a brief update on the preliminary findings of the audit undertaken at the Ministry of Public Works & Utilities premises in 2011. A full detailed energy audit report will be published and disseminated in the weeks to come following the complete analysis and monitoring of the premises.

<u>Methodology</u>

The Energy Audit was undertaken based on the following activities.

- i. **Consultation** consisted of a series of meeting among the EPU Staff Members and heads of the various departments on the planned energy adit programme where a formal letter was circulated within the Ministry.
- **ii. An analysis of historical data** consisted of the collation of electricity bills from Finance and PUB.
- iii. **The screening survey** Involved a quick walk through the MPWU premises to account for the following:
 - a. Stock take of electrical appliances in the premises
 - b. Interviews with occupants on the hours the appliances are used, left idle or switched off.
 - c. Identify areas of Energy wastages and opportunities for energy conservation and efficiency measures.
- iv. Detailed investigation and analysis involved follow-up analysis on findings at the premises covering some cost saving analysis.

Findings



i. Building Plan of MPWU Head Quarters

ii. An Analysis of Historical Data

Provided in table below is the compiled electricity bill from the period 2008 to July 2011.

Montho	Amount (AUD \$)						
MOITIIS	2008	2009	2010	2011			
January	4,014.27	7,112.70	6,441.40	7,336.00			
February	9,403.10	7,292.60	6,430.20	7,053.20			
March	6,944.70	3,668.00	6,039.60	6,362.30			
April	9,283.40	12,035.80	6,102.60	7,416.50			
Мау	7,868.70	8,130.50	6,603.80	6,204.80			
June	6,944.70	7,882.70	6,776.70	7,773.50			
July	6,456.10	7,016.80	6,365.10	6,517.00			
August	8,945.30	7,528.50	6,245.40	5,790.00			
September	8,865.70	8,136.10	6,412.70				
October	7,201.60	6,475.70	5,720.50				
November	7,577.30	7,623.70	7,259.00				
December	7,670.60	6,266.40	7,336.00				
Total/Year (AUD \$)	91,175.47	89,169.50	77,733.00	54,453.30			
Average/Month (AUD \$)	7,473.25	7,430.80	6,394.20	6,806.66			

iii. Screening survey - Break down of electricity consumption at MPWU Premises.

The quick walk through survey of the premises considered the following conditions to determining the electricity consumption at MPWU.

- MPWU opens from 8am to 4pm, however hours of appliance use averages around 9 and half hours per day
- Audit considers a 22 day month period for appliances that are used during the working week such as computers and 30 day period for appliances used on a 24 hour period such as the refrigerators.

Based on this conditions, the preliminary findings points out the MPWU consumes around 8491kWh or \$5944, in monthly electricity bills. Provided in graphs below are the consumption breakdown scenario at MPWU.

Monthly Electricity breakdown by Appliance





Monthly Electricity Breakdown By programmes and sections

iv. Observations – Areas of wastages

v. Other Observations

- The non air conditioned office space in the premises that uses fans is observed to be of poor ventilation and possible is creating working discomfort for occupants;
- High degree of appliances being switched on for 24 hours follow-up monitoring during non office hours to be undertaken.
- The use of multiple power boards and wiring connections at the premises for proper safety awareness.

Recommendations:

The Audit considers two recommendation approaches of which MPWU could achieve significant savings in Monthly Electricity Bill consumption of up to 11 - 30% in monthly electricity bill.

• No cost Housekeeping Measures – conservation activities

Based off the preliminary audit findings, a significant potential savings could be achieved by the simple practise of proper energy conservative measures. Provided below are the identified opportunities based of the MPWU monthly Electricity Bills



Based on the comparison on the number of hours the appliances in MPWU are used on a daily basis, it is identified that around 11% savings could simply be achieved by simple no cost housekeeping measures.

- Low to medium financial investment measures. The following recommendations are considered for selected opportunities which MPWU could consider.
- 1. <u>Air conditioners(excluding the ICT Air conditioner)</u>

Air conditioners like refrigerators and freezers operate in duty cycles switching on and off their compressors to maintain temperature depending on the thermostat setting. An air conditioner in efficiency in operation is measured off the high duty cycles they operate in. The recommendations provided below will help improve the performance of the air conditioner at the premises.

- The recommended office temperatures are to be maintained above 24°C. Every 1°C cooler than 24°C will increase the air conditioning power bill by 5%.
- Occupants to ensure curtains are fully drawn, especially at the east and west site to reduce the direct entrance of the sun's rays into offices.
- The ministry should encourage every staffs within the building to use air conditions more efficient by means of establishing practice rules.
 - Air condition units to be switched on from 1000hrs in the morning and switch off before leaving the office normally at 1515hrs.
 - Install the control timer for each air condition unit that automatically switch on and off the appliance within the programmed period;
- A 3 months regular maintenance program to the air condition units to be laid.
- Broken windows to be repaired and installation of strips around doors;
- Where required door springs should be installed.
- MPWU to explore smart traditional designs of shading the condensers in the east and west side of the building.
- For future plans MPWU to look into investing into tinting the windows in the east and west side of the building.



- Potential savings of around \$600 dollars alone could be achieved from air conditioners when proper housekeeping measures are followed.
- Current consumption scenario of all AC units in MPWU at an estimated 80% duty cycle taken at 9 hour workday.
- Keeping all the AC units in MPWU to operate within the normal 8 hour working hours could account to a savings of around \$500.

2. <u>Computers</u>

It was during the energy audit when it was discovered that the newly purchased computers were more energy efficient than the old versions – a new DELL LCD 17" inches monitor has an electricity consumption of 1.25 kWh/day while the old CRT 15" inches monitor consumes 3.10kWh/day.

- It is recommended that computer monitors are switched OFF or put to their power save modes at the end of the working day; and
 - Social Committee should be part of the energy efficient program and responsible for punishing those who do not shut down their respective desktops before leaving the office.
- Old CRT monitors are to be replaced with LCD monitors when opportunity avails;

Possible energy and monetary savings are tabulated below from computer monitors:

Hours	kWh	Cost (A\$)/day	kWh/month	Cost/month
8- hours a day	1.2	0.85	36	25.2
24- hours a day	3.6	2.52	108	75.6

There is a potential savings of about A\$50 per month for one computer monitor alone if switched OFF at the end of each working day.

3. ELECTRIC WATER PUMP

The MPWU owns two electric water pump located at the front and back yard, which supply water to the Secretary, Minister and Staffs restrooms including one outlet compound tap.

Tabulated below is the monthly estimated cost for running one water pump.

Hours	kWh	kWh/month	Cost (A\$)/day	Cost/month	#of electric pump	Total Cost/month
4-hours a day	2.48	74.40	1.74	52.08	1	52.08

- It is recommended that better housekeeping practises on reducing water wastages be followed to reduce water pump operating times. A reduction by an hour per day could result in a saving of \$13/month for one water pump.
- Follow-up options will look at the viability for replacing to solar water pumping.

4. CEILING FANS

The MPWU headquarter has a total of 29 ceiling fans that fully operates during office hours. It is often seen that ceiling fans left switched ON during non office hours.

It is recommended that ceiling fans switched OFF during the end of working days or connected to the timer switch for automatic control. There is a potential saving of \$26.88 per ceiling fan/month (\$40.32 - \$13.44) if all ceiling fans turn OFF at the end of the working day. Tabulated below are the associated calculation.

Hours	kW	Hours	kWh/day	kWh/month	Cost (A\$)/day	Total Cost (A\$)/month	
8-hours a day	0.08	8	0.64	19.20	0.45	13.44	
24-hours a day	0.08	24	1.92	57.60	1.34	40.32	

5. Other General no cost Housekeeping Measures

- Last person leaving room to switch off lights.
- Lights to be switched off in empty rooms during lunch breaks
- Energy saver button in photocopiers and printers to be enabled

6. Non air conditioned office space

The following analysis takes a look at some of the opportunities that MPWU could consider for providing better cooling needs t the non air conditioned areas without the need for further AC installations.

Heat load calculation of the area:

Lighting Total BTU/br emitted	5100.00 192761 56
	5400.00
Work equipment	64630.60
40 occupants	24000.00
Floor Area	99030.96



Sized Air conditioner needed – 24,000 BTU (AC 'Simmons SMS24 24000BTU' in board room)

Number of 24,000 BTU Air conditioner needed – 8 units.

Estimated Monthly Electricity bill @ 65% load cycle

EQUIPMENT	Number of	CONSUMPTION	CONSUMPTION	
	Units	per day (kWh)	per month (kWh)	
1 AC 'Simmons SMS24 24000BTU'	8	114.34	2515.39	

MPWU will be looking at an additional monthly electricity consumption load of around 2515.39 kWh. This taken at the current tariff will mean an additional monthly electricity bill of \$1760.77 or additional annual electricity bill cost of \$21, 129. 29.

The following analysis for Air condition installation excludes the associated installation and retrofitting costs.

Recommended option to Explore:

As an initiative for Staff, MPWU could look into investing into other cheaper options of utilising natural cooling methods and at the same time reduce further their Electricity consumption. Tabulated on the next page are the associated recommendations for consideration.

Action	Benefits	Associated capital costs	Additional Monthly Electricty cost
Installation of additional fans - wall and stand fans	more cooling confort for occupants	Procurement cost for 15 additional fans	\$184.80
Installation of roof mounted wind driven exhaust fans	improve removal of heat in room	Procurement cost for 10 exhaust fan	none - possible impact on reduced fan use.
installation of heat reflecting aluminium sheet in ceiling	improve prevention of heat entering building from the roof	Procurement cost for relecting sheets	none - possible impact on reduced fan use.
Painting of roof to brighter colours	reflection of heat from roof	Procurement of Paint	none - possible impact on reduced fan use.
Shifting of printers and photocopiers to air conditioner room - smarter printing control	reduction in heat load contribution from Printers and copiers	procument of additional wiring and associated it service	none - possible impact on reduced fan use.
instalation of LED Lights	reduced heat load contribution from the 4ft lighting	Procurement cost for 27 4ft LED tube light	reduction in Monthly Electrcity Consumption by \$77.81

Ongoing and Follow-up Activities:

Listed are the remaining activities that the EPU Audit team will be evaluating as part of the detailed analysis and investigation phase.

- Daily monitoring of the Buildings energy consumption during working and non working hours;
- Revised heat load calculation and verification of AC unit installed in the IT computer room;
- Opportunities for inclusions of RETs such as solar water Pumps
- Establishment of an energy management team to oversee the effective implementation of the audit report action plan.

<u>Annex</u>

LOCATION	EQUIPMENT		RATING	5	Hours in Idle		LOAD RATINGS	1	HOURS OF USE	CONSUMPTION	CONSUMPTION
ļ	13 Lights	Amps	Unit Wattage	Wattage	mode/day	0.17	Unit Wattage 45.00	585.00	(loaded)/day 10.00	per day (kWh) 5.85	per month (kWh) 128.70
1	9 Ceiling Fan					0.33	80.00	720.00	10.00	7.20	158.40
<u>c</u>	11 LCD Computer 1 Printer 'Canon MP145'		40.00	440.00 13.00	23.83	1.50	150.00 264.00	1650.00 264.00	8.00 0.17	13.64 0.35	300.08 10.62
ē	1 Printer 'Brother HL-2700CN'	0.10	24.00	24.00	23.80	2.80	670.00	670.00	0.20	0.71	21.16
F Technical	1 Printer 'Samsung ML-1710' 1 Printer 'HP Q6655A'	0.05	10.00	10.00	23.75	2.00	280.00 48.00	280.00 48.00	0.25	0.31	10.34
5	8 APC 'Back-UPS 650'	0.02	5.00	40.00	23.92	1.67	400.00	3200.00	0.08	1.22	36.70
F.	1 Electric Kettle 1 AC 'LG H5-C1264DA2'	0.21	50.00	60.00	1.80	5.30	1150.00	1150.00	4.00 7.20	8.39	66.00 184.54
ļ.	1 AC 'Mitsubishi Daiya SRC50CNA'	0.21	50.00	60.00	1.80	5.30	1150.00	1150.00	7.20	8.39	184.54
	1 AC 'Samsung UST12WHWE' 1 AC 'Simmons SMS12'	0.21	50.00	60.00 75.00	1.80	6.30 7.30	1400.00 1560.00	1400.00 1560.00	7.20	10.19	224.14 250.07
]	6 Lights					0.17	45.00	270.00	10.00	2.70	59.40
	3 Ceiling Fans 2 CRT Computer		70.00	140.00	1.00	0.33	80.00 270.00	240.00 540.00	10.00	2.40	52.80 133.80
	3 LCD Computer		40.00	120.00	1.00		150.00	450.00	8.00	3./2	111.60
Civil	1 Printer 'HP Deskjet F2120'	0.38	12.00	12.00	23.83	0.88	20.00	20.00	0.17	0.29	8.68 53.25
LOCATION	1 Laser Printer 'Samsung ML-1740'	0.04	10.00	10.00	23.75	1.17	250.00	250.00	0.25	0.30	9.00
	1 AC 'LG H5-C1264DA2'	0.21	50.00	60.00	1.80	5.30	1150.00	1150.00	7.20	8.39	184.54
	1 Lap Тор	0.61	15.00	15.00	1.00	3.42	80.00	80.00	8.00	0.66	14.41
	7 Lights 4 Ceiling Fan					0.17	45.00	315.00	10.00	3.15	69.30 70.40
	2 CRT Computer		70.00	140.00	1.00	1.00	270.00	540.00	8.00	4.46	98.12
EPU	3 LCD Computer		40.00	120.00	1.00	1.50	150.00	450.00	8.00	3.72 0.15	111.60 4.50
cio	2 Printer 'Brother HL-2040'	0.29	70.00	140.00	7.00	1.90	450.00	900.00	0.25	1.21	36.15
	1 Printer 'HP Deskjet'	0.04	7.00	7.00	7.00	0.50	20.00	20.00	0.05	0.05	1.50
	1 AC 'Simmons SMS12'	0.21	50.00	50.00	1.80	4.30	1560.00	1560.00	7.20	pri day (kwn) per day 5.65 12 7.20 15 13.3.4 35 0.35 11 0.71 22 0.34 11 0.34 12 3.00 6 8.39 18 8.39 18 8.39 18 8.39 18 8.39 18 8.39 18 8.39 18 6.44 13 0.46 1 3.15 6 3.20 77 4.46 13 3.15 6 3.20 77 4.46 9 3.72 11 0.15 4 0.15 4 0.15 4 1.132 22 3.60 7 3.60 7 3.60 7 3.61 6 0.62<	249.08
	8 Lights					0.17	45.00	360.00	10.00	3.60	79.20
	3 Celling Fans 7 LCD Computers		40.00	280.00	1.00	2.00	150.00	1050.00	8.00	2 Pr USPCONSUMPTION20005.850007.200007.200007.200007.200010.311260.311260.340003.001270.351280.341003.001208.391208.391201.370002.401003.001208.391201.370202.401003.601251.781260.301270.501280.301291.511206.141206.141206.431210.501221.781251.211260.311206.431206.431210.551221.121251.211260.431270.551281.601290.641206.431252.441260.431270.541281.811291.601200.541200.641210.551221.441231.661240.061252.481260.251271.661281.16129 <td< td=""><td>190.96</td></td<>	190.96
Water	1 Laser Printer 'Samsung ML-1710P'	0.04	10.00	15.00	23.75	1.17	280.00	280.00	0.25	0.43	12.79
	2 Printers' Brother HL-2040' 4 APC 'Buck-UPS 650'	0.29	5.00	20.00	23.75	1.90	400.00	1600.00	0.25	3.55 0.61	106.50
	1 AC 'FUJITSU AKT9ABRSW'	0.21	50.00	50.00	1.80	4.00	950.00	950.00	7.20	y per day (Wh) 5.65 7.20 13.64 0.35 0.71 0.34 0.35 0.34 122 3.00 8.39 6.39 10.13 2.70 2.40 4.46 3.72 0.29 1.78 0.30 6.39 6.39 0.30 8.39 6.14 0.36 3.20 4.46 3.15 3.20 4.46 3.15 3.20 4.46 3.15 3.60 2.41 0.05 6.43 11.32 3.60 2.46 0.43 3.55 0.61 2.70 4.46 3.72 <t< td=""><td>152.46</td></t<>	152.46
	1 lable Fan 6 Lights					0.19	45.00	45.00 270.00	10.00	2.70	59.40
	2 Ceiling Fans					0.33	80.00	160.00	10.00	1.60	35.20
	11 CD Computer 2 CBT Computer		40.00	40.00	1.00	2.00	150.00 270.00	150.00 540.00	8.00 7.00	1.24	27.28
Account	3 Printer 'Brother HL-2040'	0.29	30.00	90.00	23.75	1.90	450.00	1350.00	0.25	2.48	74.25
riccount	1 APC 'Back-UP5 650'	0.04	5.00	5.00	23.92	1.67	400.00	400.00	0.08	0.15	4.59
	1 AC 'TECO LA0918Y'	0.21	50.00	50.00	1.80	4.30	940.00	940.00	7.20	6.86	150.88
	1 AC 'Kelvinator EWH18CRA'	0.21	50.00	50.00	1.80	4.30	968.00	968.00	7.20	25 2,48 7 0.68 0.15	155.31
	6 Lights		15.00	15.00	1.00	0.17	45.00	270.00	10.00	2.70	59.40
	5 Ceiling Fans		40.00		100	0.33	80.00	400.00	10.00	4.00	88.00
Desister	2 Printer 'Brother HL-2040'	0.29	20.00	40.00	23.75	1.90	450.00	900.00	0.25	1.18	35.25
Registry	1 APC 'Back-UPS 650'	0.00	5.00	5.00	23.92	1.67	400.00	400.00	0.08	0.15	4.59
Registry	1 KONICA MINOLTA 350/250/200	0.08	30.00	30.00	23.75	5.00	1400.00	1400.00	0.25	1.06	31.88
	1 Stand Fan					0.33	45.00	45.00	9.00	0.41	8.91
	2 Ceiling Fans					0.33	80.00	160.00	10.00	1.60	35.20
Trainees	1 LCD Computer	0.00	40.00	40.00	1.00	2.00	150.00	150.00	8.00	1.24	27.28
	1 Printer 'Canon iP1800' 1 APC 'Back-UPS 650'	0.00	5.00	5.00	23.90	2.00	400.00	400.00	0.10	0.02	4.59
	8 Lights 'Energy saver'					0.03	7.00	56.00	10.00	0.56	12.32
Outside Compound	2 Lights 2 Water Pump 'DAVEY 350 P8C'					2.80	40.00 620.00	80.00 1240.00	24.00	1.92	57.60
	8 Lights					0.17	45.00	320.00	10.00	3.20	70.40
	1 Water Dispenser 'ALP AL-501,503 1 AC 'Simmons SMS24 24000BTU'	0.13	30.00 80.00	30.00	20.40	2.31 9.60	2400.00	2400.00	3.60	2.61	78.30 383.33
Registry Trainces Outside Compound Board Room Project Officer	1 TSKL ExChange Phone System	0.03	7.00	7.00	22.00	6.00	50.00	50.00	2.00	0.25	7.62
	1 Overhead Projector 'RITMO A580 1 Overhead Screen	OVA'				3.00	380.00	380.00	2.50	5.65 17.20 13.64 3.00 0.35 0.35 0.31 0.34 1.22 3.00 8.39 1.137 2.30 2.40 3.10 2.40 3.12 0.25 0.30 2.40 3.12 0.25 0.30 3.14 0.25 0.30 6.14 0.25 0.30 3.15 3.30 4.46 3.15 3.20 6.43 3.25 1.21 0.05 1.22 2.43 3.40 3.40 3.40 3.40 3.40 3.40 3.40 3.40 3.40 3.40 3.40 3.40 3.44 3.40 3.44 3.40 3.40 3.40 3.40 3.40 3.41 3.40 3.44 3.40 3.44	20.90
	1 Network router switch					2.50	25.00	25.00	24.00	0.60	18.00
	2 Lights 1 LCD Computer		40.00	40.00	1.00	0.17	45.00 150.00	90.00	10.00	0.90	19.80 27.28
Project Officer	1 Printer 'Canon iP1800'		0.70	0.70	7.70	2.00	15.00	15.00	0.30	per day (Wh) per month 5.55 128 7.20 158 13.64 300 0.35 100 0.371 21 0.311 01 0.32 300 6.339 184 8.39 184 8.39 184 8.39 184 8.39 184 8.39 184 1.137 250 2.40 522 4.44 133 0.30 90 8.39 184 6.14 155 0.56 144 3.15 66 0.56 144 0.55 122 6.43 141 1.132 246 3.55 106 0.64 160 3.55 106 0.61 160 3.55 106 0.64 160 3.50 1	0.30
	1 AC 'SIMMONS'	0.21	70.00	70.00	1.80	6.50 0.17	1560.00	1560.00	7.20	11.36	249.88
	2 LCD Computer		40.00	80.00	1.00	2.00	150.00	300.00	8.00	071 2116 0.31 0.23 0.34 10.34 1.22 36.70 3.30 66.60 8.39 184.54 10.19 224.14 11.37 226.07 2.70 59.40 2.40 52.80 3.72 111.60 0.29 8.66 1.78 53.25 0.30 9.00 8.39 184.54 0.15 6.53 0.30 9.00 8.39 184.54 0.15 6.63 3.15 60.30 3.20 70.40 4.46 98.12 3.72 111.60 0.15 4.59 1.21 3.6.15 0.05 1.50 0.43 12.27 3.55 106.50 0.64 10.35 1.32 2400 3.54 10.55 0.53 10.55 </td	
TT Officer	2 APC 'Back-UPS 650'	0.21	5.00	10.00	23.92	1.67	400.00	800.00	0.08	0.31	0.71 21.16 0.31 0.34 0.34 10.34 1.22 36.70 3.00 06.600 8.39 1184.54 8.39 1184.54 1.137 256.07 2.70 55.40 2.71 155.40 2.72 155.40 2.73 55.40 2.74 11.160 0.29 8.68 1.78 53.25 0.30 0.00 8.39 1144.54 4.44 113.50 3.50 0.00 8.39 164.54 6.13 1141.57 3.20 70.40 4.46 98.12 3.72 111.60 0.15 4.59 1.21 36.15 0.66 150 0.61 15.5 0.62 16.55 0.63 152.66 1.132 240.65 3.55 106.5
	1 Computer Server 'DELL E198WFPf	0.21	50.00	50.00	7.20	0.83	250.00	250.00	24.00	6.00	180.00
	2 Lights					0.17	45.00	90.00	10.00	0.90	19.80
	1 LCD Computer		40.00	40.00	1.00	2.00	150.00	150.00	8.00	1.24	27.28
DA Daam	1 Printer 'Brother MFC-9420CN'	0.65	25.00	25.00	23.50	0.83	600.00	600.00	0.50	0.89	26.63
PAROOM	1 APC 'Back-UPS 650'		4.50 5.00	5.00	23.20	1.67	400.00	400.00	0.80	0.13	4.59
	1 AC 'Simmons SM59-5(9000BTU)'	0.21	50.00	50.00	1.80	4.50	1020.00	1020.00	7.20	7.43	163.55
	1 Paper Cutter '685' 1 Fridae 'SAGI RD-28WR4HB'		20.00	20.00	23.85	2.00	400.00	400.00	0.15 4.32	2.12	63.65
	2 Lights					0.17	45.00	90.00	10.00	0.90	19.80
Assitant Sec Room	1 LCD Computer 1 Printer 'HP Deskiet C8413A'	0.05	40.00	40.00	1.00 23.70	2.00	150.00 225.00	150.00 225.00	8.00 0.30	1.24 0.35	27.28
	1 AC 'LG H5-C1264DA2'	0.21	50.00	50.00	1.80	5.30	1150.00	1150.00	7.20	8.37	184.14
	2 Lights 1 Ceiling Ean					0.17	45.00 80.00	90.00 80.00	10.00	0.90	19.80
Deputy Sec Room	1 LCD Computer		40.00	40.00	1.00	2.00	150.00	150.00	8.00	1.24	27.28
	1 Printer 'HP Deskjet A008474 1 APC 'Back-UP5 650'		10.00 5.00	10.00	23.75	0.21	50.00 400.00	50.00 400.00	0.25	0.25	7.50 4.59
	1 AC 'FUJITSU R410A'	0.21	50.00	50.00	1.80	3.70	880.00	880.00	7.20	6.43	141.37
	3 Lights 1 Ceiling Fan					0.17	45.00	135.00	10.00	1.35	29.70
	1 LCD Computer		40.00	40.00	1.00	1.50	150.00	150.00	8.00	1.24	27.28
Secretary Room	1 Printer 'Hp Deskjet 3745'		5.50	5.50	23.75	0.10	25.00	25.00	0.25	0.14	4.11
	1 CE Back-UPS 1 Electric Kettle 'ACCURUS MA-326	B(AG)'	5.00	5.00	23.92	1.70 3.13	400.00 780.00	400.00 780.00	0.08	0.15 0.20	4.59 4.29
	1 AC 'SHARP'	0.21	50.00	50.00	1.80	8.96	2150.00	2150.00	7.20	15.57	342.54
EPU EPU Account Account Board Room Project Officer TT Officer TT Officer Deputy Sec Room Secretary Room Minister Room	3 Lights 1 LCD Computer		40.00	40.00	1.00	0.17	45.00 150.00	135.00 150.00	10.00 8,00	1.35 1.24	29.70 27.28
Minister Poom	1 Printer 'Brother HL-2040'	0.29	70.00	70.00	23.75	1.90	450.00	450.00	0.25	1.78	53.25
Managed Room	1 Electric Kettle 'TP-50A(FAM)'	0.21	50.00	50.00	1.80	3.50	800.00	800.00	0.25	0.20	4.40 461 34
	1 Fridge 'Kelvingtor CB220A-R'	0.08	10.00	10.00	19.68	1.40	360.00	360.00	4.32	1.75	52.56